Currently there is an existing cellular tower on the proposed site which will need to be relocated if development goes ahead as per the proposed layout.

b) Requirements

The development will require telecommunications infrastructure and potentially a new telephone exchange, which will be confirmed should the project go ahead. In addition, the existing cellular tower will need to be relocated onto Platform A in the far north-eastern corner of the property.

2.5 Consideration of Alternatives

2.5.1 Description of Alternatives

The EIA Regulations (2010) guideline document stipulates that the environmental investigation needs to consider feasible alternatives for the proposed development. The developer should be encouraged to consider alternatives that would meet the objective of the original proposal and which could have an acceptable impact on the environment. The role of alternatives in the EIA process is therefore to find the most effective way of meeting the need and purpose of the proposal, either through enhancing the environmental benefits of the proposed activity, and/or through reducing or avoiding potentially significant negative impacts.

2.5.2 Potential Land Use Alternatives Assessment

A detailed assessment of land use alternatives has been undertaken, considering the following context of the site:

- JT Ross owns the property.
- The property is zoned as extractive industry.
- The property is earmarked as industrial land use in the SDF and IDP.
- The property is surrounded on three sides by existing industrial development.

The potential land use alternatives assessed are as follows:

Alternative 1 – Developer's Preferred Option

The applicant desires to develop a light industrial/shop (General Business 2) land use as described in Section 2.3.

Alternative 2 - Low Cost/ Middle Income Housing Development

The eThekwini Municipality has earmarked the site as one of many possible sites they are investigating for a low cost housing development as an alternative land use to extractive

industry. However, given the steepness of the site and nature of surrounding industry, housing is not seen as a suitable use for the site.

Alternative 3 - Mixed Land Use Development (Residential and Business)

The mixed land use option would include residential and business units built on the property. Within the mixed-use development framework there is scope for changes in densities and proportional allocations of the different land uses depending on the findings of the numerous specialist studies. For this particular site, because of the dire shortage of industrial land, and friction between large industrial trucks and residential traffic and pedestrians, the residential component may be mitigated or limited.

Alternative 4 - Mixed Light Industrial/Office Park

The Mixed Light Industrial/Office Park alternative has been put forward by the specialist team which compiled the Social Impact Assessment (Appendix E4), as a result of discussions with community stakeholders and focus groups. This option proposes that Office Park be built on eastern side of the site adjacent to the residential suburb of Glenhills; with Light Industrial warehouses on the western side of the site. The Office Park would act as a buffer between the industrial and residential zone of the northern corridor.

Alternative 5 – No-Go Option

Maintaining the *status quo* would leave the area undeveloped and the land would continue to be mined and/or used for sugarcane farming. Corobrik have a phased mining plan which will continue until all the areas have been fully mined. Thereafter an alternative land use to mining will have to take place because such a strategically located site cannot remain under its present sugar cane production once the clay has been extracted.

Please refer to Table 2-1 for a comparative assessment of land use alternatives.

Table 2-1: Comparative Assessment of Potential Land Use Alternatives

Land Use Alternative	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
Alternative 1: Developer's Preferred Option – General Business 2 (Light Industrial and Shop)	• Platform area maximised taking into account the following constraints only: o Preservation of the upper two thirds of the central/main watercourse only (limited buffer zone). o Preservation of a 100 m buffer zone to the Glenhills suburb. o Preservation of a 40 m buffer to the D'MOSS area. o Exclusion of unstable geological areas.	Environmental: • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. Social: • Creation of an open space along the 100 m residential buffer. • Upgrading and securing of site. • Enhancement of community vitality. • Upgrading and securing of site. Economic: • Acceptable platform area and thus economic viability for the developer. • Maximise creation of temporary and permanent employment and income. • Increase in local business opportunities. • Increase in rates base and income to the local authority.	Environmental: • Minimal to limited watercourse buffer. • Infilling of lower reaches of central watercourse. • Infilling of watercourses at two road crossings. • Platform embankment encroachment along central watercourse. • Loss of tributary watercourses. • Loss of some marginal faunal habitats along central watercourse. Social: • Visual and aesthetic intrusion. • Construction and industrial noise. • Erosion of residential sense of place. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Potential decline in property values. • Air pollution and dust. Economic: • None for developer. • Loss of a relatively small area of sugarcane farming.	• The option is technically and financially feasible while taking into account environmental and social constraints.
Alternative 2: Low to middle income housing	• Residential development maximised taking into account the following constraints only:	Environmental: • Maintenance of wetlands and a 30 m buffer zone. • Minimal wetland infill and	Environmental: • Typical watercourse impacts associated with low to middle income residential areas e.g.	• The topography does not lend itself to residential development without

Land Use Alternative	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
development	○ Preservation of all watercourses and the entire a 30 m buffer. ○ Preservation of a 100 m buffer zone to the Glenhills suburb. ○ Preservation of a 40 m buffer to the D'MOSS area. ○ Exclusion of unstable geological areas.	encroachment besides road crossings. • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. • Maintenance of marginal faunal habitats along central watercourse. Social: • Housing creation in close proximity to job opportunities. • Creation of a green area along the 100 m residential buffer. Economic: • Limited economic value for developer.	dumping, informal earthworks etc. • Likely no financial and human resources to manage public open spaces along watercourses and 100 m buffer zone. Social: • Visual and aesthetic intrusion. • Noise pollution. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime. • Potential decline in property values. Economic: • No economic return for developer. • Reduction in income and employment opportunities relative to light-industrial land use. • Loss of a relatively small area of sugarcane farming.	considerable investment in infrastructure. • Such an option is likely to be met with fierce social opposition from neighbouring suburbs. • Potential Income from a residential development makes such a scheme financially viable.
Alternative 3: Mixed-Use Development (Residential and Business)	• Mixed-use development maximised taking into account the following constraints only: ○ Preservation of central watercourse and the entire a 30 m buffer. ○ Preservation of a 100 m buffer zone to the Glenhills suburb. ○ Preservation of a 40 m buffer to the D'MOSS area.	Environmental: • Maintenance of wetlands and a 30 m buffer zone. • Minimal wetland infill and encroachment besides road crossings. • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer.	Environmental: • Typical watercourse impacts associated with low to middle income residential areas e.g. dumping, informal earthworks etc. • Likely no financial and human resources to manage public open spaces along watercourses and 100 m buffer zone. Social: • Visual and aesthetic intrusion.	• The topography does not lend itself to residential development without considerable investment in infrastructure. • The market for residential units in such a mixed-use setting and location is unknown and may not be feasible.

Land Use Alternative	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
	○ Exclusion of unstable geological areas.	• Maintenance of marginal faunal habitats along central watercourse. Social: • Housing could act as a buffer to industrial development. • Housing creation in close proximity to job opportunities. • Creation of a green area along the 100m residential buffer. • Upgrading and securing of site. Economic: • Limited economic value for developer.	• Noise pollution. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime. • Potential decline in property values. Economic: • No economic return for developer. • Medium income housing unaffordable to large segment of the market. • Reduction in income and employment opportunities relative to light-industrial land use. • Loss of industrial land development opportunities. • Loss of a relatively small area of sugarcane farming.	• If low cost housing is proposed, such an option is likely to be met with fierce social opposition from neighbouring suburbs. • Not financially viable for the developer.
Alternative 4: Mixed Light Industry / Office Park (Recommended for assessment in Social Impact Assessment)	• Platform area maximised taking into account the following constraints only: ○ Preservation of the majority of central/main watercourse only (limited buffer zone). ○ Preservation of a 100 m buffer zone to the Glenhills suburb. ○ Location of the Office Park component adjacent to the Glenhills residential area as a buffer from the Light Industry area. ○ Preservation of a 40 m	Environmental: • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. Social: • Office Park would act as a buffer to industrial development and lower social impacts (i.e. sense	Environmental: • Minimal to limited watercourse buffer. • Infilling of lower reaches of central watercourse. • Infilling of watercourses at two road crossings. • Platform embankment encroachment along central watercourse. • Loss of tributary watercourses. • Loss of some marginal faunal habitats along central watercourse. Social: • Construction and industrial	• There are significant office vacancies to the North of Durban (Riverhorse Valley and Umhlanga Ridge) leading to downward pressure on achievable office rentals. This combined with the existing surrounding industrial developments significantly increases the risks associated with office development. This is exacerbated as the

Land Use Alternative	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
	buffer to the D'MOSS area. o Exclusion of unstable geological areas.	of place, quality of life, devaluation of properties; industrialisation of residential zones). • Less heavy vehicle traffic than in developer's preferred option. • Upgrading and securing of site. • Creation of a green area along the 100 m residential buffer. Economic: • Limited economic value for developer.	noise. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Air pollution and dust. Economic: • Loss of industrial land development opportunities. • Risk associated with office development in terms of achievable rentals. • Loss of a relatively small area of sugarcane farm.	Estate is in a far less desirable office location compared to existing investment nodes.
Alternative 5: No-Go Option (Status Quo)	• In the medium term - Continuation of cane farming and clay mining. • In the long term - Will be developed for light industrial or low to middle income residential development.	Environmental: • Watercourses remain. • Marginal ecological linkages remain. Social: • Site continues to buffer Glenhills from surrounding industrial land uses. Economic: • None to the current owner/developer or surrounding area. • Loss of potential rates income.	Environmental: • Status quo will remain and the site will remain in a degraded state and likely further degrade over time due to continuation of mining operations and illegal dumping. • Loss of opportunities to rehabilitate as an ecological D'MOSS corridor. Social: • Site continues to be a potential hideout/refuge for local criminals. • Loss of opportunities to establish a green space. Economic: • Financial losses to the developer. • Loss of income, employment opportunities.	Not financially viable for the developer.

Ultimately, the only financially viable land use alternative to the developer's preferred option is low cost housing development. However, such a project is likely to be met with fierce social opposition from the adjacent residential suburbs and is not the best proposal in terms of the current zoning and strategic planning for the site. Thus, Alternatives 2 – 5 will not be evaluated further in this report, and will not be submitted for environmental authorisation. The no-go option, however, will be considered as required in the EIA Regulations (2010).

2.5.3 Layout Alternatives

The assessment of layout alternatives has considered four potential layout options, as indicated in Figures 2-2 to 2-5. The primary purpose of this assessment was to understand both the developer's layout constraints and environmental constraints, and determine the most feasible layout options.

There are a number of factors that determine the viability of a project of this nature, all of which are interrelated and contribute to achieving an acceptable financial return and environmentally sustainable development:

1. The location of the business estate.
2. The total platform area that can be achieved.
3. The extent of new infrastructure in and around the business estate.
4. The Floor Area Ratio (FAR) applicable to the platform area which determines the total building area and/or rentable area achievable.
5. Environmental constraints.
6. The developments cost related to all of the above.

In determining the financial viability of the project a developer needs to achieve a 'mix' of points 1-6 above to achieve a minimum acceptable return, not only for the developer but also for the financial institution funding the project. If minimum returns are not achieved the perceived risk of the project is higher resulting in refusal of development loans or higher interest rates making the project unviable. Each of the alternatives assessed in this section has taken into consideration the following requirements:

- Preservation of a 100 m buffer zone to the Glenhills suburb.
- Preservation of a 40 m buffer to the D'MOSS area.
- Exclusion of unstable geological areas.
- Access points off North Coast Road only.

The following alternatives have been investigated:

- **Option 1: Worst Case Environmental Option**
  - This option results in maximum financial returns as it maximizes use of the available site area. This option includes infilling of all watercourses on site.
- **Option 2: Developer's preferred trade-off option**
  - This option includes preservation of the upper two thirds of the central watercourse (8.9 m average buffer, ranging from 0 to 40 m) while maximizing the developable area.
- **Option 3: Environmental/Developer trade-off option**
  - This option includes preservation of the upper two thirds of the central watercourse (12.1 m average buffer, ranging from 0 to 40 m) with a 30 m buffer from the identified marsh area in the upper reaches of the watercourse (north-eastern corner of the site adjacent to the D'MOSS area).
- **Option 4: Best Case Environmental Option**
  - This option includes preservation of the upper two thirds of the central watercourse with a 10 m minimum buffer, and a 30 m buffer from the identified marsh area in the upper reaches of the watercourse (north-eastern corner of the site adjacent to the D'MOSS area).

It must be noted that all four options include the filling of the lower third of the watercourse as it has been extensively damaged due to current mining activities and has been found to be of little environmental value. If the lower third is not filled, the loss of platform area and increase in spoil material would be greater than Option 4, i.e. financially unfeasible.

The determining factors between the four options are:

1. The achievable income from saleable platform area which reduces from Option 1 to Option 4 as the watercourse buffer zones are increased.
2. The additional cost of carting material off site which increases from Option 1 to Option 4 as a result of reduced platform sizes.
3. Watercourse and wetland buffers, which reduce the developable area as the buffers increase.

Please refer to Figures 2-2 to 2-5 for layout maps of the above alternatives, and to Table 2-2 for the assessment of layout alternatives.

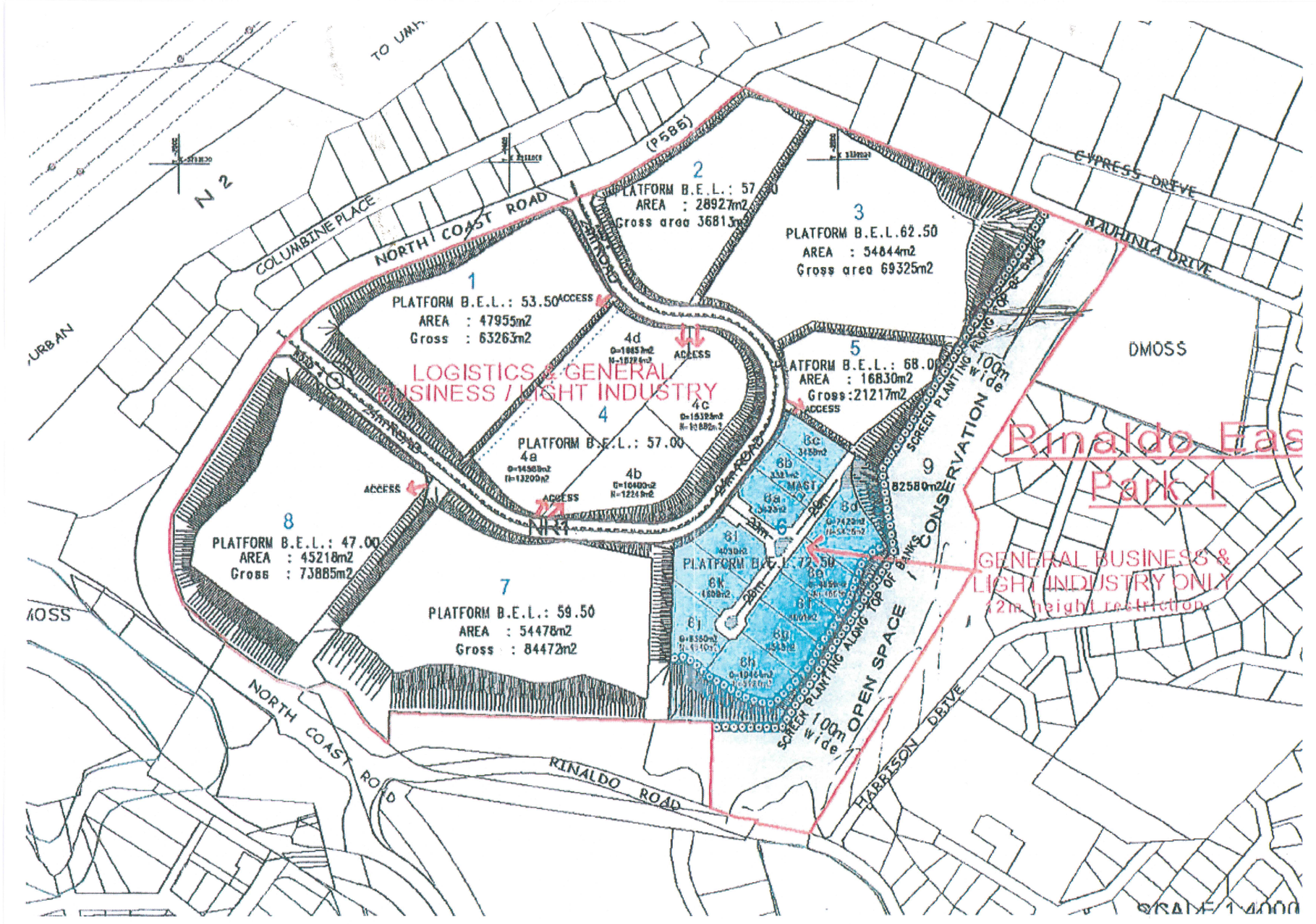

Figure 2-2: Layout Option 1 - Worst Case Environmental Option

Figure 2-3: Layout Option 2 - Developer's preferred trade-off option

Figure 2-4: Layout Option 3 - Environmental / Developer trade-off option

Figure 2-5: Layout Option 4 – Best Case Environmental Option

Table 2-2: Comparative Assessment of Layout Alternatives

Alternative Options	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
Option 1: Worst Case Environmental Option Achievable Platform Area: 34.4 ha	This option results in maximum financial returns as it maximizes use of the available site area. This option includes infilling of all watercourses on site. Platform area maximised taking into account the following constraints only: • Preservation of a 100 m buffer zone to the Glenhills suburb. • Preservation of a 40 m buffer to the D'MOSS area. • Exclusion of geologically unstable areas.	Environmental: • Rehabilitation and establishment of an ecological corridor along the 100 m residential buffer. • Environmental impact of carting large quantities of earth will be reduced. Social: • Creation of an open space conservation area along the 100 m residential buffer. Economic: • Maximise platform area and reduces earthworks costs thus increasing economic value for the developer. • Lowest development cost as the requirement to cart off excess earth will be reduced. • Maximise temporary and permanent employment and income.	Environmental: • Infilling and loss of all watercourses onsite. • Alteration of hydrological flow and drainage. • Loss of all marginal faunal habitats along central watercourse. Social: • Visual and aesthetic intrusion. • Construction and industrial noise. • Erosion of residential sense of place. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Potential decline in property values. • Air pollution and dust. Economic: • Cost of attenuation tanks rather than making use of the natural watercourse to attenuate stormwater. • Loss of a relatively small area of sugarcane farming.	Although Option 1 does make provision for a green buffer zone between the development and the adjacent residential area, it does not provide for the existing watercourse and therefore does not fit the JT Ross philosophy of sustainable development. This option also creates potential water management issues in terms of the alteration of drainage systems on site. **Therefore, Option 1 is not viable.**
Option 2: Developer's preferred trade-off option Achievable Platform Area: 31.7 ha	Platform area maximised taking into account the following constraints: • Preservation of the majority of upper two thirds of the central watercourse (8.9 m average buffer). • Preservation of a 100 m	Environmental: • Rehabilitation and establishment of an ecological corridor along the 100 m residential buffer. • Enhancement of central watercourse for stormwater attenuation and filtration.	Environmental: • Minimal to limited watercourse buffer. • Infilling of lower reaches of central watercourse. • Infilling of watercourses at two road crossings (creation of earthen embankments).	The option is technically and financially feasible while taking into account environmental and social constraints.

Alternative Options	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
% Area Lost: 7.7% Additional spoil material carted off site: 55 000 m^3	buffer zone to the Glenhills suburb. • Preservation of a 40 m buffer to the D'MOSS area. • Exclusion of geologically unstable areas.	<u>Social:</u> • Creation of an open space conservation area along the 100m residential buffer. <u>Economic:</u> • Acceptable platform area and thus economic value for developer. • Creation of temporary and permanent employment and income.	• Platform embankment encroachment along central watercourse. • Loss of tributary watercourses. • Loss of some marginal ecological habitats along central watercourse. <u>Social:</u> • Visual and aesthetic intrusion. • Construction and industrial noise. • Erosion of residential sense of place. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Potential decline in property values. • Air pollution and dust. <u>Economic:</u> • Cost of maintaining parts of watercourse -+R15 million. • The estimated costs associated with the loss of income from platform area, additional bulk earthworks and removal of spoil is ±R44 million. • Loss of a relatively small area of sugarcane farming.	**Therefore, Option 2 is considered a viable layout alternative and is presented in this EIA as the Developer's Preferred Layout.**
Option 3: Environmental / Developer trade-off option Achievable Platform	Platform area maximised taking into account the following constraints only: • Preservation of the upper two-thirds of the central/main watercourse	<u>Environmental:</u> • Maintenance of a variable wetland / watercourse buffer in the upper two thirds of the central watercourse. • Maintenance of a 30 m buffer from the marsh area	<u>Environmental:</u> • Infilling of watercourses at two road crossings and in lower third of the central watercourse. • Loss of all tributary watercourses.	Option 3 is marginal from a financial point of view and given the considerable risks associated with a development of this nature there is a real risk

Alternative Options	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
Area: 30.5 ha % Area Lost: 11.4% Additional spoil material carted off site: 159 000 m^3	and a 12.1 m average buffer. • Preservation of a 30 m buffer from the identified marsh area in the upper reaches of the watercourse (north-eastern corner of the site adjacent to the D'MOSS area). • Preservation of a 100 m buffer zone to the Glenhills suburb. • Preservation of a 40 m buffer to the D'MOSS area. • Exclusion of geologically unstable areas.	(wetland). • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100m residential buffer. • Maintenance of marginal faunal habitats along central watercourse and marsh area. <u>Social:</u> • Creation of an open space conservation area along the 100m residential buffer. <u>Economic:</u> • Marginal economic value for developer. • Creation of temporary and permanent employment and income.	• Platform embankment encroachment along central watercourse. • Loss of some marginal faunal habitats along central watercourse. <u>Social:</u> • Visual and aesthetic intrusion. • Construction and industrial noise. • Erosion of residential sense of place. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Potential decline in property values. • Air pollution and dust. <u>Economic:</u> • Reduced financial return as platform areas will be reduced, increasing the amount of earth to be removed from site resulting in significant additional earthworks costs. • The estimated costs associated with the loss of income from platform area, additional bulk earthworks and removal of spoil is ±R69 million. • Cost of maintaining parts of the watercourse -+R15 million. • Loss of a relatively small area of sugarcane farming.	of negative financial returns. However, Option 3 is environmentally viable as it includes preservation of a 30 m buffer from the wetland adjacent to the D'MOSS area. **Therefore, Option 3 is presented as a viable alternative layout.**

Alternative Options	Key Features	Opportunities / Benefits	Constraints / Negative Impacts	Technical and Financial Viability
Option 4: Best Case Environmental Option Achievable Platform Area: 29.8 ha % Area Lost: 13.5% Additional spoil material carted off site: 278 000 m^3	Platform area maximised taking into account the following constraints only: • Preservation of the upper two-thirds of the central/main watercourse and a 10 m minimum buffer. • Preservation of a 30 m buffer from the identified marsh area in the upper reaches of the watercourse (north-eastern corner of the site adjacent to the D'MOSS area). • Preservation of a 100 m buffer zone to the Glenhills suburb. • Preservation of a 40 m buffer to the D'MOSS area. • Exclusion of geologically unstable areas.	<u>Environmental:</u> • Maintenance of a 10 m wetland / watercourse buffer in the upper two thirds of the central watercourse. • Enhancement of central watercourse for stormwater attenuation and filtration. • Rehabilitation and establishment of a D'MOSS ecological corridor along the 100 m residential buffer. • Maximum ecological areas retained. • Maintenance of marginal ecological habitats along central watercourse. <u>Social:</u> • Creation of an open space conservation area along the 100 m residential buffer. <u>Economic:</u> • Creation of temporary and permanent employment and income.	<u>Environmental:</u> • Infilling of watercourses at two road crossings and in lower third of the central watercourse. • Loss of all tributary watercourses. <u>Social:</u> • Visual and aesthetic intrusion. • Construction and industrial noise. • Erosion of residential sense of place. • Traffic congestion and pedestrian safety impacts. • Potential increase in crime and growth in informal settlements. • Potential decline in property values. • Air pollution and dust. <u>Economic:</u> • Reduced financial return as platform areas will be reduced and there will be an increase in the amount of earth to be removed from site resulting in significant additional earthworks costs. • The estimated costs associated with the loss of income from platform area, additional bulk earthworks and removal of spoil is ±R88 million. • Cost of maintaining parts of the watercourse ±R15 million. • Loss of a relatively small area of sugarcane farming.	This option will result in a reduced return as platform areas will be reduced and there will be an increase in the amount of earth to be removed from site resulting in significant additional earthworks costs. The estimated costs associated with the loss of income from platform area, additional bulk earthworks and removal of spoil make the project financially unviable. **Therefore, Option 4 is not financially viable.**

2.5.4 Design Alternatives

2.5.4.1 Internal Infrastructure

Required infrastructure is detailed in Chapter 2.4, including the requirements for internal water, sewer, roads, electricity and telecommunications infrastructure. A detailed Stormwater Management Plan (**Appendix E2**), as well as a Traffic Impact Assessment (**Appendix E3**) have been compiled for the development and include details of proposed infrastructure for these services.

The recommendations and mitigation measures provided by the wetland and water specialists will be incorporated into the design of the internal water and sewer reticulation and storm water management system wherever possible to effectively manage water movement on site and minimise the impacts on watercourses from discharging stormwater.

No design alternatives for internal infrastructure have been proposed at this stage, as designs have been compiled to account for technical, financial and environmental constraints.

2.5.4.2 Energy and water consumption reduction and recycling

At this stage in the project, detailed alternatives have not been assessed for energy and water consumption reduction/recycling measures. However, the developer has committed to incorporating feasible energy and water consumption reduction measures into architectural and infrastructural designs for the development wherever possible. Initial proposed measures for ensuring the responsible use of energy and water on site include:

- Use of energy efficient lighting (i.e. Fluorescent lighting and low energy external lamps).
- Use of solar panels for geyser installations wherever possible (dual solar and electrical power supply, as recommended by Eskom).
- Installation of water-conserving plumbing systems (e.g. dual-flush toilets, low pressure showers).
- Installation of automatic timer switches on geysers.
- Rainwater harvesting for garden irrigation.

3 DESCRIPTION OF THE PROJECT ENVIRONMENT

3.1 Biophysical Environment

3.1.1 Climate

The region is characterised by a hot, damp, tropical climate in summer and a mild and slightly drier sub-tropical climate in winter (Mucina & Rutherford, 2006). This type of climate is considered favourable for agricultural production with good yields for a wide range of adapted crops throughout the year.

The mean annual temperature is 20.5 degrees Celsius (ºC) where mean maximum monthly temperature peaks at 28.3 ºC in February and dips to 10.3 ºC in July. The Mean Annual Precipitation (MAP) of the study area is 973 mm. Mean monthly rainfall peaks at 127 mm in February and dips to 26 mm in July. Winter rainfall is usually associated with frontal systems. High evapotranspiration rates are associated with high temperatures in summer therefore Mean Annual Evapotranspiration (MAE) is high (A-pan 1692 mm). Predominately strong winds blow from either the north-east or east-north-east with slightly less strong winds blowing from between south and south-west.

3.1.2 Geology

The specific geology of the site includes the following four (4) formations (as per findings of the Geotechnical Assessment (**Appendix E5**). Please refer to Figure 3-1 for a map of the site's geological formations.

Vryheid Formation - This geological unit covers the majority of the site. The bedrock is comprised of predominantly shale with subordinate sandstone. The subsoils associated with the Vryheid Formation are typically clayey and where affected by seepage such as in depressions or low-lying areas, may attain a thickness in excess of 3 m. On the more elevated portions of site, these clay soils are generally less than 1 m thick.

Karoo Dolerite - The dolerite occurring on this site is variably weathered but at present ground surface it is generally exposed as a highly weathered rock which will be recovered from excavations as a coarse gravel/cobble/sand mix. It is likely that much of the dolerite will be used in proposed road layer works. The sub soils associates with the dolerite are very clayey but generally not well developed on this site. Where present, the thickness of the residual dolerite clay is likely to be in the order of 0.5 m on the elevated portions of site, increasing locally to thicknesses in excess of 3 m in areas of groundwater seepage.

Berea Formation - This material is typically a fine to medium grained clayey sand to sandy

clay. It is the product of deep weathering of a Quaternary age sand dune which capped the bedrock some 4 to 5 million years ago. The thickness of this soil horizon is irregular, varying from a few metres to locally, well in excess of 10 m. It is preserved only on the well elevated portions of the site.

Colluvium and Topsoil - Capping all of the above mentioned *in-situ* soil horizons is a transported colluvium and topsoil which varies in thickness from negligible (particularly upon the Berea Formation) to well in excess of 1 m on the steeper lower slopes. Although still containing much clay and being very fine grained, the colluvium is more sandy than the underlying *in-situ* soils. The organic topsoil is generally a very thin sandy veneer capping the colluvium, but locally may be relatively thick (>0,5 m) due to disturbance from the cane ploughing/harvesting.

3.1.1 Topography and Surface Hydrology

The topography is rolling, segmented by the perennial stream flowing through the centre of the property and by other ephemeral channels occurring on adjacent slopes, resulting in a terrain pattern of:

- Crests with gently to moderately sloping land having slope gradients of 2 to 8%.
- Midslopes with moderately steep to very steep land having slope gradients of 20 to 60%.

Slope aspect is mainly north/south. Altitude range above mean sea level is 20 m in the west to 95 m at the centre of the property. No rocky outcrops were noted. The study area falls within the U20M quaternary catchment, as defined by Midgley *et al*. (1994). An unnamed perennial stream (i.e. central watercourse) flows through the central section of the property in an east/west direction. Flow is currently diverted into a culvert that discharges into the perennial uMhlangane River (previously known as the Seekoeispruit) below the Chris Hani/Old North Coast Road intersection. The uMhlangane is the main river that meanders through the Riverhorse Valley industrial area. The uMhlangane River is a left-bank tributary of the Mngeni River and the confluence of the two rivers is located approximately 6 km south of the property. The lower reaches of the central watercourse have been in-filled for the establishment of Old North Coast Road and the adjacent industrial platforms, and has been heavily degraded after years of farming and clay mining. A number of ephemeral channels feed the unnamed perennial stream. Grassed waterways occupy steep valley bottom terrain units and form part of stormwater management plan for the proposed project. No surface water storage facilities, dams, boreholes or windmills were noted and there is no evidence of current or historic irrigation. No baseline surface water quality data exists for the site. Please refer to Figure 3-2 for a map of topography and watercourses on site.

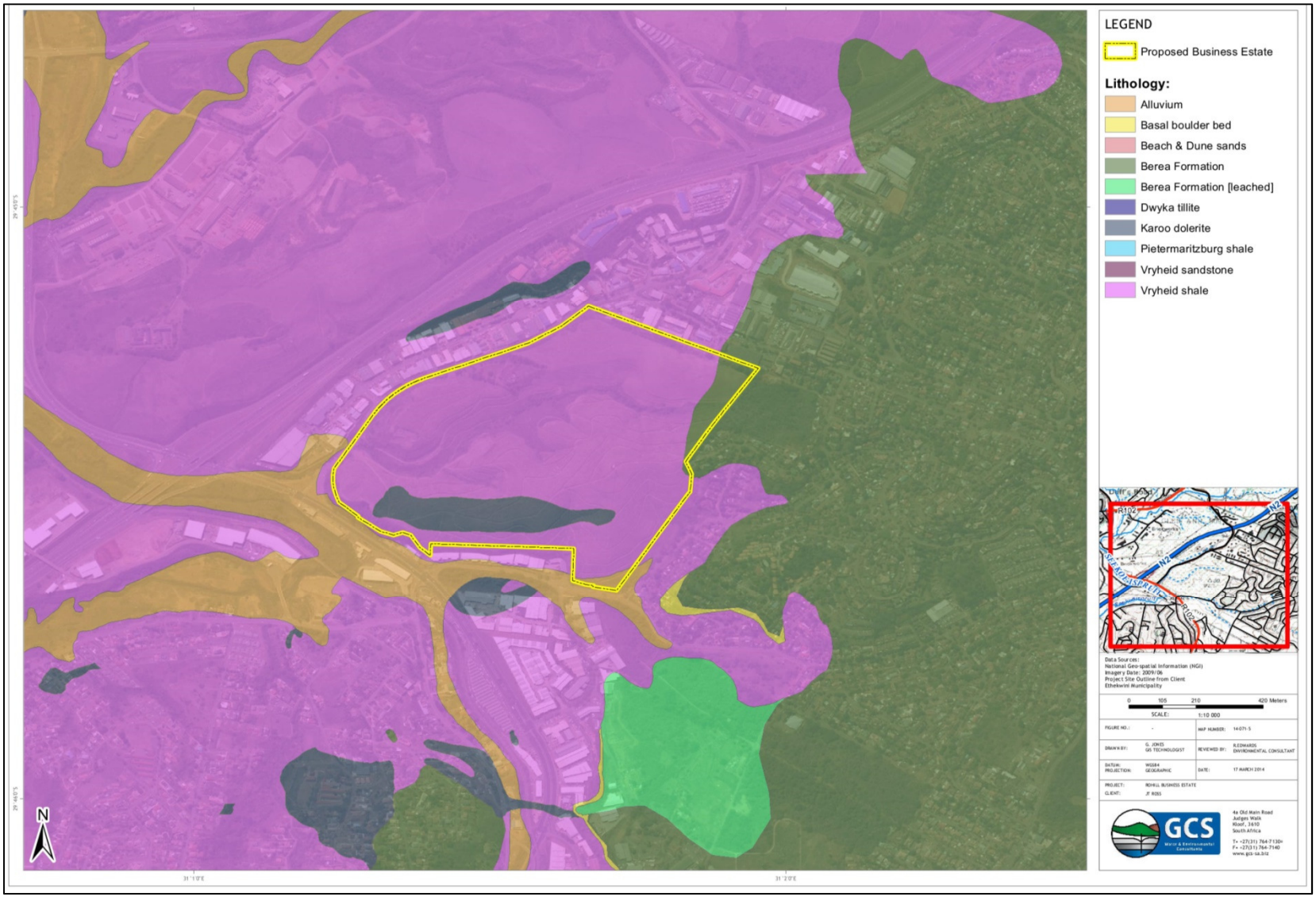

Figure 3-1: Rohill Business Estate - Geological Map

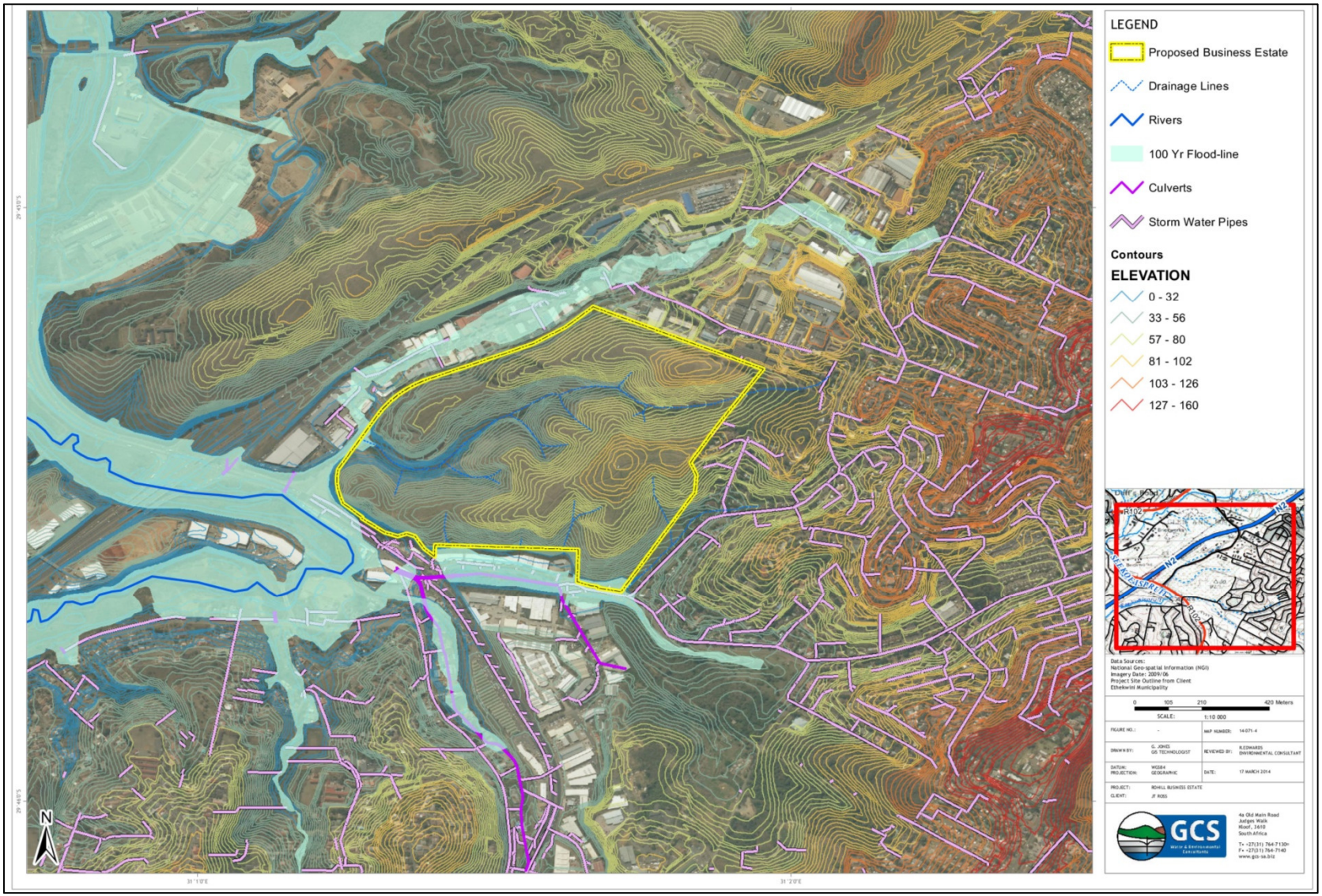

Figure 3-2: Rohill Business Estate - Topography and Drainage Map

3.1.2 Hydrogeology

The following information is obtained from the Desktop Hydrogeological Assessment (**Appendix E7**).

The groundwater associated with the proposed area is controlled by the geology of the area. Groundwater at the proposed site can be separated into the primary aquifer in the unconsolidated clayey sands of the Berea formation and the secondary aquifer in the underlying fractured rocks of the Vryheid and Pietermaritzburg formations.

The rate of recharge to groundwater and the storage and discharge from the aquifers is hydrologically different for the two aquifer systems. In the primary aquifer the groundwater is stored in the pore spaces (matrix porosity) between the unconsolidated sand particles, while it is mainly stored in fractures and fissures in the secondary aquifers with little storage in the pore spaces of the consolidated rock material. Berea sediments consist of high clay content which may potentially reduce their permeabilities. Contacts between the host rock and the dolerite intrusions and faults are zones of high groundwater movement, and therefore, since the rocks in the proposed site have been extensively intruded by Karoo dolerite, groundwater can be expected near these intrusions.

Generally, groundwater flows from high topographic areas to low topographic areas. Within the site, groundwater is expected to flow towards the stream and towards the southern part of the area. Elevated groundwater levels are expected on the eastern and western valley and seepages have been noted during previous geotechnical studies by Geosure, 2002, on these valleys. In all 7 inspection pits dug by Drennan, Maud and Partners as part of the Geotechnical Assessment (**Appendix E5**), only one inspection pit showed groundwater seepage in 1 metre below ground level (mbgl) on the eastern portion of the site. This was interpreted as flow from perched groundwater level following a one or two day heavy rain falls. There were no groundwater users that were found from the GRIP data[1] within the site.

The shales of the Vryheid formation have the expected borehole yield ranging between >0 to 3 l at drilling depths of > 20 mbgl.

No baseline groundwater quality or quantity data exists for the site.

3.1.3 Land Use

The property is currently zoned as 'Extractive Industrial' and is used by Corobrik, the original owner, to mine clay. Land that is not being mined is being used to cultivate

[1] GRIP: Groundwater Resource Information Project, Department of Water Affairs and Forestry

sugarcane. Current land use of the 59.6 ha property is comprised of bush (5.6 ha), sugarcane in production (14.4 ha), abandoned sugarcane production (24.8 ha), disturbed land (5.4 ha), quarry (4.6 ha) and wetland (4.8 ha). Land currently used for sugar cane cultivation on site, as well as abandoned cane cultivation areas, totals 39.2 ha, with the potential to produce 1 766 tons (t) of cane per annum.

Corobrik has been mining on site periodically since 1993. Shales are mined for raw brickmaking material, and mining is undertaken to approximately 5m below the ground surface. Corobrik are in possession of a mining right in terms of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) to mine the site. An EIA and Environmental Management Programme (EMPR) was compiled in March 2009, and approved by the Department of Mineral Resources (DMR). Planned decommissioning and rehabilitation plans were included in the EMPR compiled for Corobrik. It is noted that current Corobrik mining activities on site have significantly altered the topography, existing drainage lines and stormwater flows, as well as available soils, and mining activities have extended to an area of approximately 10 ha. Both alien and indigenous vegetation have been removed as part of site preparation for mining over the years, and much of the work undertaken has affected banks of the central watercourse, as fill material has been pushed to the edge of the watercourse, altering the banks.

JT Ross is in the process of compiling the rezoning application for the proposed development and has proposed the following zoning option: General Business 2 zoning, comprising 92.1% Light Industrial (140 352 m^2 GLA3) and 7.9% Shop (15 000 m^2 GLA) (GCS, 2014c).

3.1.4 Soils

Five (5) different soil groups were identified in the study area as part of the Natural Resources and Agricultural Land Potential Assessment (**Appendix E6**).

Oxidic Soils - Oxidic soils are typically well drained, well aerated and of red and brown hue, indicating a high concentration of iron and aluminium oxides. Dominant soil forms are Hutton 1200 and Oakleaf 1120. Topsoil texture is sandy loam becoming sandy clay loam in the subsoil. Water storage and water holding capacities are thus favourable for agriculture with calculated total available moisture content of 121 mm. Rainfed sugarcane will do well on these soils. Inherent soil fertility is however somewhat poor due to leaching of nutrients in the high rainfall environment, evidenced by the dystrophic subsoil base status. Fertilizer requirements will be demanding for all crops, especially sugarcane. Limitations to cropping are soil nutrition, increased slope gradients at some locations and an erosion hazard.

Melanic Soils - The melanic soils are typically dark in hue with a blocky structure, have a

high base status and are derived from shale. Dominant soils are Bonheim 1110 and Mayo 1100. Topsoil and subsoil textures are clayey resulting in high water holding capacity but water storage capacity is restricted due to the somewhat shallow root depth. Calculated total available moisture is 52 mm. Base status of the top- and subsoil is somewhat high, thus providing a favourable inherent supply of macro- and micro nutrients to the plant. Fertilisation requirements will be moderate. The soils are inherently stable and erosion hazard is reduced.

Lithic Soils - The lithosols are typically associated with weathered or hard rock at shallow depth in the soil profile and is derived from shale. Mispah 1100 and Glenrosa 1111/1211 sandy clay loam soils are dominant. The shallow soils seldom exceed 30 cm in depth with hard rock and saprolite restricting root development. Calculated total available moisture is about 30mm and crops grown on these sites will thus constantly be under stress due to soil moisture content commonly reaching wilting point. Limitations to cropping are soil depth and steep slopes in places.

Anthropic Soils - Anthropic soils are a consequence of man's activities. They are disturbed soils or are associated with complete soil removal. The anthropic soils occur at the quarry areas and building locations at Erf 3481. They have zero agricultural potential.

Gleyic/Cumulic Soils - The soils are associated with riparian habitats, wetlands and waterways on the property. The Gleyic soils are confined to the main perennial channel traversing the property and have Westleigh 1000 clay, Katspruit 1000 clay and Oakleaf 1110 sandy clay loam soil forms. Grassed waterways and other ephemeral channels have Cumulic soils and show evidence of soil movement due to water scouring where Oakleaf 1210 soil form dominates. Gleyic and Cumulic soils are not arable and should service conservation corridors on the property.

3.1.5 Waste Management

Illegal dumping is a problem on the Rohill development site (Harrison Drive and Bauhinia Drive), Erf 3452, and in the bush adjacent to Rinaldo Park. This dumping has had a serious impact on the functioning of the ecological systems of the development site (GroundTruth, 2014).

3.2 Ecological Environment

3.2.1 Flora

The following information is obtained from the Vegetation Impact Assessment (**Appendix E8**).

3.2.1.1 Current Ecological Condition

The study site is comprised mostly of transformed habitat in the form of sugar cane fields, old cane roads, and a section in the west that had been mined for shale and clay. Adjacent to the property is a portion of the Durban Metropolitan Open Space System (D'MOSS) area which lies in a north east direction to the site. The remaining natural areas consist of a perennial stream with associated wetland and riparian habitat which bisects the study site. This stream is a tributary of the uMhlangane River. Areas adjacent to the stream comprise old cane fields where secondary scrubby vegetation has established. This secondary vegetation provides foraging habitat and shelter for many grassland type bird species. Other faunal habitat on the site comprises clumps of exotic trees which offer shelter and nesting habitat to birds and bats. While these habitats cannot support viable populations, they offer some opportunity to fauna, especially in modified landscapes.

3.2.1.2 Biome and Bioregion

The study site is located within the Indian Ocean Coastal Belt biome which covers the seaboard in the KZN and Eastern Cape provinces (Mucina & Rutherford, 2006). The specific study area is situated within the KwaZulu-Natal Coastal Belt which occurs only in KZN from Mtunzini in the north to Margate in the south where the altitude ranges from 20 - 450 masl.

The KwaZulu-Natal Coastal Belt consists of dissected undulating coastal plains with patches of thicket, coastal thornveld and remnant patches of various types of subtropical forest. Some primary grassland still occurs in hilly, high-rainfall areas where pressure from natural fire and grazing regimes prevail. This vegetation type is affected by extensive sugarcane fields, timber plantations, residential areas and coastal holiday resorts (Mucina & Rutherford, 2006).

3.2.1.3 Previous Floristic Classification

Important taxa recorded in The KwaZulu-Natal Coastal Belt include *Cyperus natalensis, Eragrostis lappula, Helichrysum longifolium* and *Senecio dregeanus* while geophytic herbs include *Kniphofia gracilis, K. rooperi, Pachystigma venosum, Zeuxine africana* and *Strelitzia nicolai* and trees such as *Anastrabe integerrima* and *Acacia nilotica* subsp. *Kraussiana.* Two species from this vegetation type have already gone extinct, i.e. *Vernonia africana* and *Barleria natalensis,* while *Kniphofia pauciflora* is endemic.

3.2.1.4 Floristic Description of the area

The study area could be dived into four (4) vegetation components:

- Drainage line/valley bottom

The unnamed perennial stream and the uncultivated part of the valley bottom that cusp it is an amalgam of different vegetation, mostly interpolated and secondary. The only parts

not secondary are patches of wetland vegetation mainly comprised of *Cyperus dives* and *C. latifolius*. Other more hygrophytic species seen were the semi-ruderal sedge *Pycreus polystachyos* (the latter on the more mesic edges or where more open), *Typha capensis* (Bulrush), the shrub or small tree *Hibiscus diversifolius* and the herbs *Conyza ulmifolia, Gnaphalium austroafricanum* and *Melanthera scandens*. *H. diversifolius* can be confused with the indigenous weed *H. cannabinus* which is common in the valley.

The balance of the vegetation in the uncultivated part of the valley comprises a grassy scrub in which aggregations of trees are also nested. The grass comprises only a few species typical of disturbed sites, well mixed with short-lived herbaceous weeds, such as *Conyza* (*Erigeron*) *canadensis, C.* (*Erigeron*) *sumatrensis*, *Lactuca serriola*, *Tagetes minuta* (these herbs alien) and *Senecio polyanthemoides* (indigenous). The grassy scrub is becoming well infiltrated by *Chromolaena odorata* though this has begun to close up in only a few places.

Aggregated trees forming patches of woodland or clumps are mainly comprised of alien species. *Melia azedarach* is by far most common, but some *Schinus terebinthifolius* (Pepper Tree) and *Listea sebifera* was also seen. A smaller number of indigenous trees mixed with this growth or free-standing comprise only a handful of species, namely *Bridelia micrantha* (the Mitzeeri, which is by far the most common of the indigenous trees), *Clerodendrum glabrum* and *Dalbergia obovata* (Climbing Flat-bean).

Small parts of the untransformed part of the valley are bare or have insubstantial ground cover. This is probably for several reasons: hot fires have burned into vegetation that in any event comprises a large number of only short-lived weeds, and topsoil has been removed or washed away. The poor vegetation cover may also be due to more extensive historical cultivation on the site. As a result there are localized areas of high erosion risk.

- Secondary grassland

This is an area with vegetation mainly comprised of grasses, of composition similar to more open parts of the Secondary Thicket Community. Some of the ground is bare from recent disturbance. However, it should possibly not been mapped separately but included with the interpolated secondary vegetation mapped as the Secondary Thicket Community.

- Mixed Woodland Community

This community, where it occurs as a narrow line on the northern boundary, includes a mix of alien species including some eucalypts and *Melia azedarach;* but also many indigenous trees, some of larger size. These include the ecologically valuable species *Ficus burkei* and *F. natalensis* (both fig species are present). It was only in this line that *Chaetacme aristata* (Thorny Elm) and *Rapanea melanophloeos* (Cape-beech) were seen on the site. Subcanopy or smaller forest trees also occur such as *Pychotria capensis* (Black Bird-berry). Some of the

herbs present are less frequently encountered species, or at least are not ruderals, such as *Rhinacanthus gracilis*. However, through with alien control work, perhaps combined with some plantings, this could in time be rehabilitated to Northern Coastal Forest.

North-east of the property boundary, common indigenous trees are mixed with a larger number of alien trees, creating the appearance of forest. However, *M. azedarach* is the most common large tree and *Litsea sebifera* the most common subcanopy tree – both are alien species. Some *Mangifera indica* (Mango) trees are also present. The herbaceous layer is also dominated by weeds, particularly a debatably indigenous form of *Achyranthes aspera* (Burrweed) and the more definitely alien *Tithonia diversifolia* (Mexican Daisy).

- Northern Coastal Forest

This is the oldest woody growth on or next to the site. Although only more common indigenous trees were seen to occur, some of the herbs indicate that this forest is of long standing but has become degraded. This forest patch includes two such species, namely *Chlorophytum comosum* and *Isoglossa woodii*. *I. woodii* has also spread from this core into nearby parts of the adjacent Mixed Woodland Community.

3.2.1.5 Alien and invasive plants

Alien vegetation is dominated by the alien trees *Eucalyptus camaldulensis*, *E. citriodora*, *Melia azedarach* (Syringa) and *Listea sebifera* (Indian Laurel), amongst others. Common smaller species are *Chromolaena odorata* and *Lantana camara*, although many others occur as listed in the Vegetation Impact Assessment (**Appendix E8**). A smaller number of indigenous species may also be found mixed with these alien species, including the tree *Clerodendrum glabrum* (White Cat's Whiskers) and some indigenous weeds of disturbance.

3.2.1.6 Sensitivity

The KwaZulu-Natal Coastal Belt is listed as an endangered ecosystem in terms of Section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) with less than 21 000 ha of natural vegetation remaining. Land transformation is due to cultivation, urban developments and road infrastructure where extensive invasions by alien invasive plant species affect the remaining natural areas.

The site also falls within a smaller Critically Endangered listed ecosystem, namely Durban Metropole North Coast Grassland (KZN 2) (South African National Biodiversity Institute (SANBI) 2009). According to SANBI (2009) it is listed according to Criterion F because it comprises: "Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan" with "very high irreplaceability and high threat." But due to the proportion of modified habitat on the site as well as the level of disturbance in the surrounding landscape, it is unlikely that the study site in its entirety will contribute to

meeting any conservation target.

3.2.1.7 Red Data Species

Only one Red Listed floral species was found on the site. At GPS position S29.75475 E31.02476 four *Crinum macowanii* plants were seen. This plant is assessed as Declining (Raimondo et al 2009), which is a lower order category and is protected by the provincial conservation ordinance. These plants may not be damaged or destroyed without permit issued by Ezemvelo KwaZulu-Natal Wildlife (EKZNW). They should be relocated to other suitable habitat on the site (an open area where soil is not dry or poor but the grass is not tall) where they will be protected from the development. It is noted that, following the Vegetation Impact Assessment and the identification of this plant, Corobrik mining activities have expanded and moved into the site of *Crinum macowanii*, and it is highly likely that earth-moving activities have damaged or removed it completely. However, recommendations for the protection of this species are included in this report as a conservative measure, as individuals of the species may be present at other locations on site which may not have been found by the Vegetation Specialist.

3.2.2 Fauna

A detailed faunal assessment was undertaken to determine which species are currently present on, and surrounding, the proposed development site (**Appendix E9**).

According to the EKZNW's C-Plan, important faunal species are modelled to occur in and around the proposed site, namely *Bradypodion melanocephalum* (Natal Dwarf Chameleon, Vulnerable) and *Hyperolius pickergilli* (Pickersgill's Reed Frog, Critically Endangered). In addition, a number of Interested and Affected Parties (I&APs) have raised concern over the effect of the proposed development on local wildlife such as birds, fish eagles, monkeys, lizards, snakes, etc. A nearby resident also indicated that the area has the only colony of wild parakeet birds and the development could contribute to their demise or migration to another area.

High faunal activity (especially avifauna) on site was detected in and around wetland and riparian habitat associated with the central drainage line. Watercourses and wetlands are usually areas of high faunal diversity as the riparian environment and dense vegetation provides abundant cover, feeding and breeding habitat for many species of invertebrates, birds, mammals, reptiles and amphibians. When it is available, surface water provides drinking water for many faunal species while the soft substrate provides perfect burrowing environments for fossorial animals. The increase in prey and vegetation attracts a high diversity of birds as well as terrestrial mammals and reptiles (including predators).

3.2.2.1 Mammals

During the field survey, seven (7) mammal species were identified in the study area, none of which are currently species of conservation concern. A further 27 mammal species were given a high likelihood of occurring in the study area due to the presence of suitable habitat, five (5) of which are currently of conservation importance (i.e. species with a conservation status higher than Least Concern and includes protected species). These include *Otomops martiensseni* (Large-eared Free-tailed Bat; currently listed nationally as Vulnerable and globally as Near Threatened), *Scotoecus albofuscus* (Thomas's House Bat; currently listed nationally as Vulnerable), *Miniopterus fraterculus* (Lesser Long-fingered Bat; currently listed nationally as Near Threatened), *Hypsugo anchietae* (Anchieta's Pipistrelle; currently listed nationally as Near Threatened) and the nationally protected *Tragelaphus scriptus* (Bushbuck). Potential breeding and/or feeding habitat existed on site for an additional 16 species of conservation concern, however the urban-industrial surroundings render them unlikely to utilise the site, especially for breeding purposes. Such species were given a medium likelihood of occurring in the study area.

3.2.2.2 Birds

A total of 63 bird species were observed within the study area during the field survey. These are a mixture of grassland and woodland species, many associated with riparian habitat. The highest number of species was detected in the drainage lines (40) and disturbed forest patch (32). No bird species of conservation concern were detected during the field survey, six (6) species endemic to southern Africa were observed on site. These included *Pternistis natalensis* (Natal Spurfowl), *Laniarius ferrugineus* (Southern Boubou), *Chlorophoneus olivaceus* (Olive Bush-Shrike), *Batis capensis* (Cape Batis), *Osterops capensis* (Cape White-eye) and *Passer melanurus* (Cape Sparrow).

Suitable breeding and/or feeding habitat was observed for three species of conservation concern. While not encountered during the field survey, these species were given a high likelihood of occurring in the study area based on the expert opinion of the faunal specialist. They include *Falco peregrinus* (Peregrine Falcon), *Ciconia episcopus* (Woolly-necked Stork) and *Schoenicola brevirostris* (Broad-tailed Warbler), all currently listed as Near Threatened.

3.2.2.3 Herptofauna

While no reptile species were recorded during the field surveys, 20 species were given a high likelihood of occurring in the area due to the presence of suitable habitat. This includes six (6) species endemic to southern Africa, one (1) species of conservation concern, the endemic *Bradypodion melanocephalum* (KwaZulu Dwarf Chameleon; currently listed nationally as Vulnerable), and one provincially protected species, namely *Varanus niloticus* (Water Monitor). Habitat on site for *Bradypodion melanocephalum* existed in the

reed beds and riparian vegetation in and around the central drainage line.

A specialist study to establish the likelihood of occurrence of the *Bradypodion melanocephalum* (KwaZulu Dwarf Chameleon) (KDC) at the study site was conducted (**Appendix E10**). It was found that a very large proportion of the site is unsuitable for KDCs. This includes areas that are covered by sugarcane cultivation, fallow ground formerly under sugarcane, where current cover consists of short, sparse vegetation typified by weeds and grasses, areas of entirely alien vegetation (e.g. stands of *Eucalyptus* spp. and Bugweed *Solanum mauritanum*), and areas where vegetation has been cleared for clay abstraction and other activities. No high quality KDC habitat was seen on site, given the high levels of transformation and degradation of remaining vegetation, primarily through aggressive infestation by alien invasive plants. If present, KDCs will be virtually confined to the central watercourse and edge of the woodland/forest patch in the extreme north-east of the property. The drainage line is however heavily infested with aliens and it is unlikely that it is all suitable for KDCs. The area in the uppermost reaches of the catchment where some hygrophilous vegetation occurs as a relatively large area, and is less heavily impacted on by aliens is the most suitable portion, in combination with the adjoining wooded area. However, even immediately adjacent to these areas, the upslope vegetation cover consists of short, sparse weedy growth and secondary grass cover and in its present state is also unsuitable for KDCs. Areas along the drainage lines that have any chance of supporting KDCs are very narrow, seldom extending more than 20 m away from the channel. Further downstream along the drainage line, habitat deteriorates, but it remains vaguely possible that small numbers of KDCs may persist in portions of this area. Vegetation away from the drainage line in these areas has been heavily infested with alien plants, and is unlikely to support KDCs.

A further follow up study was conducted to assess if the species was present on site (**Appendix E10**). None were detected despite covering a large proportion of site and all of the area most likely to support KDCs. Although it is difficult to prove absence of most faunal species following a rapid survey, chameleons are relatively conspicuous when present, and, on the basis of this assessment, it is considered that KDCs are either absent or occur in very small numbers on the site. This is likely due to the large amount of transformation and disturbance that this site has been exposed to historically, and the fact that most of the site is currently unsuitable for this species. In its current state, the site does not represent an important location for the conservation of KDCs. Even so, in the event that any individuals remain here, they will be confined to restricted areas that are currently within the proposed open area zones.

3.2.2.4 Amphibians

One amphibian species was identified in the study area during the field surveys, namely

*Amietia quecketti*1 (Common River Frog) which is currently listed as Least Concern. While not encountered during the field surveys, a further 11 amphibian species were given a high likelihood of occurring in the study area due to the presence of suitable habitat, none of which are species of conservation concern.

Hyperolius pickersgilli (Pickersgill's Reed Frog), which is currently listed as Critically Endangered, was given a medium-high likelihood of occurring on the site. This species occurs in coastal bush/grassland mosaic habitat, breeding in stagnant, usually temporary to semi-permanent water, rarely exceeding 50 cm in depth, surrounded by dense sedges (Measey, 2011). While potential habitat for the species on the site (reedbeds in central drainage line) was not considered to be ideal, the species is known to have occurred in the area historically and the type locality for the species is situated adjacent to the study site on the Umhlangane River (29°45'36.36" S 31°01'19.16" E; Dr Jeanne Tarrant, pers. comm., 2014).

A specialist habitat survey to establish the likelihood of occurrence of the *Hyperolius pickersgilli* (Pickersgill's Reed Frog) at the study site was conducted (**Appendix E11**). Following this, a follow-up amphibian survey was undertaken to determine the presence/likelihood of presence of threatened (Red Listed) frog species on site (**Appendix E11).**

The findings of the habitat survey were that it is deemed **probable** that the Pickersgill's Reed Frog could occur within the study area. Given the habitat structure, it is also likely that a large number of other amphibian species utilise the habitat, including other possible Red List species known from the region, such as the Natal Leaf-folding Frog *Afrixalus spinifrons* (Near Threatened) or Spotted Shovel-nosed Frog *Hemisus guttatus* (Vulnerable).

The follow up assessment to determine presence/likelihood of presence found identified five (5) out of a possible 26 frog species on site, including confirmation of the presence of the Spotted Shovel-nosed Frog. It is highly likely that the species is relatively widely spread throughout the site. The species makes use of both the wetland and grassland habitat. As this is a new record for *H. guttatus* it is likely to be treated as having significance, and is most probably a remnant population of a larger population from this area. The Pickersgill's Reed Frog was not identified on site during this assessment.

3.2.2.5 Invertebrates

A full invertebrate survey (including sampling) was not undertaken within this assessment and likelihood of occurrence was based on broad habitat observations and literature review. If deemed necessary by the authorities, it is recommended that a specialist entomological study be conducted on the site to confirm the presence or absence of these

species.

3.2.3 Freshwater Ecosystems

Information for the following section has been obtained from findings of the Wetland Delineation (**Appendix E12**), Freshwater Ecosystems Assessment (**Appendix E13**).

3.2.3.1 Wetland delineation

Wetlands are defined as those areas that have water on the surface or within the root zone for long enough periods through the year to allow for the development of anaerobic conditions. These conditions create unique soil conditions (hydric soils) and support vegetation adapted to these flood conditions.

The assessment revealed two (2) different systems of wetland:

Unchannelled Valley Bottom Wetland- This wetland unit dominated the central portions of the site. The system originates in the north eastern part of the site and drains south west through the property within a heavily incised and constricted valley. The wetland is highly modified with excavations and earth movement having further constricted and restricted the extent of the system. The wetland has been highly invaded by alien plant species and maintains a limited biodiversity value.

Functionally, the system acts more as an open drain for runoff than a wetland. This unit is captured in the eThekwini Municipality's stormwater system as it exits the site. The system is highly restricted by the local topography and occupies the very narrow valley bottom between the steep sided ridges on the northern, western, southern and eastern portions of the site. A series of short side arms to the main body of the wetland were noted and included in the main assessment of the system given the common conditions in these areas.

The site is characterised by the presence of shallow bedrock and low soil permeability. This is further supported by the steep incised nature of the valley and the exposed rock faces. The valley head along the eastern boundary does show a sandier composition and higher soil permeability. Given the shallow rock and thin soil covering of the site, rapid movement of water across the site can be expected. Rainfall is likely to infiltrate and then move as sheet flow rapidly into the watercourse and off of the site. Limited retention can be expected from the sandy catchment head.

The vegetation is highly modified but there is some indigenous species that are limited to the central portions of the watercourse but were highly fragmented by large stands of alien invasive vegetation.

Hillslope Seepage Wetland- Two seepage systems were noted on the south and south eastern portion of the site. The southern system lies within a portion of the valley head where the gradient softens and a slightly more level area is formed. The system quickly disappears and the gradient increases again further down the slope. The underlying geology in the form of shallow rock, coupled with the minor break in slope, has created a minor area of deposition and suitable conditions for wetland formation. Sand in the upper catchment is likely to move as colluvium (and possibly alluvium) into the system. The natural break in slope, together with the shallow geology forces water moving downslope to daylight across this portion of the valley, thus resulting in the formation of waterlogged conditions. The sands of the upper catchment are likely to allow deeper infiltration of rainfall and will ensure a longer, more sustained input in to the system. Flow out of the system is likely to be rapid as a result of the steepened gradient and the shallow soils. This area contained no indigenous vegetation and was entirely covered by sugar cane.

The south eastern system originates in a small incised catchment which quickly opens into a fairly broad south draining seepage area. The system is restricted to the west by steeper slopes and to the east by Harrison Drive. The upper catchment lies on shallow soils and rock, while the lower parts of the system have accumulated eroded sediments and are notably sandier in nature. Water drains rapidly from the upper catchment and surrounding slopes given the underlying geology. However with the shallower gradient of the lower part of the system promotes a more diffuse flow and comparatively longer periods of saturation. The upper portion of the system was dominated by sugar cane and invasion by alien vegetation was limited.

3.2.3.2 Current wetland functioning and ecological condition

The current extent of the freshwater ecosystems within the study site is approximately 2.9 ha, based on the delineation study undertaken by SiVEST (2012), of which 1.5 ha is classified as wetland habitat and the remaining 1.4 ha riparian habitat. The riparian habitat onsite is a tributary of the uMhlangane River and flows in a south-westerly direction. The wetland habitats associated with this system are characterised by unchannelled valley bottom and hillslope seepage wetlands. The remaining freshwater ecosystems within the study site have been classified as hillslope seepage wetlands. The freshwater ecosystems within the study site are fed by both sub-surface and surface water inputs, with the latter being supplemented by runoff from roads.

The identified freshwater ecosystems were classified as follows:

- One unchannelled valley bottom wetland that is located at the head of the riparian system, dominated by the dense hydrophytic vegetation, although areas of alien invasive plant species were observed.
- Eight hillslope seepage wetlands which drain towards the central riparian system as

well as in a southerly direction. These systems are currently dominated by sugarcane cultivation or secondary vegetation, dominated by alien invasive plant species.

- Channel riparian habitat, with the steep nature of the local topography strongly defining the extent of the system. The system is largely dominated by alien invasive vegetation.

There is minimal variation among the different identified freshwater ecosystems on site when assessed in terms of their effectiveness and opportunity of supplying ecosystem services. These freshwater ecosystems are considered to be important in terms of enhancing water quality within the landscape, which is linked to the high opportunity that exists for these systems to contribute towards water quality enhancement. The opportunity relates to the potential for elevated levels of pollutants to be introduced to the systems from agricultural practices, rather than as a result of the effectiveness of the wetlands at providing these services. The effectiveness of the wetlands, in terms of enhancing water quality, has been greatly reduced by the transformation of the systems for agriculture and the encroachment of alien invasive plant species. The modified nature of the wetlands limits their integrity in terms of biodiversity and therefore limits the systems' ability to provide undisturbed wetland habitat within the landscape. The systems' provision of direct benefits and services, such as harvestable natural resources and use for education, is limited due to the wetlands' location on privately-owned property. Thus it was found that in general the wetlands are supplying ecosystem services at a ***Moderately Low*** to ***Intermediate*** level for the current scenario.

The National Freshwater Ecosystem Priority Areas (NFEPA) is a tool developed to assist in the conservation and sustainable use of South Africa's freshwater ecosystems, including rivers, wetlands and estuaries. For the study site none of the freshwater ecosystems onsite were classified as NFEPA systems, most likely due to their altered nature. However, downstream of the study site wetland systems have been classified as NFEPA systems based on their proximity to other systems and being located within 500 m of a threatened water bird point.

3.2.3.3 Riparian assessment

The riparian assessment includes the following areas: instream habitat, riparian habitat and riparian vegetation.

It was established that the *instream habitat* is currently largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged (Kleynhans, 2008a). The instream habitat is impacted by bed modification, physicochemical modification and illegal solid waste

disposal. These impacts had a high intensity at the site, but are localised in their extent.

Physicochemical modification is a result of catchment land use and the dense canopy cover of alien invasive vegetation over the instream habitat. The major land-use in the catchment is intensive sugarcane agriculture. This agricultural practice is widely recognised to deteriorate aquatic ecosystems through sedimentation and excessive nutrient input (Martinelli and Filoso, 2008). Furthermore, dense alien invasive vegetation canopy was seen to reduce sunlight penetration to the active channel, thereby reducing water temperature (Kleynhans *et al*, 2007). Illegal solid waste disposal has occurred within the downstream section of the stream (proximal to North Coast road). Bed modification within the stream is a result of current catchment land use and bank erosion causing sediments to enter the system at accelerated rates. Other impacts included channel modification as a result of pipes placed within the instream habitat and flow modification as a result of surface runoff and the presence of invasive exotic vegetation.

The assessment results indicate that the riparian habitat is currently moderately modified where a loss and change of natural habitat and biota has occurred, but the basic ecosystem functions are still predominantly unchanged. Predominant impacts on the riparian habitat include the presence of alien invasive vegetation, bank erosion, channel modification, vegetation removal, and burning of vegetation. Alien invasion vegetation however, is the greatest driver impacting the riparian zone.

Riparian vegetation in the study area is classified as **largely to seriously modified**. There has been a large to extensive loss of natural habitat, biota and basic ecosystem functions. The riparian vegetation is largely dominated by alien invasive vegetation that occurs in both the marginal and non-marginal zones. The non-marginal zone is considered to be more important in maintaining the ecological integrity of the riparian zone than the marginal zone. The marginal zone is dominated by non-woody vegetation and currently is a mixture of reeds and herbaceous dominated species. Approximately 40% of the marginal zone was invaded by alien vegetation. At a number of sites within the reach, the alien vegetation in the non-marginal zone formed a dense canopy that drastically reduced light in the marginal zone limiting indigenous vegetation growth and allowing shade tolerant species to survive.

3.3 Socio-Economic Environment

Information for the following sections has been obtained from findings of the Natural Resources and Agricultural Land Potential Assessment (**Appendix E6**), Economic Impact Assessment (**Appendix E14**), Social Impact Assessment (**Appendix E4**), Traffic Impact Assessment (**Appendix E3**), Visual Impact Assessment (**Appendix E15**) and the Noise Impact Assessment (**Appendix E16**).

3.3.1 Socio-Economic Context

The residential suburbs around the development site include a low income townships and informal areas west of N2 (KwaMashu, Inanda, Ntuzuma, Newlands East and Newlands West), lower/middle income areas (Phoenix west of N2 and Sea Cow Lake, Kenville and Avoca east of N2) and middle/upper income areas around Rinaldo Road in the east. Commercial land uses are situated along the North Coast Road. A mix of manufacturing, warehousing and related sales activity takes place in the Red Hill and Glen Anil industrial areas. Most enterprises are stand-alone on their own sites but there are also some small business park developments within these precincts e.g. on Cypress Road and Moreland Drive. The River Horse Valley Business Estate, a similar development type to the proposed Rohill Business Estate, is situated to the south of the proposed development site, and includes a mix of light manufacturing and warehousing. Most of the area is dominated by an extractive industry tied to its raw material source: Corobrik Mining (established in Durban in 1902) operating in Avoca and on the other side of N2. Corobrik is based on the quarrying of various shales in the Ecca formations. The remaining vacant land is used by farmers to grow sugarcane. Following North Coast road are other residential areas of Park Hill, Greenwood Park and Red Hill and Avoca. In the late 19th century these areas were villages focused on railway halts.

3.3.2 Agriculture and Mining Use

The proposed development site is a consolidated tract of land that is currently zoned as "extractive industrial". Some of this land is currently cultivated to sugarcane, some is used by Corobrik for clay mining to manufacture bricks, and a portion of the land has been abandoned from sugarcane cultivation.

The inherent agricultural land potential at the Rohill site consists of 41.2 ha of arable land of varying potentials and 18.3 ha of non-arable land, is to produce 1 766 t cane per annum assuming that 39.2 ha (the land extent that is currently planted plus the land extent previously cultivated) are planted. It is estimated that sucrose content will be about 12%. Erf 3481 is marginally suited to agricultural production, mainly due to its restricted hectare extent with limitations of steep slopes and marginal soils in places.

3.3.3 Population and Demographics

The social and development context of the site is considered with an emphasis on the residential communities of Glenhills and Avoca and the Glen Anil and Red Hill industrial areas.

Glenhills is an established middle income residential suburb situated east of the Rohill site. The main access road through the suburb is Rinaldo Road which links it to Chris Hani Road (R102) in the south-west and Umhlanga Rocks Drive in the north-east. The suburb is stable,

well educated, racially integrated and with low levels of unemployment. Property ownership is generally stable apart from properties in the lower end of Glenhills closer to the development site and the Glen Anil/Red Hill industrial areas (the industrial-residential interface). There is higher level of rental and resident turnover here. Glenhills is highly valued by its residents for its accessibility to good schools and shopping facilities as well as to the regional road network, while still being affordable and a quiet, green suburb. However there are concerns regarding the nearby Malacca Road informal settlement; congestion and intrusion of heavy vehicles into the suburb.

Avoca is a middle to lower income tight-knit suburb, also well established and well-situated within the northern residential corridor. The suburb links to Chris Hani Road via Old North Coast Road in the north and via Effingham Road in the south. uMhlangane Road on its north-western boundary links the suburb to Nandi Drive. The suburb is racially well integrated and has substantially higher employment levels than the city average. Property ownership in Avoca is stable and there is growth in younger owners. Avoca has deep community roots and is valued for being affordable, accessible to the broader northern area and generally peaceful with good views. The peaceful residential atmosphere of Avoca is being eroded by crime, nuisance related to local informal settlements (the Mathambo settlement) and poor service delivery.

3.3.4 Crime

The Rohill development site is of considerable concern to residents as it is not fenced and therefore there is no control over the use of the site. Apart from being used as escape route by criminals and for illegal dumping, it is reported to also be used as an access point to break into homes on its eastern boundary (Cranberry Grove and Wisteria Grove), as a short-cut from Old North Coast Road to Cypress Road and the Glen Anil industrial park by local workers and job seekers, and as a source of firewood by wood collectors from Duff's Road.

The major social issues in both Glenhills and Avoca area relate to crime. The main types of crime in the areas are housebreaking, robbery, motor vehicle theft, electricity theft (illegal connections), cable theft, drug peddling aimed at school children, drag racing at night (on uMhlangane Road, Chris Hani Road and the N2), noise from the informal settlements and the illegal parking of trucks on verges. There have been crime incidences related to the presence of the *Malacca Road informal settlement* which is situated just outside of Glenhills in Malacca Road, Red Hill opposite the Durban Solid Waste (DSW) garden refuse site and this is causing issues related to security for the residence of Glenhills.

3.3.5 Traffic

The site for the proposed development is situated in Durban North, north-east of the

KwaMashu Diverging Diamond Interchange (DDI) situated along Chris Hani Road (R102). The N2 is located along the western boundary of the site and is aligned in a north-easterly/south-westerly direction. Chris Hani Road is located along the southern boundary of the site and is aligned in a north-westerly/south-easterly direction. The site is mainly bound along its southern boundary by Chris Hani Road and Rinaldo Road, its western boundary by Old North Coast Road (P585), on its northern boundary by Cypress Drive and Banhinia Drive and along its eastern boundary by Harrison Drive and Poinsettia Road.

Existing traffic conditions have been assessed as part of the Traffic Impact Assessment (**Appendix E3**), as follows:

Intersection of Chris Hani Road and Old North Coast Road

There are currently very heavy through flows along both carriageways of Chris Hani Road during the morning peak hour. Long queues form along both carriageways of Chris Hani Road, along the north to east left-turn movement from Old North Coast Road into Chris Hani Road and the west to north left-turn movement from Chris Hani Road into Old North Coast Road. The left-turn slips from both Chris Hani Road and Old North Coast Road operate at relatively better levels of service during the afternoon peak period.

Intersection of Chris Hani Road, Rinaldo Road and North Coast Road

The intersection of Chris Hani Road, Rinaldo Road and North Coast Road experiences heavy flows along all approaches during the morning peak hour. The delays experienced are however acceptable during the morning peak hour.

Intersection of Old North Coast Road & Columbine Place

Long queues originating from the Chris Hani Road and Old North Coast Road intersection extend to this intersection and beyond, frequently. Queues are also formed by the right-turn movement into Columbine Place as there is not a right-turn bay into Columbine Place. Buses also contribute to queue formation as they stop along the road on both carriageways of Old North Coast Road at this intersection to drop-off / pick-up passengers.

Intersection of Old North Coast Road & Cypress Drive

Queues form along both approaches of Old North Coast Road and Cypress Drive. Queues form as a result of downstream effects at the Old North Coast Road and Columbine Place intersection and Old North Coast Road and Chris Hani Road intersection for the traffic stream travelling towards Chris Hani Road. Queues also form as a result of the right-turn movement into Cypress Drive for the northbound traffic stream along Old North Coast Road.

Intersection of Old North Coast Road & Sasswood Road

No queues were observed along Sasswood Road. There are very high through flows along Old

North Coast Road.

Intersection of Old North Coast Road, Sneezewood Road and Oak Street

Long queues form along both carriageways of Old North Coast Road and the approach from Sneezewood Road. Oak Street carries relatively lower traffic than Old North Coast Road and Sneezewood Road. The through flows along both carriageways of Old North Coast Road are very high. Sneezewood Road appears to be serving a lot of traffic from Glen Anil.

KwaMashu Diverging Diamond Interchange

There is currently very heavy through flow along Chris Hani Road eastbound carriageway and right-turn flow onto the N2 Southbound and this traffic presently forms long queues. The left- and right-turn flows from the N2 northbound off-ramp into Chris Hani Road are heavy and extend back to the N2 slow lane.

3.3.6 Visual

The area surrounding the proposed Rohill Business Estate can be described as a mix of urban, agricultural and residential environments. To the east of the site are the suburbs of Red Hill and Glen Hill, whilst to the west is the N2. There are many smaller commercial businesses and light industry between the proposed site and the N2.

Generally the proposed development falls within close proximity to an existing light industrial area. The area surrounding the development can be described as being a transitional landscape characterised by intermixed land use between rural, agricultural and urban areas. The sense of place around the proposed Rohill Business Estate could be that of light industry, agriculture and residential.

Residents living in close proximity to the proposed development (i.e. in the suburbs of Red Hill and Glen Hill), are considered to be the most visually sensitive towards the development, particularly those living directly adjacent to the development, as well as those who look directly onto the site.

3.3.1 Noise

The Noise Impact Assessment (**Appendix E16**) included a baseline noise survey to determine existing noise conditions in the site vicinity. Noise Sensitive Receptors (SR's) were selected based on proximity to the proposed site, and include residential properties in addition to an industrial receptor at SR4.

The baseline noise survey was undertaken in accordance with best practice methods as specified in SANS 10103 [1]. Measurements were taken at a standard height of 1.5 m and minimum of 3 m away from any reflecting surfaces. Both night and day time measurements

were recorded. Environmental noise measurement parameters measures include LAeq, LA10, LA90, and LAmax. The results show that the noise levels in the areas surrounding the proposed Rohill Business Estate have some variability, with the highest measurements recorded at SR4 (67.9 dB(A)). This is to be expected as SR4 is in close proximity to both the busy North Coast Road and the neighbouring industrial area. The remaining SRs are all located in suburban areas and have measured ambient noise levels below 60 dB(A). The LAeq values are in exceedance of the respective SANS Guidelines [1] for all locations apart from SR4. The receptor baseline noise levels and SR locations are presented in Table 3-1.

Table 3-1: Sensitive Receptor Locations and Baseline Noise Levels (Source: KWC, 2014)

Site	Location	Distance from Rohill	UTM Co-ordinates	Day Time			Night Time			Comments
				L_{Aeq} (dB(A))	L_{A90} (dB(A))	SANS Limit (dB(A))	L_{Aeq} (dB(A))	L_{A90} (dB(A))	SANS Limit (dB(A))	
SR1	Harrison Drive	145 m	309,492 m E 6,706,181 m S	59.4	43.1	50	56.1	43.7	40	Moderate to heavy vehicular traffic was noted as the main noise source
SR2	Cul-de-sac at the end of Cranberry Grove	113 m	309,601 m E 6,706,529 m S	51.6	43.8	50	54.5	43.9	40	Birds and insects noted during the monitoring period. Distant dogs barking, hammering, grinding and vehicular traffic noted.
SR3	Cul-de-sac at the end of Begonia Road	393 m	309,843 m E 6,706,272 m S	50.3	41.9	50	49.0	45.4	40	Main noise source from vehicles entering and exiting residential complex as well as birds and insects noted.
SR4	Corner of Columbine and NCR	50 m	308,715 m E 6,706,689 m S	67.9	61.2	70.0	57.3	54.5	60	Main noise source attributed to vehicular traffic on Columbine Road and NCR.
SR5	Cul-de-sac at the end of Hydrangea Place	236 m	309,541 m E 6,706,085 m S	59.6	45.3	50	49.6	46.4	40	Main noise source from distant vehicular traffic.

3.3.2 Cultural and Heritage Resources

Due to the nature of the site, it is unlikely that any heritage resources occur there. The Phase 1 Heritage Impact Assessment (**Appendix E17**) concluded that no heritage or archaeological sites or features were identified within the construction footprint.

4 ASSESSMENT OF ENVIRONMENTAL IMPACTS

4.1 Introduction

The purpose of this chapter is to describe and assess the potential impacts that may arise as a result of the construction and operation of the proposed Rohill Business Estate and to recommend associated and appropriate mitigation measures. These impacts include potential biophysical, ecological, economic and social environment impacts, which were identified during the Scoping Phase of the EIA.

4.2 Impact Assessment Methodology

4.2.1 Significance Rating Criteria

The impact assessment methodology, as covered in this section, considers a number of aspects listed below in order to calculate the significance of impacts linked with the construction and operation of the Rohill Business Estate. The predicted impacts fluctuate between qualitative and quantitative, depending on the need for appropriate classification of the impact.

The methodology used to rate all potential and identified environmental risks is as follows: Risk or Significance is determined using a quantitative ranking technique, and ultimately expressed as a High (13-18), Moderate (7-12.9), or Low (0-6.9) significance. The predicted impacts are described for the situation preceding mitigation as well as after the implementation of mitigation measures for those situations where impacts of significance are predicted. Regarding those cases where the mitigation requires time to establish, the consequential impact is based on the situation after establishment of the mitigation measures.

To ensure uniformity, the assessment of potential impacts is addressed in a standard manner so that a wide range of impacts are comparable. For this reason a clearly defined rating methodology has been used to assess the impacts identified in each specialist study. Each impact identified is assessed in terms of the following aspects:

- Status of the Impact (i.e. positive or negative).
- Probability of the Impact.
- Frequency of the Impact.
- Spatial Extent of the Impact.
- Intensity of the Impact
- Duration of the Impact

The significance of the impact upon each environmental factor is classified according to its quantitative evaluation (**Table 4-1**). This rating, however, is not a reflection of the environmental risk or severity of impact. In certain instances a specific factor may have been permanently altered, but the impact of that factor on the environment (natural, cultural, social) is marginal or even inconsequential. It is therefore important to analyse the entire scope of the impact and its context and not assess it entirely on the significance of the rating alone.

Table 4-1: Impact Assessment Scoring

Rating	Description	Quantitative Rating
Status (S)		
Positive	A benefit to the holistic environment	1
Negative	A detriment to the holistic environment	-1
Probability (P)		
Improbable	In all likelihood the impact will not occur	1
Low Probability	Possibility of the impacts to materialise is very low	2
Probable	A distinct possibility that the impact will occur	3
Highly Probable	Most likely that the impact will occur	4
Definite	The impact will occur regardless of any prevention measures	5
Frequency (F)		
Continuous	Daily	1
Frequent	Less than daily (hours)	0.8
Infrequent	Moderate frequency (weekly)	0.5
Occasional	Less than weekly (once or twice per month)	0.2
Spatial Extent (SE)		
Site Specific	Effects occur within the site/servitude boundary	1
Local	Effects extend beyond the site boundary	2
	Affects immediate surrounding areas	
Regional	Widespread	3
	Extends far beyond the site boundary	
	Effects felt within a 50km radius of the surface lease area	
National	Effects felt beyond the 50km radius	4
Intensity (I)		
Very Severe	Substantial deterioration/improvement	4
	Irreversible or permanent	
	Cannot be mitigated	
Very Beneficial	Permanent improvement and benefit	4
Severe	Marked deterioration	3
	Long term duration	
	Serious and severe impacts	
	Mitigation is very expensive, difficult or time consuming	
Beneficial	Large improvement	3
	Long term duration	

Rating	Description	Quantitative Rating
Moderately Severe	Moderate deterioration Medium term to long term duration Fairly easily mitigated	2
Moderately Beneficial	Moderate improvement Medium to long term duration	2
Slight	Minor deterioration Short to medium term duration Mitigation is easy, cheap or quick	1
Beneficial	Minor improvement Short to medium term duration	1
Duration (D)		
Short Term	0 - 5 years Less than the project life span	1
Medium Term	5 - 10 years	2
Long Term	15 - 40 years Life of project	3
Permanent	Where the impact will be irreversible and will remain	4
Significance		
NEGATIVE		
High	Negative long term/permanent change to the natural and social environment	13 - 18
Medium	Medium or long term effects to natural and social environment These effects are real and mitigation is possible, difficult and often costly	7 - 12.9
Low	Short term effects on the natural environment Effects are not substantial and are often viewed as unimportant Mitigation is cheap, easy, quick or seldom required	0 - 6.9
POSITIVE		
Low	No real benefit to the holistic environment	0 - 6.9
Medium	A benefit to the holistic environment Monitoring is needed Some mitigation is needed	7 - 12.9
High	To the greater benefit of the social and/or natural environment No mitigation or monitoring needed	13 - 18

4.2.2 Mitigation Measures

The significance of an impact gives one an indication of what mitigation measures need to be taken in order to control negative impacts and reduce environmental damage during the construction and operational phases. Mitigation measures are often modelled on natural controls found in ecosystems and incorporated into the project design. Suitable and appropriate mitigation measures were identified for each of the potential impacts based on specialist recommendations and GCS expertise.

Where applicable, each impact has been assessed and rated both without and with mitigation to reflect how the application of mitigation measures can change the environmental significance of an impact.

The recommended mitigation measures are incorporated in the Environmental Management Programme (EMPr) for the proposed Rohill Business Estate (Please refer to **Appendix F**).

4.3 Project Activities Potentially Resulting in Environmental Impacts

The nature of activities to be undertaken during construction and operation of the proposed Rohill Business Estate has the potential to cause on and off-site environmental damage. These activities are listed in the following sections.

4.3.1 Construction Phase Impacts

- Traffic congestion and disruption during construction of the new intersections and road upgrades.
- Removal of vegetation and infilling of wetlands and ephemeral streams for platform creation.
- Setting up of a construction camp site at the proposed site.
- Use of available roads and tracks, and creation of new roads for transportation of equipment materials and for construction site access.
- Use of transportation and construction vehicles and equipment.
- Noisy construction activities, such as heavy vehicles, jack hammers, hoists, cranes etc.
- Refuelling and maintenance of construction vehicles and equipment.
- Establishment and use of concrete batching equipment and/or a concrete batching facility.
- Resourcing, introduction, storage and use of construction material such as water, concrete, brick, fuel, oils, steel structures, equipment, construction waste and litter.
- Use of hazardous substances such as fuels, oils, paints, solvents, etc.
- Use of temporary ablution facilities on site for construction workers.
- Disposal of construction rubble and excess spoil material.
- Waste management during construction.
- Undertaking of potentially dangerous construction activities by construction workers.
- Stormwater management on the construction site which could result in erosion and soil loss.

4.3.2 Operational Phase Impacts

- Increased traffic as a result of operational activities and movement of heavy vehicles in and out of the site (transporting materials and goods).
- Traffic congestion and disruption during construction of further new intersections and long-term road upgrades.
- Maintenance of the open space areas on site for conservation and visual buffer purposes.
- Noisy operational activities at industrial facilities.
- Storage and handling of potential contaminants at workshops, fuelling stations or industries (e.g. fuels, oils, chemicals, paints).
- Sorting, storage and transportation of domestic, garden and hazardous waste.
- Use of ablution facilities.
- Stormwater management on site with discharge into the central watercourse, which could result in erosion and soil loss.

4.4 Impacts Identified in the Scoping Phase

A broad range of potential environmental impacts and issues were identified and described during the Scoping Process. Many of these can be grouped into 'over-arching' impact aspects which are cumulatively significant, and therefore warranted the need for specialist investigation and assessment as part of the Impact Assessment Phase of the project. The consolidated significant issues and concerns arising during the public participation process are summarised herewith, along with the reference of where in the Draft EIA Report this issue has been investigated (Table 4-2).

Table 4-2: Potential Impacts Identified in the Scoping Phase

Issues	Report reference for assessment of impacts
1. Alternatives and development layout • Investigate an office land use that will serve as a buffer/intermediate use between the Industrial land use and Residential land. • The 100 m buffer is not sufficient and needs to be larger. • Detailed plan of proposed development required.	• Refer to Chapter 2.5 for the alternatives assessment and detailed layout plans.
2. Impacts of Corobrik mining • Mine rehabilitation requirements prior to proposed development.	• Refer to Chapter 3.1.3 for details of Corobrik mining and planned decommissioning.
3. Traffic impacts • Increase in congestion. • Increased use of smaller residential roads by heavy vehicles. • Creation of unintended shortcuts for taxis and heavy vehicles. • Upgrade requirements and costs. • Location of access points.	• Refer to Chapter 4.8.4 for the assessment of traffic-related impacts. • Refer to the Traffic Impact Assessment in Appendix E3.

Issues	Report reference for assessment of impacts
4. Infrastructure and services impacts • Direct impact to cell phone tower and reception. • Increased sewage volumes. • Increased pressure on existing services and insufficient capacity to meet demands. • Upgrade requirements. • Damage to existing services. • Reduction in level of service.	• Refer to Chapter 2.4 for a description of infrastructure availability and requirements. • Refer to the Engineering Services Report in Appendix E1.
5. Geotechnical and soil stability impacts • Slope instability and financial and safety implications for onsite and neighbouring properties.	• Refer to Chapter 4.5.1.3 for the assessment of potential soil stability issues. • Refer to the Preliminary Geotechnical Assessment in Appendix E5.
6. Water contamination • Potential for surface/groundwater contamination from spills/leakages. • Soil erosion and sedimentation. • Spill contingency plans required for handling and storage of hazardous materials onsite.	• Refer to Chapter 4.5.2 for the assessment of water contamination impacts. • Refer to the Preliminary Hydrogeological Assessment in Appendix E5.
7. Stormwater management • Increased stormwater volumes. • Erosion and sedimentation of watercourses. • Impacts on municipal stormwater infrastructure and services in terms of increased volumes, current capacity, potential reduction in service and upgrades required. • Clarification of function of attenuation ponds: storage of clean water or contaminated stormwater. • Potential for flooding and property damage.	• Refer to Chapter 4.5.4 for the assessment of stormwater related impacts. • Refer to the Stormwater Management Plan in Appendix E2.
8. Social impacts • Change in sense of place and character. • Increase in crime (increased foot traffic). • Positive and negative security impacts. • Safety of workers. • Safety of travellers / pedestrians. • Reduction in privacy. • Changes in human movement and trade patterns.	• Refer to Chapter 4.8 for the assessment of social impacts. • Refer to the Social Impact Assessment in Appendix E4.
9. Socio-economic impacts • Increase in municipal rates base. • Decrease in property values. • Local economic development and job creation.	• Refer to Chapter 4.7 for the assessment of socio-economic impacts. • Refer to the Economic Impact Assessment in Appendix E14 and the Social Impact Assessment in Appendix E4.
10. Visual and aesthetic impacts • Visual impact on adjacent properties in Glenhills. • Height of buildings to be restricted to mitigate impact on the environment.	• Refer to Chapter 4.8.5 for the assessment of visual impacts. • Refer to the Visual Impact Assessment in Appendix E15.
11. Noise • Increased noise resulting from construction and operational activities.	• Refer to Chapter 4.5.5 for the assessment of noise impacts. • Refer to the Noise Impact Assessment in Appendix E16.
12. Air quality • Developments must ensure a low carbon footprint. • Potential for dust pollution in the construction phase. • Construction vehicles causing traffic	• Refer to Chapter 4.5.6 for the assessment of air quality impacts.

Issues	Report reference for assessment of impacts
congestion. • Increased traffic volumes in the operational phase can cause an increase air pollution from vehicles. • Potential for chemical/smoke pollutions & smells be arising from the factories.	
13. Open space management • Fencing of the open space area. • Responsibility for management and maintenance of open space. • Risks of informal settlement. • Maintenance and responsibility for buffer zone. • Water quality monitoring.	• Refer to Chapter 4.8.3 for the assessment of safety issues relating to the open space buffer. • Refer to the Rehabilitation and Conservation Management Plan in Appendix E19, as well as to the EMPr for details of open space management responsibilities.
14. Watercourses and wetlands • Wetland and riparian zone infilling. • Alteration of hydrological functioning and change in habitat of the wetlands and rivers. • Loss of wetland and riparian habitat. • Sedimentation of local water sources and rivers. • Issue of establishment of stormwater structures within wetlands.	• Refer to Chapter 4.6.3 for the assessment of impacts to watercourses and wetlands. • Refer to the Freshwater Ecosystems Assessment in Appendix E13, and the Wetland Rehabilitation Plan in Appendix E20.
15. Fauna • Impacts to onsite and surrounding fauna. • Impacts on local faunal biodiversity maintenance. • Impacts to threatened Pickersgill's Reed Frog, KwaZulu Dwarf Chameleon and various millipedes and molluscs. • Impacts to a colony of wild parakeet birds resident on site.	• Refer to Chapter 4.6.2 for the assessment of impacts to local fauna. • Refer to the Faunal Assessment in Appendix E9, and associated chameleon and amphibian specialist studies (Appendices E10-11).
16. Flora • Disturbance of floral species. • Loss of, or reduction in, local biodiversity. • Impacts to adjacent D'MOSS area. • Require a buffer zone to adjacent D'MOSS area.	• Refer to Chapter 4.6.1 for the assessment of impacts to local flora. • Refer to the Vegetation Impact Assessment in Appendix E8.
17. Cultural and heritage resources • The effect of the proposed development on archaeological artefacts.	• Refer to Chapter 4.5.2 for the assessment of impacts relating to Cultural and Heritage Resources. • Refer to the First Phase Cultural Heritage Impact Assessment in Appendix E17.
18. Agricultural impacts • The effect of the proposed development on agricultural activities.	• Refer to Chapter 4.7.4 for the assessment of agricultural land potential. • Refer to the Natural Resources and Agricultural Land Potential Assessment in Appendix E6.
19. Waste management • A Waste Management Plan is required detailing how waste is going to be managed within the proposed development. • Further details required in terms of anticipated general and hazardous waste to be generated during construction and operation phases.	• Refer to Chapter 4.5.2 for the assessment of waste-related impacts. • Refer to the Waste Management Plan included in the EMPr.
20. Cumulative impacts • It is anticipated that the development of the Proposed Business Estate will create a number of cumulative impacts.	• Refer to Chapter 4.5.2 for the assessment of cumulative impacts.

4.5 Biophysical Impacts

4.5.1 Earthworks and Soil Management

4.5.1.1 Soil Erosion and Sedimentation

a) Impact Description

During the start of the construction phase, major earthworks required for platform creation and ground preparation is likely to be the major source of potential soil-related impacts, such as soil erosion and sedimentation. Vegetation within the construction footprint will be cleared at the onset of the project. The movement of soil during platform creation is likely to result in the creation of large soil stockpiles on site until platforms are established, and large amounts of soil will be moved by truck to different platforms as part of cut-to-fill operations. In addition, access roads will be established on site for the movement of construction vehicles. These activities will leave the soil surface uncovered and unprotected, and this is when soil erosion is most likely to occur as rain and wind erode soil particles which are then carried away and deposited into water systems or dispersed by the wind.

The erosion of topsoil or subsoil may lead to the following impacts:

- Deterioration of soil conditions in areas marked as 'open space' for rehabilitation and conservation purposes. Soil erosion may lead to a loss of nutrients, scouring of soil and loss of topsoil, as well as ground instability.
- Eroded soil from the site deposited down slope or downstream can inhibit or delay the emergence of seeds and bury small seedling and plants.
- If sediment run-off from the site reaches the central watercourse or wetlands on site, or moves off site to downstream water systems, it can accelerate scouring of streams or alternatively, in slower moving waters, it can clog stormwater drains and stream channels, cover fish spawning grounds, fill in wetlands and reduce downstream water quality. If severe amounts of sediment load from the site enter into the watercourse or wetlands it could result in a possible destruction of these systems, including species reliant on these systems (such as the Spotted Shovel-nosed Frog identified on site).
- If hazardous substances are spilled on the site they can be transported along with the eroded soil and water and contaminate or pollute downstream watercourses and wetlands.

During the operation of the site, the majority of activities will be restricted to areas with hard standing and few soil-related impacts are anticipated. There is the potential for soil

erosion to occur within any open green spaces on the edge of embankments on either side of the central watercourse or wetlands, or areas maintained as 'natural vegetation (i.e. 100 m buffer to Glenhills) if vegetation has not properly established, or if stormwater discharge is not undertaken correctly in line with the SWMP (**Appendix E2**). This is especially true during high rainfall periods. It is noted that the SWMP incorporates the design of discharge points leading directly into the central watercourse. Should the SWMP not be properly implemented, erosion can occur during periods of peak water flow from the stormwater discharge points, as the fast moving water has increased energy and can potentially erode soil, undercut pipes, destabilise and collapse banks or remove vegetation, transporting it downstream until it is deposited in a water system (i.e. wetlands/central watercourse).

b) Impact Assessment and Rating

Soil erosion will be more prominent during the construction phase of the project due to the fact that the vegetation will be removed or excavated from the construction site and the remaining soil surfaces will be bare. However, the subsoil and bedrock specific to this site, which is comprised of Vryheid Formation shale, Berea Formation clayey sand and Karoo dolerite, are not considered to be highly erodible. They are therefore unlikely to be eroded by wind and only to a limited extent by concentrated flows of water. The impact therefore has a low probability of occurrence, and would likely only occur on an infrequent basis during high-wind or rainfall events. The effects may extend to the immediate surrounding areas, and the intensity of the impact may lead to moderate deterioration of on-site soil conditions or watercourse/wetland ecological functioning. The impact rating for soil erosion and sedimentation impacts in the construction phase is **Medium** (negative) without mitigation, and **Low** with mitigation.

During the operation of the Rohill Business Estate, most of the cleared surfaces will be re-vegetated and rehabilitated, which will reduce the potential for soil erosion to occur. The hard surface areas of new platforms will, however, increase the rate and volume of runoff and, in turn, result in accelerated soil erosion at discharge points or in open space areas if not mitigated. The impact probability is very low, and would only occur during periods of high water flow. However, should the impact occur, it would likely extend to the immediate surrounds of the site and have a moderately severe intensity. The impact rating in the operational phase is **Medium** (negative) without mitigation, and **Low** with mitigation.

Please refer to Table 4-3 for a summary of impact ratings.

c) Mitigation Measures

The following mitigation measures are recommended in order to reduce the potential and intensity of soil erosion and sedimentation impacts in the construction and operational phases:

- Prevent soil erosion on site at all times, i.e. pre-, during- and post- construction activities. This can be achieved by implementing erosion control measures in areas sensitive to erosion such as near water supply points, edges of slopes, etc. Measures for the construction phase could include the use of sand bags, hessian sheets and retention or replacement of vegetation.
- As far as possible, undertake soil stockpiling and earth-moving activities on slopes or in close proximity to wetlands / the central watercourse during the dry winter months, to reduce the potential for soil erosion. Where this is not possible (as it is noted that construction activities will extend over one year), silt fences must be installed around stockpiles to prevent erosion and downstream sedimentation, and erosion control measures must be installed on slopes adjacent to the wetlands / watercourse.
- Specific design measures for stormwater management infrastructure must be implemented according to the SWMP (SMEC, 2014).
- The drainage outlet to the attenuation pond must be constructed so as to accommodate severe flooding, in line with recommendations of the SWMP.
- Minimise erosion by reducing the flow velocity of stormwater within the camp and construction site using appropriate attenuation measures.
- Stabilise and manage cleared areas to prevent and control erosion.
- Capture storm water effectively and direct well away from soil stockpiles and exposed soil.

The above mitigation measures are not exhaustive and more detailed mitigation is covered in the EMPr.

4.5.1.2 Subsoil Saturation

a) Impact Description

An impact which may occur in the construction phase is related to subsoil drainage. As noted in the Geotechnical Assessment (**Appendix E5**), the nature of *in-situ* clay subsoils capping the bedrock on this site (which are of typically low hydraulic conductivity) indicates that during lengthy periods of heavy rainfall, a perched water table will develop in the upper ~0.5 – 1 m of soil, this groundwater seepage migrating fairly rapidly downslope toward the main drainage lines. In migrating from the spur crests toward the main drainage lines, the perched groundwater will make use of preferential paths down the spur slopes, these being evident as depressions within the natural slope. Within these depressions, the clay subsoils underlying the sandy colluvium will be prone to remain very moist or wet for much of the year round, although the moisture is likely to be largely retained within the clay, hence not likely to present itself as perennial seepage. This has the potential to

impact on the platforming process in terms of stability concerns and groundwater seepage to the surface. This may transfer into the operational phase if not property addressed in the construction phase.

b) Impact Assessment and Rating

The potential for subsoil drainage mismanagement to occur in the creation of platforms without mitigation is distinctly probable. The impact will likely be restricted to within the boundaries of the site, and the duration of the impact is expected to be medium term. Should subsoil drainage not be properly implemented, the intensity of the impact may be severe in terms of causing delays in the construction phase, potential damage to buildings and platforms, and potential safety issues. Mitigation would be significantly more expensive than the cost of correct design and construction upfront. The impact has a significance rating of **Medium** without mitigation, and **Low** with mitigation. Please refer to Table 4-3 for a summary of impact ratings.

c) Mitigation Measures

During the development of this site, it will be necessary to administer subsoil drainage to the wet areas where crossed by the proposed earthworks. The subsoil drainage will take the form of a network of pipes, leading into a main subsoil drainage pipe (known as a herringbone layout). It is likely that subsoil drainage pipes will discharge into the central watercourse, in a controlled manner according to the SWMP.

4.5.1.3 Impacts on Geological Stability

a) Impact Description

As noted in the Geotechnical Assessment (**Appendix E5**), the creation of large cut-to-fill platforms presents a number of stability concerns, particularly for areas on site underlain by shale bedrock, as this is prone to subsidence. Should the geotechnical recommendations made not be properly implemented, this has the potential to result in serious instability being introduced either during or post-construction.

b) Impact Assessment and Rating

The potential impacts relating to slope instability on site may be severe in terms of both financial and safety issues. The impact may extend beyond the boundaries of the site, and may affect businesses and residences adjacent to the site if the recommended safety and foundation measures are not implemented. Impact duration would be medium term and would be expensive and difficult to mitigate should it occur. The impact has a significance rating of **Medium** without mitigation, and **Low** with mitigation. Please refer to Table 4-3 for a summary of impact ratings.

c) Mitigation Measures

Ensure implementation of recommendations made in the Geotechnical Assessment (**Appendix E5**), such as the construction of a suitable foundation along the toe of the proposed embankments in order to ensure long-term stability. This involves the excavation of any soft *in-situ* soils along the toe of the new fill embankments, and replacement of such material with a durable crushed rock fill and appropriate subsoil drainage. The foundation structures should be positioned largely in areas of 'cut' (where excavation of the natural ground has been carried out and hence bedrock is relatively shallow).

It is noted that Drennan Maud (Pty) Ltd will be involved in the assessment of fill embankment stability throughout the course of the earthworks contract; in order to ensure that foundations are taken to the optimum depths required ensuring long term structural stability.

Table 4-3: Soil Erosion and Sedimentation Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Earthworks and Soil Management	Soil Erosion and Sedimentation	-7.5	Medium	-5.5	Low
	Subsoil saturation	-9.8	Medium	-6.8	Low
	Impacts on Geological Stability	-9.8	Medium	-6.8	Low
OPERATIONAL PHASE					
Earthworks and Soil Management	Soil Erosion and Sedimentation	-9.2	Medium	-6.2	Low

4.5.1.4 Change in Land Use: Cessation of Mining Activities

d) Impact Description

The proposed development will result in a positive impact in terms of the change in land use from invasive excavation of shales in current mining activities by Corobrik, and associated environmental degradation, to one of a managed property with rehabilitated open space areas.

e) Impact Assessment and Rating

The potential impacts relating to the proposed change in land use and the cessation of mining activities on site will definitely occur. The impact will be confined to the site for the most part, although will extend into the immediate area from a visual and noise perspective. Impact duration would be permanent (for the life of the project), and will

show a marked change in site conditions. The impact has a significance rating of **High (positive).** Please refer to Table 4-3 for a summary of impact ratings.

f) Mitigation Measures

No mitigation measures are required.

Table 4-4: Change in Land Use Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
OPERATIONAL PHASE					
Earthworks and Soil Management	Change in Land Use: Cessation of Mining Activities	13	High		

4.5.2 Soil, Surface and Groundwater Contamination

a) Impact Description

During the construction phase, the storage and handling of hazardous substances (such as fuel, oil, chemicals or hazardous waste) can result in accidental or negligent small scale spills. This can potentially contaminate soil, surface and groundwater resources with associated toxicological effects to water users depending on the extent of the contamination. In the case of groundwater contamination, the impacts to underground water resources will be long lasting and very difficult to remediate. According to the Hydrogeological Assessment (**Appendix E7**), the baseflow component or shallow groundwater seepage on the Rohill site plays a prominent role in surface water and wetland ecology. Therefore, groundwater impacts will have an influence on water quality of surface seepage and on site wetlands. Should contaminated surface water move off site (highly likely considering the topography of the site, where all stormwater runoff will flow downhill and into the central watercourse), this will cause downstream water systems, such as riparian habitats/wetlands, to be contaminated. Soil erosion has the potential to contaminate watercourses/wetlands in terms of sedimentation, as discussed previously in Chapter 4.5.1.1.

During the operational phase, contamination arising from oil and fuel spills on the roads, as well as from potential spillages/leaks at workshops or waste storage areas, could potentially lead to stormwater contamination should such contaminants drain into the stormwater system. Potential sedimentation of watercourses/wetlands is also a potential impact in the operational phase, where the poor management of stormwater may lead to soil erosion at discharge points.

b) Impact Assessment and Rating

During the construction and operational phases, there is a distinct possibility for contamination of soils or water to arise from accidental or negligent spillages/leaks, as well as from sedimentation, without the implementation of mitigation measures. The impact is expect to be localised on site, however should impacts occur, they may result in a marked deterioration of water/soil quality and be very expensive or difficult to remedy. Hazardous substances that are spilled onto the site through construction activities and not cleaned up can leach into the soil resulting in soil contamination and further entering the groundwater system from which contaminants are easily dispersed and can negatively impact on the downstream environment.

Soil and water contamination can have significant consequences for local ecosystems as even small amounts of contaminate can alter the soil and water chemistry and affect the sensitive microorganisms and plant species that inhabit these environments. The effect of this can be damaging to individual species and populations and, if severe, to entire ecosystems. Hazardous substances such as hydrocarbons spilled onto the site/roads follow similar flow paths but have much greater ecological impacts than other less dangerous contaminants.

Construction and operational phase impacts are rated as having a **Medium** significance before mitigation and **Low** after mitigation, however it is important to note that this cannot be accurately predicted at this stage, as the degree of pollution will vary depending on the nature and concentration of the contaminant, and the receptor affected. Please refer to Table 4-5 for a summary of impact ratings.

Table 4-5: Soil, Surface and Groundwater Contamination Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Soil, Surface and Groundwater Quality	Contamination of soils or water by hazardous substances.	-9.8	Medium	-6.8	Low
	Contamination of watercourses / wetlands via sedimentation	-9.8	Medium	-6.8	Low
OPERATIONAL PHASE					
Soil, Surface and Groundwater Quality	Contamination of soils or water by hazardous substances.	-11.2	Medium	-6.2	Low
	Contamination of watercourses / wetlands via sedimentation	-9.2	Medium	-6.2	Low

c) Mitigation Measures

Good environmental management practices must be followed to prevent potential contamination of soil and water resources. Typical mitigation measures should include the following:

- A detailed Spill Prevention and Management Plan must be prepared for the construction and operational phases of the project, to be implemented and monitored on an ongoing basis (dependent on types and quantities of potential contaminants stored on site).
- Safeguard hazardous substances from being stolen, vandalised, catching fire or spilling on open ground.
- Ensure storage areas are bunded (110% of volume stored) to contain any leaks or spills during construction.
- Ensure that maintenance activities are undertaken in such a manner that no spillage of hazardous substances occur.
- Install appropriate waste collection and disposal procedures and facilities.
- Ensure that alien vegetation control and spraying with herbicides is undertaken by a trained and experienced professional qualified to do so.
- As far as possible, alien vegetation removal on slopes or in close proximity to wetlands / the central watercourse during the dry winter months, to reduce the potential for water contamination by herbicides.
- Adhere to all requirements of the Occupational Health and Safety Act and associated Regulations and any amendments thereto that are relevant for management of hazardous substances.
- Compile and implement a detailed Stormwater Control Plan, in line with the findings of the SWMP and the Conceptual Wetland Rehabilitation Plan (**Appendix E20).**

A number of additional mitigation measures are recommended in terms of water monitoring:

- It is recommended that the central watercourse running through the site be sampled on a quarterly basis upstream of the site and at the down-stream area where it leaves the site.
- No data currently exists to supply the developer with an idea of current groundwater quality or depths, as no boreholes exist. We suggest that, for future reference, the owner of the site must have such information at hand (i.e. baseline water quality data) to overcome future disputes or litigation if any issues occur.
- No groundwater monitoring network is recommended for this planning phase, but if any water quality issues are identified as a result of sampling, it is recommended that a follow up hydrogeological assessment be conducted and that small diameter

boreholes, located hydraulically up-gradient of the sites and pre-identified hydraulically down-gradient of the sites, be constructed. These can be used as a detection system for ongoing groundwater monitoring purposes. Such a monitoring programme must be confirmed with the local Department of Water and Sanitation.

4.5.3 Reduction in Groundwater Baseflow

a) Impact Description

As identified in the Hydrogeological Assessment undertaken by GCS (2014) (**Appendix E7**), the creation of platforms covered with an impermeable surface may result in a reduction in recharge to the underlying aquifers during the final stages of the construction phase and the operation phase. This may have a negative impact on localized wetlands and reduction in baseflow to the streams.

b) Impact Assessment and Rating

The potential impacts relating to the reduction in groundwater quality are not likely to occur, but will extend from the final stages of the construction phase through the duration of the operational phases as the hard-surface on will reduce the amount of rainwater infiltrating into the soil. The impact may extend beyond the boundaries of the site to the immediate surrounds. The impact has a significance rating of **Medium** without mitigation, and **Low** with mitigation.

Please refer to
Table 4-6 for a summary of impact ratings.

Table 4-6: Groundwater Reduction Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Groundwater Quantity	Reduction in groundwater baseflow	-7.2	Medium	-4.2	Low
OPERATIONAL PHASE					
Groundwater Quantity	Reduction in groundwater baseflow	-9.2	Medium	-6.2	Low

c) Mitigation Measures

No data currently exists to supply the developer with an idea of current groundwater quality or depths, as no boreholes exist. It is recommended that, for future reference, the owner of the site must have such information at hand (i.e. baseline water quality and

volume data) to overcome future disputes or litigation if any issues occur.

No further mitigation measures for groundwater recharge are applicable, other than ensuring that the SWMP is implemented such that clean and dirty water are separated and clean water is directed downstream to the central watercourse at numerous discharge points.

4.5.4 Stormwater Management

a) Impact Description

The construction and operation of the Rohill Business Estate can alter and impact the natural stormwater flow regime if not properly managed. Once constructed, the majority of previously vegetated areas will be covered by hard-standing impermeable surfaces (levelled platforms and access roads) which can alter and/or increase the flow, volume and velocity of water runoff into the environment causing modifications of surface water flows which can have implications for aquatic systems in the central watercourse/wetlands in terms of their natural hydrological flow regimes. There is also the potential for onsite or downstream flooding if the flow and velocity is not managed within the capacity of the proposed stormwater infrastructure.

b) Impact Assessment and Rating

The construction phase of the Rohill Business Estate should initially have a low potential impact on stormwater flow, increasing as the platforms are constructed and hard-surface such as roads, parking areas and building foundations are laid. Stormwater management infrastructure will also be put in place in the construction phase. During the early stages of construction, stormwater will continue to follow into natural flow paths towards the central watercourse until such time as the stormwater system redirects water flow into specified discharge points. A number of small ephemeral streams which currently feed into the central watercourse will be in-filled as part of the development, and therefore it is critical that stormwater management account for this drainage.

Stormwater systems which modify natural water flow paths have the potential to cause modifications of surface water flows which can have severe implications for adjacent aquatic systems in terms of their natural hydrological flow regimes. If not properly managed, water flows and particularly peak storm flows, can cause unnaturally high water contributions to rivers and wetlands. The contribution of additional quantities of surface runoff over a much shorter period of time exacerbates the issues attributed to physical damage to aquatic ecosystems, i.e. increased erosion, sedimentation and damage to vegetation. The potential alteration of the stormwater flow regime at Rohill is expected to be short-term during the construction phase, with the impact extended to the immediate surrounds and causing moderate deterioration to hydrological systems if not properly

managed. During the operational phase, the alteration of the stormwater flow regime will be long-term (i.e. duration of the project), but is not expected to result in serious modification of natural systems, considering that the SWMP for Rohill is a key part of the planning process and has been produced to minimise potential impacts during the operational phase. Both construction and operational phase impacts are rated as **Medium** before mitigation, and **Low** after mitigation. Please refer to Table 4-7 for a summary of impact ratings.

Table 4-7: Stormwater Management Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Stormwater Management	Alteration of stormwater flow regime	-7.2	Medium	-4.2	Low
OPERATIONAL PHASE					
Stormwater Management	Alteration of stormwater flow regime	-9.2	Medium	-6.2	Low

The Rohill Business Estate's SWMP has been compiled to ensure appropriate management of discharge volumes and points to minimise the impact on properties downstream. However, it is noted that the presence of wetlands on site may necessitate specific stormwater management designs to incorporate measures to ensure the successful rehabilitation and conservation of wetlands. Therefore, the Conceptual Wetland Rehabilitation Plan (**Appendix E20)** will inform this process prior to commencement of the construction phase. Close monitoring of construction activities is recommended so as to identify possible risks early before they manifest into serious issues.

c) Mitigation Measures

Stormwater will be managed primarily by means of a stormwater drainage system discharging into the central watercourse at a number of discharge points, with an attenuation pond in the lower portion of the watercourse to prevent high flows of water from leaving the site. In addition the following mitigation measures are recommended:

- Mitigation measures for the prevention of spillages/leakages, and for the correct handling, storage of disposal of waste, must be implemented (as per the EMPr).
- Installations must be provided to contain pollution as close to source as possible and in a practical location for servicing.
- The potential increase in flood peaks must be mitigated to at least pre-development levels by the provision of sufficient stormwater attenuation facilities

at micro and macro levels.

- The potential increase in flood volumes must be mitigated where possible by subsoil infiltration, retention of runoff in on-site facilities for irrigation use and unsaturated wetland areas where evaporation and infiltration can help to reduce flood runoff rates.
- Prior to any physical work proceeding on site, a Stormwater Control Plan detailing the proposed stormwater control measures is to be formulated.
- A stormwater systems model should be developed during the detailed design phase to determine peak flood flow rates and flood levels and assess the collective impacts of development on runoff patterns. The outputs from the modelling will provide the input data required for the design of culverts, channels and other stormwater infrastructure associated with the proposed developments.
- The proposed stormwater attenuation facility should be designed for the 50-year storm event and located at an appropriately selected site. Site selection must take account of the necessary geotechnical, environmental and topographical conditions, including wetland conservation.
- The Conceptual Wetland Rehabilitation Plan (**Appendix E20)** must inform the detailed Stormwater Control Plan and designs in terms of attenuation of stormwater, preventing possible damage to the central watercourses or wetlands, and ensuring their successful rehabilitation.
- The construction of stormwater management infrastructure must take into consideration the required measures for protection of valuable faunal species on site, and adhere to any buffer requirements made by Ezemvelo KZN Wildlife.

4.5.5 Noise

a) Impact Description

Ambient noise levels are expected to rise during the construction and operation of the Rohill Business Estate. The Social Impact Assessment (**Appendix E4**) noted that one of the major concerns of nearby residents is the potential for noise disturbance. Accordingly, a noise impact investigation was undertaken by WardKarlson Consulting Group (**Appendix E16**).

Construction activities may result in noise disturbance to nearby residential areas and surrounding business. Such activities include: increased traffic entering and exiting the site; the movement of construction and earth-moving vehicles for creation of platforms; operation of generators; noise from hydraulic hammers and winches; and general construction noise. In additional, a potential increase in noise levels experienced by sensitive receptors in the surrounding residential areas may occur as a result of the creation of platforms, as residents have noted that the existing hill on site acts as a noise

barrier from the N2 highway and existing industrial areas. The levelling of this site would then alter the noise barrier that currently exists.

Operational activities may result in noise disturbance on a long-term basis from industrial activities on site, as well as from the increased traffic movement in and out of the site. It is noted that one of the major concerns raised by residents is the potential for night-time noise to be generated from factories or businesses working night-shifts. In these cases, industrial noise/sirens may cause disturbance if not properly controlled or screened.

b) Impact Assessment and Rating

Traffic-related and construction activity noise impacts in the construction phase are anticipated to be short-term, and there is a distinct possibility of occurrence, considering the close proximity of the residential areas. The impacts will extend to the immediate surrounding area, and will most likely occur on a daily basis during the construction phase. The impact is rated as having a **medium** (negative) significance.

Traffic-related and operational activity noise impacts in the operational phase are anticipated to be long-term (i.e. for the duration of the project), although results of the Noise Impact Assessment indicate that the possibility of this impact occurring from the Rohill Business Estate in isolation is very low, as noise level results of noise modelling were below the relevant SANS guidelines. The impacts will extend to the immediate surrounding area, and will most likely occur on a daily basis during the operational phase. The impact is rated as having a **medium** (negative) significance. However, it is noted that noise impacts cannot be accurately predicted at this stage, as the exact industrial activities occurring on site are not known. Mitigation measures have been included in this assessment as a provision, should there be a need for inclusion of such measures in the design of the development. Please refer to Table 4-8 for a summary of impact ratings.

Table 4-8: Noise Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Noise	Noise disturbance from increased traffic	-9.0	Medium	-6.8	Low
	Noise disturbance from construction activities	-9.0	Medium	-6.8	Low
OPERATIONAL PHASE					
Noise	Noise disturbance from increased traffic	-8.0	Medium	-6.5	Low
	Noise disturbance from operational activities	-8.0	Medium	-6.5	Low

Cumulative noise impacts are anticipated for the project, and have been assessed in Section 4.9 of this report.

c) Mitigation Measures

The implementation of the following mitigation measures is expected to reduce the potential impact significance to a **Low** rating:

- It is recommended that the Body Corporate of the Business Park establish a set of rules about hours of construction and operation to prevent noise pollution at inappropriate hours (sirens/alarms). The relevant ratepayers associations should be consulted in this process.
- It is recommended that trees and other vegetation are planted within the Business Estate as part of site landscaping, and within the open space buffer to act as a noise screening barrier between noise sources and sensitive receptors..
- Construction vehicles are to be well maintained and fitted with silencers prior to the construction phase.
- Generators and other noisy equipment to be situated within an enclosure for noise screening, and to be properly maintained at all times.
- Reverse hooters of heavy earthmoving vehicles must be set at recommended levels to comply with safety requirements.
- Detailed designs to incorporate recommendations of the Noise Impact Assessment, such as window design, road layout design, and noise screening.
- Adhere to recommendations of the Traffic Impact Assessment to limit traffic impacts in the operational phase, i.e. required road upgrades, in consultation with the eThekwini Transport Authority.
- As no noise monitoring is deemed necessary for the project, monitoring will be in the form of keeping a record of any complaints lodged by members of the public or employees working on site in the construction or operational phases. Ensure that all complaints and non-compliances are actioned, with the action recorded in the Complaints Register.

4.5.6 Air Quality

a) Impact Description

Construction activities may result in a reduction in local air quality from dust generation and vehicular emissions, potentially affecting nearby residents and land-users. Dust generating activities include vegetation-clearing, earth-moving activities for levelling of platforms, creation of soil stockpiles for platforms, creation of access roads and

construction of buildings and associated infrastructure. Residents have expressed a concern that increased levels of dust may increase the cost of maintaining their properties. Activities which may generate vehicular emissions, potentially resulting in a health impact to sensitive receptors, include the operation of construction and earth-moving vehicles.

Operational activities may result in air quality impacts in terms of the release of emissions from industrial activities on site, and the dispersal of vehicular emissions from increased traffic within and in the vicinity of the site.

b) Impact Assessment and Rating

Air quality impacts relating to the release of vehicular emissions and the dispersal of dust in the construction phase are anticipated to be short-term, and there is a distinct possibility of occurrence, considering the close proximity of the residential areas and the fact that large volumes of soil will need to be moved in the creation of platforms. The impacts will extend to the immediate surrounding area if not mitigated, and will occur on a regular basis during the construction phase. These impacts are rated as having a **medium** (negative) significance.

Air quality impacts relating to industrial and vehicular emissions in the operational phase are expected to have a low probability of occurrence, as the types of industries planned for the site will most likely not involve the emission of air pollutants. However, this can only be accurately determined once the tenants for the Rohill site are secured. The impacts are anticipated to be long-term (i.e. for the duration of the project), and will extend to the immediate surrounding area. These impacts are rated as having a **medium** (negative) significance. Please refer to Table 4-9 for a summary of impact ratings.

Table 4-9: Air Quality Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Air Quality	Dust pollution from earth-moving activities	-9.8	Medium	-5.8	Low
	Air pollution from vehicular emissions	-8.8	Medium	-5.8	Low
OPERATIONAL PHASE					
Air Quality	Air pollution from industrial processes	-9.8	Medium	-6.8	Low
	Air pollution from vehicular emissions	-9.8	Medium	-6.8	Low

Cumulative air quality impacts are anticipated for the project, and have been assessed in Section 4.9 of this report.

c) Mitigation Measures

The implementation of the following mitigation measures is expected to reduce the potential impact significance to a **Low** rating:

- Construction vehicles to be well maintained to reduce emissions, and speed limits to be strictly adhered to.
- Dust suppression measures or temporary stabilising mechanisms must be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including platform areas, access roads, borrow pits, construction camp, etc.
- No erodible materials may be excavated, handled or transported under high wind conditions. Seed long-standing soil stockpiles and exposed areas of the site. Soil stockpiles must be wetted and/or sheltered from the wind.
- Should fires be required on site in the operational phase for the control of alien vegetation, residents of the adjacent suburbs must be notified via the relevant Ratepayers associations beforehand, and fires must be controlled so as not to cause damage to any private property or result in excessive levels of smoke.
- No construction vehicles or trucks will be permitted to travel within residential roads.
- Once the types of industries to be constructed on site have been confirmed, JT Ross must determine whether any further studies or management plans are required, based on whether or not any air pollutants will be emitted. The relevant legislative requirements must also be determined at this stage.

4.5.7 Waste Management

a) Impact Description

Waste generated on the site during construction phase will include excess soil and excavated material (subsoil and rocks) from platform levelling, as well as construction and domestic waste. Small quantities of hazardous waste may be generated due to accidental spills of fuels or oils. Should any spills or leakage occur, the potential for soil, groundwater and surface water contamination exists. It is the potentially contaminated soil, or materials used to clean up spills (such as rags or containers) that constitute a hazardous waste. In addition, liquid waste such as collected oils from drip trays or contaminated stormwater, is considered to be hazardous waste. Waste generated during the construction process and in the contractors' camp will be the responsibility of the contractor.

Waste which is likely to be generated in the operational phase includes both solid and liquid

waste comprising general litter, general waste, garden waste, hazardous waste, sanitary waste, and contaminated water or collected contaminants. The latter may consist of used oil, spills from fuel storage areas collected in bunds, oil from drip trays used at workshops, and the sludge collected from oil interceptors/silt traps. Improper management of all waste, will result in both direct and indirect soil and water pollution both on site and in the immediate surrounds, or at the final disposal site. Considering the sensitive nature of the area (i.e. central watercourse and wetlands present on site, and presence of sensitive fauna), such pollution, regardless of volume or concentration could lead to significant ecological damage.

b) Impact Assessment and Rating

Construction phase impacts associated with waste management, in terms of the handling, storage and disposal of general, construction and hazardous waste (as well as excess excavated material), are expected to continue for the duration of the construction phase. There is a distinct possibility that the impacts will occur if waste is not properly managed, and the intensity of these impacts may be severe and expensive/ time-consuming to mitigate. The impact may extend beyond the site boundaries in terms of the incorrect storage/disposal of waste, e.g. if waste is not disposed of at an appropriately licensed landfill site. Construction phase impacts are rated as having a **Medium** significance (negative). The implementation of mitigation measures for the construction phase is expected to reduce impact significance to a **Low** rating.

Operational phase impacts associated with waste management, in terms of the handling, storage and disposal of general or hazardous waste are expected to continue for the duration of the operational phase (i.e. long term impact). There is a distinct possibility that the impacts will occur if waste is not properly managed, and the intensity of these impacts may be severe and expensive/time-consuming to mitigate. The impact may extend beyond the site boundaries in terms of the incorrect storage/disposal of waste, e.g. if waste is not disposed of at an appropriately licensed landfill site. Operational phase impacts are rated as having a **Medium** significance (negative). After mitigation, operational phase impacts are expected to reduce in significance, but are still rated as **Medium**, as the duration of the impact would be long-term. Please refer to Table 4-10for a summary of impact ratings.

Table 4-10: Waste Management Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Waste Management	Pollution arising from poor waste management	-10.0	Medium	-6.0	Low
	Pollution arising from poor management of excess soil	-9.5	Medium	-4.2	Low
OPERATIONAL PHASE					
Waste Management	Pollution arising from poor waste management	-12.0	Medium	-8.0	Medium

c) Mitigation Measures

The management of waste during the construction and operational phase is critical in ensuring that all waste is stored, handled and disposed of in such a manner as to prevent any contamination of the site/surrounding environment, especially considering the sensitive ecological habitats on site. The EMPr prepared for the project incorporates a detailed Waste Management Plan with mitigation measures related to waste management during and post construction. The key mitigation measures are summarised as follows:

- Implement appropriate training and induction procedures to ensure all sub-contractors adopt best practice waste minimisation procedures.
- Establish a contract with the waste service provider specifying the requirements for removal and disposal of waste generated on site.
- Ensure that an adequate number of correctly labelled waste receptacles are provided on site in the construction and operational phase.
- Implement the correct handling and disposal procedures as required by the NEM:WA and according to best practice.
- Reduce the amount of waste generated from the construction and operational phase by means of efficient operations and recycling of general waste.
- Hazardous waste must be stored separately in sealed containers, on a bunded impermeable surface, and collected by a hazardous waste service provider for safe disposal or recovery.

4.6 Ecological Impacts

4.6.1 Flora

a) Impact Description

A Vegetation Impact Assessment was undertaken for the project, and is available in **Appendix E8**.

While much of the site is transformed through cultivation of sugar cane and clay mining, the vegetation remaining on site is largely dominated by alien vegetation, and has little ecological value except as open space or habitat for fauna. Some of the vegetation components on site which include indigenous species will require specific mitigation measures. The following potential impacts have been identified which may occur during the construction phase:

- Removal of vegetative cover leading to a loss of ecological habitat/open space for movement of fauna on site.
- Loss of some indigenous tree species in the Mixed Woodland Community on the northern boundary of the site.
- Loss of Red Data List species, *Crinum macowanii*, during earth-moving and platform creation. It is noted that it is highly unlikely that the species is still present at this location, as mining activities has expanded into the area. However, this potential impact has been assessed in this section as it is possible that some individuals may be present on site which have not yet been detected.
- Potential damage to vegetation or hydrological conditions in the Mixed Hydrophytic Community located in the wetland north-east corner of the property adjacent to the D'MOSS area, and within other delineated wetland areas.
- Clearing of or damage to vegetation within the Secondary Thicket and Secondary Grassland Communities, which are located along the central watercourse, during the construction of embankments, roads, platforms and stormwater infrastructure.
- Potential damage to vegetation within the Northern Coastal Forest situated within the D'MOSS area. It is noted that the development will not extend into this vegetation unit, but the potential for disturbance exists if construction activities are not properly managed.
- The disturbance of vegetation may lead to opportunities for alien vegetation to establishment or spread. Alien vegetation is often seen more prolifically along and near fence lines and boundaries that separate the developed from the undeveloped.

- Vegetation may be affected by the contamination of soil with chemical or nutrients. This may have a detrimental effect on the growth of the vegetation.

No negative impacts are anticipated during the operational phase, as the proposed rehabilitation and maintenance of open space areas is considered to be a positive impact of the development.

b) Impact Assessment and Rating

Potential impacts to vegetation communities within and around the site are more likely to occur during the construction phase, as this is when vegetation will be cleared for earth-moving and platform creation. The loss of ecological habitat and open space for fauna is most likely to occur considering the transformation of land and clearing of vegetation. The intensity of this impact would be long-term and show a marked loss of habitat availability. This impact is rated as **Medium** (negative) before mitigation. However, the mitigation measure for this is the proposed rehabilitation of land as open space, specifically the 100 m buffer to Glenhills and the upper two-thirds of the central watercourse. Therefore, the impact is rated as **Medium** (positive) after mitigation, as the site conditions will have improved from an ecological habitat perspective after the construction phase.

Similarly, the disturbance or loss of vegetation associated with riparian or wetland habitats within the central watercourse and adjacent wetlands will most likely occur, based on the proposed layout for the site and the developer's requirement to establish embankments on the watercourse edges for platform stability. This would be a long-term and severe alteration of the vegetation structure. However, the mitigation measure is the proposed rehabilitation of the central watercourse and remaining wetlands as part of the Conceptual Wetland Rehabilitation Plan (**Appendix E20),** which will mitigate the impact from a **Medium** (negative) significance to a **Medium** (positive) significance.

The potential loss of the Red Data List species, *Crinum macowanii*, is not likely to occur as a result of this project, as the plant has most likely already been disturbed by mining activities at its location. However, it is possible that some individuals of the species remain on site. Should the impact occur, the loss of this species on site is likely to be long-term unless re-introduced. The impact is rated as **Medium** (negative) before mitigation, and **Low** after mitigation.

The potential damage to the Northern Coastal Forest is not likely to occur, as this vegetation component lies within the D'MOSS area and is not included in the proposed site. However, damage to vegetation as a result of wood harvesting by construction workers, fire, or littering, may occur and would represent a moderate deterioration of the site. The impact is rated **Medium** (negative) before mitigation and **Low** after mitigation.

The spread of alien vegetation as a result of land disturbance is a probable impact of the construction phase, due to the intensity of land-clearing to take place. This may extend to the immediate surrounds of the site and have a moderate impact on biodiversity of indigenous vegetation communities. The probability for this impact to occur is expected to reduce in the operational phase after rehabilitation and landscaping of the site. The impact is rated as **Medium** (negative) before mitigation and **Low** after mitigation for both phases.

Contamination of soil affecting the health of on-site vegetation, as a result of spills or leakages of hazardous substances, or from poor waste management, has a distinct possibility of occurring in the construction phase. This would lead to a marked deterioration in ecosystem health should it occur, particularly where contamination may be transported by stormwater, thereby covering a larger area. The potential for this impact to occur is reduced in the operational phase, as potential contaminants will be stored on impermeable surfaces and the SWMP includes the construction of oil/grease interceptors before stormwater discharge. The impact is rated as **Medium** (negative) before mitigation and **Low** after mitigation for both phases.

A positive impact on vegetation in the operational phase will be the maintenance of open space areas for conservation, taking into account the recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014) (**Appendix E19**), as well as the Conceptual Wetland Rehabilitation Plan compiled by Eco-Pulse (2014) (**Appendix E20).** This impact is rated as having **Medium** significance, as it will continue throughout the life of the project and will improve current vegetation conditions on site to a large extent.

Please refer to Table 4-11 for a summary of impact ratings.

Table 4-11: Floral Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Flora	Loss of ecological habitat and open space	-12.0	Medium	12.0	Medium
	Disturbance or loss of wetland / riparian vegetation	-12.5	Medium	7.5	Medium
	Loss of indigenous and red data species	-12.5	Medium	-6.5	Low
	Damage to Northern Coastal Forest	-7.2	Medium	-4.2	Low
	Spread of alien invasive vegetation	-8.5	Medium	-5.2	Low
	Contamination of soil reducing vegetative health	-8.5	Medium	-4.2	Low

OPERATIONAL PHASE					
Flora	Maintenance of rehabilitated open space and wetland areas	12.0	Medium		
	Spread of alien invasive vegetation	-9.2	Medium	-5.2	Low
	Contamination of soil reducing vegetative health	-8.2	Medium	-4.2	Low

c) Mitigation Measures

- The Red Data List species identified, *Crinum macowanii*, is protected by the provincial conservation ordinance. These plants may not be damaged or destroyed without permit authorization from Ezemvelo KZN Wildlife. If identified on site, they must be relocated to other suitable habitat on the site (an open area where soil is not dry or poor but the grass is not tall) where they will be protected from development. This must be done in consultation with a Vegetation Specialist prior to the commencement of earth-moving activities.
- In order to mitigate the disturbance of vegetation and open space areas of the development the construction activities should not alter hydrological conditions that sustain hygrophytic plants. Where this will not be possible due to the proposed layout and rock embankments required to be constructed within the watercourse valley, the Conceptual Wetland Rehabilitation Plan (**Appendix E20)** must be implemented to mitigate damage to wetland conditions.
- Rehabilitation of the remaining open space requires the control of alien vegetation, which must be implemented in line with recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014).
- Rehabilitation and re-vegetation of areas to be maintained as open space or wetlands, in line with recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014) (**Appendix E19**), as well as the Conceptual Wetland Rehabilitation Plan compiled by Eco-Pulse (2014) (**Appendix E20**).
- A Waste Management Plan, as included in the EMPr, must be implemented during the construction an operational phases.
- Soil contamination must be prevented through the compilation and implementation of a Spill Prevention and Management Plan.
- The mitigation measures applicable to the faunal impacts must be implemented, as specified in the EMPr.

4.6.2 Fauna

a) Impact Description

A Faunal Impact Assessment was undertaken for the project, and is available in **Appendix E9**. Results of the specialist Chameleon and Amphibian Assessments have also been included in this section (**Appendix E10-11**). The possible impacts identified during the assessment included negative, positive and cumulative impacts.

The following negative impacts are anticipated to occur in both the construction and operational phases:

- Destruction of or disturbance to faunal habitat

The destruction of natural faunal habitat will mainly occur when ground clearing takes place, may continue throughout the construction and operational phases. The proposed development activities will destroy natural faunal habitat and will have a disturbance effect on the central watercourse and the small patch of forest adjacent to the site. Construction rubble and material extracted during the levelling process will be used to in-fill areas of the central watercourse, permanently destroying natural faunal habitat. Construction will also result in high levels of noise, vibrations and the operation of floodlights, should construction continue in the night. This will disturb the fauna utilising the natural areas, especially nocturnal species, and could result in a localised decrease in biodiversity as faunal species move away from the disturbance. The presence of the construction site may also result in negative faunal interactions that could be associated with construction personnel, including poaching, trapping and hunting of faunal species, as well as possible collisions of fauna with construction vehicles. Food and rubbish can attract wildlife to the area, increasing risk of negative interactions.

- Direct disturbance to habitat and possible disturbance to individuals of protected species

Results of the specialist Amphibian Assessment (**Appendix E11**) confirm the presence of the Spotted Shovel-nosed Frog (*Hemisus guttatus*) on site at two locations within the proposed development site. This species is listed as 'Vulnerable' in terms of the IUCN Red List (2012). The Assessment notes that it is highly likely that the species is relatively widely spread throughout the site, and the fact that the species makes use of both wetland and grassland habitat indicate that the proposed development is likely to impact on the core wetland habitat, as well as terrestrial foraging and sheltering habitat. Construction activities in terms of earth-moving for platform creation and the disturbance of riparian and wetland habitats during the construction of rock embankments for platform stability are expected to destroy current habitat to a large extent if mitigation measures are not implemented.

The Amphibian Assessment also noted that, based on the habitat availability on site, there is also the potential for the Pickersgill's Reed Frog (*Hyperolius pickersgilli*) and the Natal Leak-Folding Frog (*Afrixalus spinifrons*) to occur on site, although these species were not identified on site. Should these species be present on site, the construction and operational phases of the development may result in habitat destruction/damage for these species, should mitigation not be properly implemented.

Results of the specialist Chameleon Assessment (**Appendix E10**) indicate that the majority of the Rohill site is unsuitable to support the KwaZulu-Dwarf Chameleon (*Bradypodion melanocephalum*), which was identified as a potential species of concern during the Scoping Phase of the project and in the Faunal Impact Assessment. The chameleon is listed as 'Vulnerable' in the IUCN Red List. Individuals of the species have not been identified on site, although it is noted that if present, they will most likely be confined to the central watercourse and the edge of the D'MOSS area in the north-east corner of the property. No impacts to the species are anticipated at this stage, but potential impacts in terms of available habitat disturbance have been assessed.

- Introduction and spread of alien and domesticated animals

Domesticated animals such as dogs and cats can have an impact on the local indigenous faunal species through direct competition, spread of diseases and hunting, while alien species usually associated with human presence have negative impacts on local biodiversity (e.g. *Acridotheres tristis* (Common Myna) and *Rattus rattus (*Black Rat)).

- Pollution of areas containing natural faunal habitat

During the construction phase, soil and vegetation will be removed and this coupled with the steep slopes within the area will result in an increase of erosion and subsequent siltation of the central drainage line in the lower lying areas. In addition to this, spills from vehicles used during the construction phase may contaminate the drainage line. During the operational phase solid waste in the form of sewerage and litter may pollute and contaminate the drainage line. These pollutants will be carried downstream to other riparian areas in the landscape.

In addition, the following potential positive impacts have been identified:

- The creation of a new ecological corridor within the landscape will be a result of the maintenance and rehabilitation of a 100 m buffer on the east and south side of the property.
- The rehabilitation of the wetland habitat associated with the drainage line within the 100 m buffer on the east side of the property will be able to support aquatic and amphibian species.

Cumulative faunal impacts are anticipated for the project, and have been assessed in Section 4.9 of this report.

b) Impact Assessment and Rating

The destruction of natural faunal habitat and disturbance to areas containing natural faunal habitat and fauna occurring during the construction and operational phase is highly probable, site specific and this impact will continue for a medium term until such time as open spaces have been rehabilitated (5 - 10 years). The significance rating of this impact will be **Medium** (negative) before mitigation, and **Low** after mitigation.

The potential impact of direct disturbance to habitat and possible disturbance to individuals of protected species, such as *Hemisus guttatus* (Spotted Shovel-nosed Frog) will have long-term effects on habitat availability and a possible reduction in local biodiversity, which is considered to be an impact of severe intensity. The impact will be restricted to the site, but is highly probable in terms of the proposed layout and construction process. However, mitigation measures will need to be put in place to protect these species in terms of both specialist recommendations and the requirements of Ezemvelo KZN Wildlife. The impact is therefore rated as **High** (negative) before mitigation, and **Medium** after mitigation.

It is probable that the introduction and spread of alien and domesticated animals will occur during the construction and operational phases. The impact will be local but long term. This will give the impact a significance rating of **Medium** (negative) before mitigation, and **Low** after mitigation.

The occurrence of the impact of pollution will be probable and long-term. The extent of the impact will affect surrounding areas and therefore is local. Thus the significance rating of this impact will be **Medium (negative)** before mitigation, and **Low** after mitigation.

The positive impacts of a new ecological corridor being established within the landscape, as well as rehabilitation of wetland habitat on site, are highly probable and will be long term. It will have a highly beneficial effect on the site, and will apply to the operational phase of the project as the complete rehabilitation of open spaces areas is only expected to be completed after the construction phase. The significance of this impact is **Medium (positive)**.

Please refer to Table 4-12 for a summary of impact ratings.

Table 4-12: Faunal Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Fauna	Destruction of / disturbance to faunal habitat	-9.5	Medium	-6.5	Low
	Habitat / individual disturbance of protected species	-13.5	High	-11.5	Medium
	Introduction and spread of alien and domesticated animals	-10.2	Medium	-6.0	Low
	Pollution of faunal habitats	-10.8	Medium	-6.5	Low
OPERATIONAL PHASE					
Fauna	Destruction of / disturbance to faunal habitat	-9.5	Medium	-6.5	Low
	Habitat / individual disturbance of protected species	-13.5	High	-11.5	Medium
	Proliferation of alien vegetation	-10.2	Medium	-6.0	Low
	Pollution of faunal habitats	-10.8	Medium	-6.5	Low
	Creation of ecological corridor	12.2	Medium		
	Rehabilitation of wetland habitat	12.2	Medium		

c) Mitigation Measures

The following mitigation measures apply to habitat disturbance / destruction:

- In order to mitigate the destruction of natural faunal habitat and disturbance to areas containing natural faunal habitat and fauna; wherever possible, the proposed development should remain outside of the wetland buffer of the central drainage line as delineated by the Wetland Impact Assessment, through cordoning it off and no building rubble or soil removed during the levelling process must be allowed to fall into the drainage line or associated wetland and riparian habitat.
- The location of access routes is important and construction routes should not be wider that 3 m in sensitive areas, with passing bays where two-way traffic is required. The construction of access roads for the construction phase should avoid drainage lines wherever possible.
- Adequate culverts are required so as to have a minimal impact on water flow patterns through the drainage line. Culverts and bridges must not restrict the movement of fauna.
- Avoid constructing broad hard surfaces or canalisation within the drainage line that may cause the drowning of fauna.
- All the areas within the drainage line which have been modified by construction

activities must be re-vegetated using indigenous wetland species found in the area.

- If any hard surfaces cannot be re-vegetated then steps or ledges should be incorporated to aid fauna in climbing or as a path for dispersal.
- All topsoil and spoil (excavated subsoil) must be stored without causing the damming up of water, erosion gullies, or washing away itself and exotic/invasive plants and broad leaf weeds must be removed from topsoil stockpiles when they emerge.
- Any faunal species located on the site, which cannot relocate themselves (e.g. burrowing animals), should be moved in an ecologically acceptable manner to a more suitable location. This should be undertaken by a faunal relocation expert with relevant permit approval, as required by the provincial MEC and Ezemvelo KZN Wildlife.
- As recommended by the Amphibian Specialist Report (**Appendix E11**), a 'rescue and rehabilitation plan' must be compiled and implemented to remove individual Spotted Shovel-nosed Frogs from site to a suitable location, where they can be kept in captivity until such time as the open space and wetland areas on site have been successfully rehabilitated. This must be undertaken by a suitably qualified relocation expert, and with the required permits from Ezemvelo KZN Wildlife or the provincial MEC in place, prior to commencement of any site preparation.
- No wild animal may under any circumstance be handled, hunted, snared, captured, injured or killed, including animals perceived to be vermin with or by construction workers. Checks of the surrounding natural areas must be regularly undertaken to ensure no traps have been set. Any snares or traps found on or adjacent to the site must be removed and disposed of.
- To prevent possible collisions with animals, drivers of construction vehicles must remain vigilant to the possibility of animals crossing their paths and a strict speed limit should be adhered.

In the event that permanent loss of faunal habitat in the riparian zone is unavoidable, the following measures are recommended to mitigate residual impacts:

- The remaining natural areas must be rehabilitated and a riparian zone re-established using naturally occurring species, as per recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014) (**Appendix E19**), as well as the Conceptual Wetland Rehabilitation Plan compiled by Eco-Pulse (2014) (**Appendix E20**).
- The resulting development should be landscaped with indigenous plant species that will be beneficial to faunal species, such as bats and birds. Bat and owl nesting boxes could be erected to encourage these species to reside in the area which will

result in environmentally friendly insect and rodent control.

- The proposed 100 m buffer on the east side must be imposed and extend to the end of the property to include the D'MOSS area so as to protect the habitat from future disturbance.
- The 100 m buffer must be rehabilitated with naturally occurring woody species so as to help create a corridor for movement that will link the forest patch and drainage line.
- The preservation of the D'MOSS area adjacent to the site (Erf 3452 Durban North) must be ensured and all future disturbances to it prevented through restricted access. An alien vegetation eradication and control plan must be implemented to improve the quality of the habitat.

The following mitigation measures apply to the introduction of alien/domestic animals:

- No domesticated animals must be allowed on site. Stray animals must be reported to the local SPCA for control measures to be implemented.
- All food should be securely stored away to prevent attraction of faunal species and all rubbish should be disposed of away from the site. Bins should have tightly fitting lids to prevent faunal species raiding the bins.

The following mitigation measures apply to the pollution of areas containing natural fauna:

- An ecologically-sound SWMP must be implemented during construction and appropriate water diversion systems put in place.
- All areas susceptible to erosion must be vegetated with species naturally occurring in the area and ensure that when erosion does occur that it is repaired timely. Indigenous vegetation must be retained wherever possible.
- Surface water or stormwater must not be allowed to concentrate, or flow down cut or fill slopes without erosion protection measures being in place.
- Vehicles used during the construction phase must be parked in a designated area and containers should be used to prevent any oil leaks.
- Formal waste management, inclusive of a recycling program, and sewerage systems must be put in place.

4.6.3 Wetlands and Watercourses

a) Impact Description

The Freshwater Ecosystems Assessment Report, compiled by GroundTruth (2014) (**Appendix E13**), identified a number of wetland systems associated with the central watercourse on site (i.e. 6 hillslope seepage wetlands and 1 unchannelled valley bottom wetland). There are also two hillslope seepage wetlands on the south and south-eastern portion of the property.

The construction phase of the project and associated platform creation would entail the following:

- Infilling of 7 hillslope seepage wetlands and extensive development of their catchments.
- Preservation and rehabilitation of one unchannelled valley bottom wetland in the north-east corner of the property (adjacent to the D'MOSS area).
- Preservation and rehabilitation of one hillslope seepage wetland at the south-western corner of the property, within the 100 m buffer to the Glenhills residential area.
- Alteration of the lower third of the central watercourse in terms of creation of an attenuation pond within the watercourse and diverting flow through a culvert underneath Platform D towards the site boundary uMhlangane River.
- Alteration of flow of the central watercourse through infilling and construction of a box culvert for construction of an access road through the site.

The direct loss of functional wetland systems is an anticipated impact of the construction phase, resulting from infilling for platform creation and infrastructure construction.

A further impact of the construction and operational phases is the alteration of freshwater instream habitat. The key drivers for this impact include flow modification, bed modification, channel modification and inundation. Flow modification is a result of increased hardened surfaces in the catchment and the additional construction of attenuation dams in the instream channel. The increase in hardened surfaces will prevent the natural percolation of precipitation through the soil accelerate surface runoff. Furthermore, the placement of the attenuation pond in the instream channel has the potential to alter the natural flow regime in the system. Increased bed modification is the result of the combined influence of flow modification and construction of embankments within the riparian buffer zone. Increased flows from surface run-off will erode banks and scour the river bed. The construction of the attenuation pond will further modify the bed. Increased channel modification is the result of the construction of the culverts in the riparian zone and canalisation for the stormwater culvert. Temporary flooding of

attenuation pond (which is to be maintained as a dry pond for emergency retention) during periods of high rainfall, has the potential to modify localised stream characteristics.

The alteration of freshwater riparian habitat is an anticipated impact of the construction and operational phases. The critical drivers for habitat modification are vegetation removal, bank erosion, channel modification, flow modification and inundation. Vegetation removal is anticipated within the riparian buffer zone, and the poor management of stormwater may lead to bank erosion and sedimentation of the riparian zone. Increased sedimentation can have the following negative impacts on water quality (*inter alia*): Reduction of the penetration of light and consequently reduction in photosynthesis and primary productivity; Reduction in food availability to aquatic invertebrates due to a reduction in photosynthesis; Damage to macrophyte leaves and stems due to abrasion; Change in substrate composition. Channel modification to the riparian zone will be driven by construction of the storm water culvert. Flow modification caused by the attenuation pond will reduce flow rate during the high flow season. However, the maintenance of high flows is important for the distribution of vegetation propagules, supplying of water and nutrients to dry bank vegetation through lateral movements and maintenance of dynamic zones. High flows maintain the ratio between different riparian zones and substrate types and this will influence the vegetation species assemblage as certain species will occupy particular niches provided by these zones.

b) Impact Assessment and Rating

The direct loss of functional wetland systems as part of earth-moving and platform creation in the construction phase has a high probability of occurrence, as this is included in the proposed construction process to maximise platform area and reduce the potential for instability due to subsoil seepage. The impact will be permanent and will have a high intensity, although impacts will be restricted to the Rohill site. The impact has a **High** (negative) significant rating before mitigation, and **Medium** after mitigation and the implementation of wetland rehabilitation as an on-site offset strategy.

The alteration of freshwater instream and riparian habitats will extend into the operational phase, and will therefore be long-term impacts. There is a distinct possibility of these impacts occurring should mitigation measures not be implemented, and impacts may extend beyond the boundaries of the site in terms of an alteration of downstream characteristics. Should the impact occur, a marked deterioration in these freshwater habitats may result. Therefore the impacts are rated as having a **Medium** significance before mitigation, although this can be reduced to a **Low** significance after successful mitigation and rehabilitation.

Please refer to Table 4-13 for a summary of impact ratings.

Table 4-13: Wetland and Watercourse Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Wetlands and Watercourses	Direct loss of functional wetland systems	-13.5	High	-11.5	Medium
	Alteration of freshwater instream habitat	-9.5	Medium	-6.5	Low
	Alteration of freshwater riparian habitat	-9.5	Medium	-6.5	Low
OPERATIONAL PHASE					
Wetlands and Watercourses	Alteration of freshwater instream habitat	-11.5	Medium	-6.5	Low
	Alteration of freshwater riparian habitat	-11.5	Medium	-6.5	Low

c) Mitigation Measures

- It is generally recommended that developments incorporate a buffer zone from the edge of the freshwater ecosystems to assist in protecting the systems from further degradation. A buffer zone of 15 – 30 m is generally recommended within urban settings. However, it is noted that the freshwater ecosystems within the study site have been significantly modified, with the alteration of the systems' integrity associated with historical disturbance of the vegetation and hydrology. However, the proposed development includes the infilling of 7 of the hillslope seepage wetland units in establishment of the levelled platforms and the fill embankments. As the implementation of 15 – 30 m buffers for each of these wetlands will make the construction of platforms, and therefore the entire project, unfeasible, the developer must endeavour to apply the greatest feasible variable buffer to the upper two thirds of the central watercourse, ensuring conservation of as much of the freshwater ecosystem as possible within the constraints of the platforming and embankment requirements.
- It is essential that the platform embankments are appropriately re-vegetated and appropriate stormwater management measures are implemented.
- It is further recommended that a 30 m buffer be applied to the unchannelled valley bottom wetland at the north-east corner of the site, and that the hillslope wetland at the south-eastern corner within the 100 m residential buffer be retained and rehabilitated for increased wetland functionality.
- To limit the impacts of storm water runoff on the freshwater ecosystems, the discharge of storm water runoff into the identified systems should be managed by means of a detailed SWMP, including *inter alia*:
    - Multiple discharge points that are reasonably spread out across the development adjoining the wetland habitat.

  - Flow through the buffer zone should be via diffuse flow and concentrated flow should be avoided. This would assist in reducing the concentration of flows and hence the risks of erosion and further degradation of the receiving environments.
  - Accompanying each discharge point should be suitable baffle structures (e.g. gabion mattresses) that will dissipate the energy of storm flow and encourage infiltration thus reducing the likelihood of erosion.
  - The runoff entering the buffer zone of the central watercourse should not exceed 1.5 m/sec as this is considered to reduce the pollutant removal performance of the buffer area.
  - It is also recommended that these outflow points incorporate a best management practice approach to trap excess suspended solids and waste originating from the proposed development before entering the buffer zones. These will need to be regularly serviced and maintained to ensure adequate functioning and efficacy.
- Bridges and/or culverts must be designed in an environmentally friendly manner with minimal impacts in the riparian zone.
- Under no circumstances must hazardous liquids be allowed to enter the riparian zone.
- All solid waste must be legally disposed of off-site.
- Sedimentation of the riparian zone must be prevented through sound environmental practices.
- No re-routing of flows should be allowed in the riparian zone.
- Rehabilitation must incorporate recommendations of the Rehabilitation and Conservation Management Plan (Themtek, 2014) contained in **Appendix E19**, specifically in terms of alien vegetation removal and revegetation with appropriate indigenous species.

Wetland Rehabilitation:

A recommendation of the Freshwater Ecosystems Assessment Report was the consideration of on-site rehabilitation of freshwater ecosystems as an offset mitigation measure. To this effect, the Conceptual Wetland Rehabilitation Plan has been compiled by Eco-Pulse (**Appendix E20**). Ten (10) potential rehabilitation (enhancement) interventions have been identified in this Plan, and recommended for further investigation, the bulk of which involve the establishment of concrete gabion walls with drop inlets and raised gabion revetments. The excavating out of selected valley floor areas is also recommended to increase the width of the wetland areas above the proposed structures. However, not all of the recommended interventions are feasible for each of the developer's layout options (Options 2 and 3) due to planned wetland and riparian habitat encroachment by platform fill embankments and the establishment of the attenuation pond within the central valley.

Option 3 has reduced opportunities and Option 2 severely limits the opportunities for onsite wetland function enhancement.

Eco-Pulse has recommended that, with the exception of the road fill crossings and Platform D, all embankment fill should be pulled out of the wetland and riparian areas of the central valley (with a 5 – 10 m buffer) in order to maximize enhancement opportunities and minimize wetland and riparian habitat loss. However, it is noted that the 5 – 10 m buffer from all wetland and riparian areas is not financially feasible for the developer, as discussed in the Alternatives Assessment (Section 2.5.3). Variable buffer zones have been committed to in Layout Options 2 and 3, of 8.9 m and 12.1 m average buffer zones respectively (ranging from 0 m to 40 m). In certain areas of the drainage line, the financial constraints of platform size necessitate the encroachment of embankments to the edge of the wetland zones and central watercourse, and any further withdrawing of embankments will render the development unfeasible from a financial perspective. Furthermore, pulling out embankment fill will mean that embankments will be steeper in these sections, with potential soil erosion impacts. Therefore, the developer has committed to implementing recommendations of the Conceptual Wetland Rehabilitation Plan as far as possible within the constraints of feasible layout options. The following specific recommendations should be implemented:

- Construction of intervention mechanisms proposed by Eco-Pulse (structures 1 – 8 as specified in the Rehabilitation Plan, and structures 9 – 10 where possible).
- Onsite attenuation (within platform footprints) must be maximized as far as possible to minimise the burden of stormwater attenuation placed on the freshwater habitats within the central valley, and ultimately reduce and minimize the size of the currently planned retention pond.
- All concrete wall enhancement interventions must be designed to incorporate attenuation facility to reduce the size of the downstream retention pond. For these multi-purpose interventions, the 10-50 year flood events must be drained away from the wetland within 24hrs and the 100 year flood within 36hrs to ensure that the enhanced freshwater habitat is not impaired.
- All stormwater attenuation ponds onsite should be designed as detention ponds rather than retention ponds in order to maximize onsite wetland and riparian habitat.
- The interventions must be designed in such a way that the structures must not be back flooded.

It is noted that the Conceptual Wetland Rehabilitation Plan determined that, even with the implementation of recommended measures, there will still be a net-loss in wetland function (ecosystem services) suggesting that off-site wetland offsets are still likely to be required. This must be discussed with the Department of Water and Sanitation (DWS) and

Ezemvelo KZN Wildlife as part of the public participation process during the Draft EIA review period. It is noted that DWS have confirmed that they are in support of the principle of wetland offsets for the project. Should it be determined that off-site offsets are required, appropriate sites must be identified in consultation with a suitably qualified wetland specialist.

4.7 Economic Impacts

This section is informed by the Economic Impact Assessment (**Appendix E14**), the Natural Resources and Agricultural Land Impact Assessment (**Appendix E6**), and the Social Impact Assessment undertaken for the project (**Appendix E4**).

4.7.1 Employment and Business Opportunities

a) Impact Description

The establishment of the Rohill Business Estate will lead to the creation of two main forms of job opportunities. The construction phase of the proposed development will provide temporary unskilled and semi-skilled labour opportunities, whereas the operational phase will provide permanent employment opportunities in the light industrial and retail sectors. In addition, employment opportunities will be created for support services, such as security, landscaping, maintenance, cleaning, etc.

In addition, the operational phase will create opportunities for the development of local businesses, which would be a boon for the local economy. Business representatives in the area have noted that there is a current shortage of available business premises for expanding businesses, and therefore the establishment of the Estate will create space for such expansion.

b) Impact Assessment and Rating

The occurrence of job opportunities will differ between the construction and operational phase. Job opportunities during the construction phase will be definite but short term and the scale of the impact would be localised as a result of people in the surrounding areas being employed as unskilled or semi-skilled labour. The operational phase of the development will provide permanent skilled and semi-skilled job opportunities over a long term, and will extend over a local scale where people in the surrounding areas are likely to be employed. The significance rating of this positive impact for both the construction phase is **Medium**, and **High** for the operational phase.

The creation of local business opportunities in the operational phase is rated as having a **Medium** significance, as it is the probability for the impact is occur is low, but will extend

into the local area on a long-term basis.

Please refer to Table 4-14 for a summary of impact ratings.

Table 4-14: Employment and Business Opportunities Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Employment and Business Opportunities	Short-term employment opportunities	12.2	Medium		
OPERATIONAL PHASE					
Employment and Business Opportunities	Long-term employment opportunities	15.2	High		
	Local business opportunities	8.2	Medium		

c) Mitigation Measures

No mitigation measures are applicable (positive impact), however the developer should endeavour to employ local labour in the construction phase as far as possible, in consultation with Community Liaison Officers (CLO) from the local settlements.

4.7.2 Public Revenue

a) Impact Description

Public revenue gains will take place in the form of additional rates income to the Council and generation of new taxes for National Treasury as a consequence of new jobs.

b) Impact Assessment and Rating

Public revenue gains will be more significant during the construction phase than during the operational phase due to a loss in construction jobs and no further procurement of building materials after the development is completed. Nevertheless, the impact of continued revenue gains as a result of rates, taxes and business income during the operational phase is long term and definite. The significance rating of this impact for both phases is **Medium (positive)**.

Please refer to Table 4-15 for a summary of impact ratings.

Table 4-15: Public Revenue Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Public Revenue	Generation of public revenue	11.2	Medium		
OPERATIONAL PHASE					
Public Revenue	Generation of public revenue	11.2	Medium		

c) Mitigation Measures

Mitigation measures are not applicable for the positive impact of public revenue generation.

4.7.3 Property Value

a) Impact Description

The introduction of externalities is a potential economic impact associated with the development. Negative externalities are introduced from industry and warehousing on residential suburbs, this includes the potential negative impact on housing values close to industrial areas. This concern has been raised by residents in the adjacent Glenhills suburb as a potentially serious impact, in terms of the visual impact of the proposed development.

b) Impact Assessment and Rating

It is possible that there will be a decrease in value for residential properties near to the development, although the occurrence will be local as this negative externality impact minimises drastically with distance from the development. Thus the significant rating for this impact is **Medium (negative)** before and after mitigation, as while mitigation measures will decrease the significance of the impact, the potential for this impact to occur is long-term (i.e. for the life of the project). It is noted that, with the successful implementation of visual and noise mitigation measures, there is the potential for this impact to become a positive impact, with property values potentially increasing due to successful rehabilitation and the implementation of security measures and aesthetic design.

Please refer to Table 4-16 for a summary of impact ratings.

Table 4-16: Property Value Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Property Value	Possible decline in residential property values	-8.2	Medium	-6.2	Low
OPERATIONAL PHASE					
Property Value	Possible decline in residential property values	-10.2	Medium	-6.2	Low

c) Mitigation Measures

- In order to mitigate the decrease of residential property values the visual impacts of the development needs to be addressed. This can be done through landscaping, vegetation, layout, architecture and screening. The mitigation measures applicable to the Visual and Aesthetic Impacts, as well as Noise Impacts, must be implemented, as specified in the EMPr.

4.7.4 Agricultural Land Potential

a) Impact Description

Of the 59.6 ha of land on Erf 3481, 41.2 ha is ranked as moderate to high potential for agriculture production whilst the remaining land has restricted to very low potential for agricultural potential. The agricultural assessment found that Erf 3481 is marginally suited for agricultural production due to restricted hectare extent, steep slopes and marginal soils that are found in some places. It was concluded that a loss of 41.2 ha of arable land will occur resulting in the forfeiture of 1 766 t potential sugar cane production per year due to construction of the Rohill Business Estate.

b) Impact Assessment and Rating

The occurrence of this impact is definite and will be permanent but the scale of the impact would be localised. The percentage sugar cane yield on this standalone production unit is not seen as economically viable; therefore this impact is seen as highly insignificant and will have no impact on the sugar mill production. Therefore the significance rating of this impact is **Low (negative)**, and limited to the construction phase.

Please refer to Table 4-17 for a summary of impact ratings.

Table 4-17: Agricultural Land Potential Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Agricultural Land Potential	Loss of Agricultural Potential	-6.2	Low	-6.2	Low

c) Mitigation Measures

- No mitigation measures are applicable for this impact as the loss of sugar cane production on site will be a definite result of site development.

4.8 Social Impacts

The assessment of social impacts in this section has been informed by the Social Impact Assessment undertaken for the project (**Appendix E4**).

4.8.1 Procedural Justice

a) Impact Description

One of the issues arising from the Social Impact Assessment (**Appendix E4**) was the perceived lack of procedural justice during the planning phase of the project. Residents of the local area raised the concern that the minimum due process has been followed in the EIA, and the process thus far has been insufficient for them to engage properly with the development proposal. These initial social impacts are linked to people's expectations and fears regarding the proposed development, hence the development begins to have an impact on the surrounding communities long before construction begins. The following are impacts already identified by I&APs, and impacts with the potential to occur:

- Lack of trust in the developer due to there not being a 'firm development proposal' in the Scoping Phase.
- Lack of involvement of the community in the development process.
- Lack of transparency and openness.
- Lack of communication.
- Lack of concern about social impacts.

b) Impact Assessment and Rating

These impacts relate to the planning phase of the project i.e. the initial phases of the project that include project feasibility, the EIA process and the municipal planning process, but will continue into the construction and operational phases if the correct communication and engagement are not undertaken. Should the impact occur, it is likely to extend to the

immediate surrounds of the site, and will have a moderate intensity in terms of the change in experienced procedural justice. The duration in the planning and construction phases is short-term, and long-term (for the life of the project) in the operational phase. Planning, construction and operational phase impacts are rated as having a **Medium (**negative) significance before mitigation. However, with the implementation of mitigation measures, careful understanding of social concerns and ongoing communication, the developer can ensure that this impact does not occur and mitigate the impact to one of positive significance.

Please refer to Table 4-18 for a summary of impact ratings.

Table 4-18: Social – Procedural Justice Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
PLANNING PHASE					
Procedural Justice	Perceived Lack of Procedural Justice during planning phase	-7.2	Medium	-5.2	Low
CONSTRUCTION PHASE					
Procedural Justice	Perceived Lack of Procedural Justice during construction phase	-7.5	Medium	6.5	Low
OPERATIONAL PHASE					
Procedural Justice	Perceived Lack of Procedural Justice during operational phase	-9.5	Medium	7.5	Medium

c) Mitigation Measures

- Be open to communication with the local ratepayers association, civic associations and local businesses.
- Establish a complaints and incident register, to be maintained throughout the life of the project, whereby affected parties can notify the developer of any issues relating to safety, noise, traffic, air pollution, etc.
- Where practical, make a dedicated attempt to use local labour through the CLO process to build good relationships with local communities.

4.8.2 Quality of Life

a) Impact Description

The project has a number of influences on the sense of place and quality of life of surrounding residents, both positive and negative.

The negative social impacts to quality of life can be summarised as 'an erosion of sense of

place by industrialisation of the area.' Residents have raised a concern that the gradual industrialisation and growth of the northern corridor, including increased traffic volumes and congestion, is eroding the suburban sense of place, and this is expected to worsen with the development of the Rohill Business Estate. The impact is expected to result from the possible issues related to the development:

- Air pollution during the construction phase and associated health, nuisance and economic impacts.
- Noise pollution during the construction and operational phases and associated health and nuisance impacts.
- Loss of local sense of place and character for the surrounding residents.
- Visual impact of the industrial development as seen from the Glenhills residents.
- Traffic impacts - Increase in stress and nuisance levels of the local residents as a result of an increase in traffic congestion and delay times associated with access point and intersection upgrades, and heavy construction vehicles travelling to and from the site during construction phase.
- The creation of jobs may result in the influx of people into the area from the rural areas, which may result in the expansion and/or creation of informal settlements in the area.
- Possible decrease in property values of surrounding homes (as raised by residents).
- Possible increase in crime in the area.

The positive impacts related to quality of life of local residents are as follows:

- The enhancement of social and community life; increased vitality, racial diversity and upgrading of area. This relates to possible upgrades of properties in response to an upgraded site; the creation of demand for housing and education with the increased of employees of various levels in the area; and the increased mixing of races within the community.
- Establishment of the 100 m residential buffer on the eastern/Glenhills boundary, which can relate to a significant positive impact in the operational phase if issues relating to re-vegetation, security and visual impacts are sufficiently addressed.

b) Impact Assessment and Rating

The negative impact of 'erosion of sense of place' applies to both the construction and operational phases, and is essentially a cumulative impact of many environmental aspects as described previously. The intensity of the impact is expected to be high, and extending to the local area. The probability that this impact will occur is highly likely. It has been given a rating of **Medium (**negative) significance for the construction phase (as impacts will be short-term), and **High** significance for the operational phase (long-term). With the

implementation of mitigation measures, a lower **Medium** score is expected in both phases.

The enhancement of social and community life is rated as **Medium** (positive) for both the construction and operational phases, as impacts will extend to the regional area and has a distinct probability of occurring.

The establishment of the 100 m open space buffer is rated as **Low** (positive) for the construction phase, as the open space area will still be in establishment in the construction phase. However, the significance rating increases to **High** in the operational phase, as rehabilitation of the buffer will show a marked improvement in site conditions and is highly likely to occur based on the developer's commitments to establish this open space buffer. The positive impact will continue for the life of the project if properly managed and maintained. Please refer to Table 4-19 for a summary of impact ratings.

Table 4-19: Social - Quality of Life Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Quality of Life	Erosion of sense of place	-12.0	Medium	-7.2	Medium
	Enhancement of social and community life	10.0	Medium		
	Establishment of 100m open space buffer	4.2	Low		
OPERATIONAL PHASE					
Quality of Life	Erosion of sense of place	-14.0	High	-10.0	Medium
	Enhancement of social and community life	12.0	Medium		
	Establishment of 100m open space buffer	13.0	High		

c) Mitigation Measures

- Mitigation measures applicable to all other impacts to be implemented, specifically in terms of traffic, visual and safety aspects.
- The following guidelines are recommended for establishment of the 100 m open space buffer:
    - Alien plant removal and indigenous planting to be undertaken in line with specialist recommendations (i.e. Vegetation Impact Assessment (**Appendix E8**) and Rehabilitation and Conservation Management Plan (**Appendix E19**).
    - Plant trees and shrubs at same level as buildings to screen buildings/soften visual impact – trees to grow to height of at least 11 m as recommended in

Visual Impact Assessment (**Appendix E15**).

- Plant fast growing indigenous trees as much as possible.
- Plant trees during construction phase to reduce period during which buildings will be unscreened.
- Fence buffer along the Rohill site boundary with visually attractive and secure fencing.
- Rohill development management body to ensure the security of the fencing and to implement measures to minimise any security breaches which may impact on neighbouring residential properties.

4.8.3 Safety

a) Impact Description

Residents of the adjacent suburbs have raised concern that the safety of residents in suburbs adjacent to the Rohill site may be threatened by the proposed development. The following potential negative impacts have been identified for the construction phase:

- Safety risks to pedestrians and motorists in the area as a result of movement of construction and earth-moving vehicles on nearby road networks.
- Potential increased in crime associated with the presence of construction workers in the site, in suburbs where crime is already an issue experienced by residents (i.e. Avoca and Glenhills).
- Safety risks to construction workers on site as a result of poor training, poorly maintained machinery or human error.

The following potential safety impacts relate to the operational phase of the development:

- Safety risks to pedestrians and motorists in the area as a result of increased heavy vehicle traffic entering and existing the site. Should truck drivers not comply with road traffic regulations and speed restrictions, there is a risk of serious traffic accidents.
- The 100 m open space buffer between the Rohill site and Glenhills, as well as the D'MOSS area in the north-eastern corner of the property have been identified as possible areas for criminals to move through and hide, increasing the safety risk to residents along the boundary of the development site. This is a potential negative impact. However, the development of the site and the proposed fencing of open areas, as well as the D'MOSS area, will translate into a positive impact of the development as the site will be secured with a perimeter fence and strict access control, and provide increased safety from that of the status quo, where the area is open and easily accessible as a 'hide-out' or 'escape route' for vagrants or criminals.

b) Impact Assessment and Rating

The construction phase impacts, in terms of safety risks and a potential increase in crime, have a distinct low possibility of occurring, but impacts may be severe if they occur (e.g. fatalities which may occur during robberies, traffic accidents or accidents on during construction). The duration of the impact will be limited to the construction phase, but permanent in the case of serious injury, loss of property, or fatalities. The safety risk impacts are rated as having a significance of **Medium** (negative) before mitigation and **Low** after mitigation. The potential increase in crime is rated **Medium** (negative) before mitigation and Low (positive) after mitigation, as the site will be secured and fenced, thereby improved the security on site.

The operational phase impacts, as in the case of construction phase impacts, have a low possibility of occurring, but potentially sever outcomes if they do occur (e.g. serious injury, loss of property, or fatalities). The impact would likely extend within the surrounding area and potentially in the regional area in the case of an influx of employment seekers and heavy vehicle traffic. The potential for these impacts to occur will continue throughout the life of the project. The impacts have a significance rating of **Medium** before mitigation and **Medium** after mitigation, except in the case of the potential increase in crime from the open space buffer, which translates into a positive impact of **Medium** significance after incorporation of security measures on site, which will reduce the risk of crime occurring from that of the status quo. This is due to the fact the mitigation measures can be applied to the open space buffer as the property owner is in control of that piece of land. However, the potential safety impact from heavy vehicle traffic is outside of the developer's control and extends beyond the boundaries of the site. Therefore, this impact has a reduced significance but is still rated as **Medium**.

It is important to note that this cannot be accurately quantified as it is impossible to predict the outcome of such safety impacts. Moreover, the enforcement of security and mitigation measures contained in the EMPr by the contractor (in the construction phase), the owner of the site or tenants can only be applied to a certain extent and regarding issues within their control.

Please refer to Table 4-20 for a summary of impact ratings.

Table 4-20: Social - Safety Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Safety	Safety risks to pedestrians and motorists	-9.2	Medium	-6.2	Low
	Potential increase in crime.	-9.5	Medium	6.2	Low
	Safety risks to construction workers.	-8.2	Medium	-6.2	Low
OPERATIONAL PHASE					
Safety	Safety risks to pedestrians and motorists	-12.5	Medium	-8.2	Medium
	Potential increase in crime from creation of open spaces	-11.8	Medium	10.5	Medium

c) Mitigation Measures

- Traffic warning signage and, where required, traffic calming measures must be employed during the construction phase to reduce the potential for traffic accidents.
- Transport of materials/machinery to or from the site must be done at off-peak hours, and no heavy vehicles may move on residential roads in either the construction or operational phases.
- The construction area is to be demarcated and access must be restricted. All staff must comply with the relevant safety regulations on site and wear appropriate safety clothing and gear at all times while on site.
- Local job creation: JT Ross to actively develop a process to access local labour from the local informal settlements. The recommendation is to work with the local ward councillors to set up a Community Liaison Officer (CLO) process for the local informal settlements.
- In the construction phase, the site must be well managed to prevent crime and theft around the site. Installation of a secure boundary fence at the start of the project is recommended, including the D'MOSS area.
- The developer is to liaise with community representatives in terms of the proposed security measures for the construction and operational phases. Rules for site access in both phases are to be established and agreed upon.
- Gated entries, electric fencing and CCTV cameras are recommended for the operational phase.
- Recommendations of the Traffic Impact Assessment (**Appendix E3**) to be implemented in consultation with the eThekwini Transport Authority to ensure that traffic congestion does not occur, which may lead to traffic accidents safety risks to pedestrians and motorists.

- Communities are to be informed of the procedure for lodging complaints / concerns arising from the proposed development.

4.8.4 Traffic

a) Impact Description

The development will result in traffic impacts in both the construction and operational phases in terms of increased traffic volumes and congestion in the surrounding road network. There is also the potential for associated pedestrian and motorist safety issues, which have been assessed separately under 'Safety' impacts in Section 4.8.3.

A further potential impact relates to the increase in heavy vehicles on the road network, transporting construction materials, excess excavated soils, waste and equipment. Earth-moving vehicles, cranes and concrete mixer trucks are also anticipated to be travelling to and from site in the construction phase. This, coupled with construction activities, is likely to cause a disruption to the traffic flow for the duration of the construction period. Delays and congestion of traffic at the intersection may also occur, increasing the chance of accidents occurring. During the operational phase, delivery trucks are expected to travel to and from the site. There is the potential for these vehicles to intrude into residential road networks if not adequately restricted.

A Traffic Impact Assessment (**Appendix E3**) was undertaken for the project in order to address these issues and ensure that the necessary road upgrades are identified to mitigate all traffic flow problems related to the proposed development. Under existing traffic conditions, the road network surrounding the proposed development currently carries heavy traffic volumes during the commuter peak hours. Site observations and analyses undertaken show that certain elements are presently operating at or beyond capacity and, since this is nothing to do with future development, the authorities responsible for the road network are therefore responsible for the necessary road infrastructure improvements.

b) Impact Assessment and Rating

Given the magnitude of the proposed development, the Traffic Impact Assessment shows that a substantial volume of traffic will be added to the surrounding road network as a result of the presence of the proposed development. Traffic congestion and increased heavy vehicle traffic is expected to continue in both the construction and operational phases of the project, and is expected to have an influence of traffic in both the local and regional area. The probability of these impacts occurring without mitigation is high. Traffic congestion and increased heavy vehicle traffic are rated as **Medium** before mitigation and **Low** after mitigation in the construction phase, as this is a short-term impact. However, in the operational phase, traffic congestion increases to a **High**

significance due to the long-term and regional nature of the impact. Increased heavy vehicle traffic remains a **Medium** significance as this is not expected to extend beyond the local area. Both impacts are rated as **Medium** after mitigation due to the long-term nature of the impacts.

Once construction is complete it is anticipated that the road upgrades will reduce accident potential and improve safety as well as improve the flow of traffic along Chris Hani Road (R102) and Old North Coast Road (P585).

Please refer to Table 4-21 for a summary of impact ratings.

Table 4-21: Social - Traffic Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Traffic	Traffic congestion	-11.8	Medium	-6.8	Low
	Increased heavy vehicle traffic	-10.8	Medium	-6.8	Low
OPERATIONAL PHASE					
Traffic	Traffic congestion	-13.8	High	-9.8	Medium
	Increased heavy vehicle traffic	-12.8	Medium	-9.8	Medium

c) Mitigation Measures

- Ensure implementation of the Traffic Impact Assessment in consultation with the eThekwini Transport Authority, to ensure implementation of appropriate upgrades required for the existing road network, in order to ensure that the road links and intersections in the vicinity of the development have adequate capacity to accommodate the estimated additional trips generated by the proposed development and from all other known proposed developments in the studied road network.
- Construction vehicles will access the site via Old North Coast Road and not via residential roads.
- The transport of machinery or materials onto the site must where possible be done at off peak hours, i.e. from 9:00 to 15:00, so as to prevent unnecessary interruption of traffic flow and access along roads within the project vicinity.
- Heavy vehicle logistics management by managing body of the Rohill Business Estate.

4.8.5 Visual and Aesthetics

a) Impact Description

The following section is informed by the Visual Impact Assessment undertaken for the project (**Appendix E15**), as well as the Social Impact Assessment (**Appendix E4**).

Visual impacts will result from a change in the visual character of the Rohill site, which is currently open space (sugar cane lands). During the construction phase, earth-moving activities, the creation of cut-to-fill platforms, and the construction of light industrial and retail buildings and infrastructure may result in a visual intrusion to sensitive receptors, which are predominantly residents of Glenhills in the immediate vicinity of the site.

In the operational phase, the site will be fully functional as a Business Estate, comprised of light industrial and retail uses. Large warehouse type buildings and factories are anticipated to be built, and sensitive receptors overlooking the proposed site have expressed the concern that this may completely change the visual character of the area, with consequent impacts on their property values and sense of place.

b) Impact Assessment and Rating

The construction phase impact on the visual and aesthetic character of the site is expected to be short-term in nature and restricted to the immediate surrounding area. The impact is likely to occur even with the implementation of mitigation measures, due to the height of the proposed site above that of many surrounding residents. This impact is rated as having a **Medium** significance before mitigation, and **Low** after mitigation.

The change in visual character in the operational phase will be long-term, highly probable and will affect the immediate surrounds of the site. This impact is rated as having a **High** significance before mitigation, and **Medium** after mitigation. Although the visual impacts are considered to be significant, sufficient mitigation measures may aid in reducing possible impacts.

Please refer to Table 4-22 for a summary of impact ratings.

Table 4-22: Social – Visual and Aesthetic Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Visual and Aesthetic	Change in visual / aesthetic character	-10.0	Medium	6.0	Low
OPERATIONAL PHASE					
Visual and Aesthetic	Change in visual / aesthetic character	-14.0	High	12.0	Medium

c) Mitigation Measures

In order to mitigate the visual and aesthetic impact the following measures can be taken:

- Natural vegetation, wherever possible, should be retained on and around the proposed development site. The vegetation around a structure tends to breaks the outline of the structure against the landscape and will therefore allow for the structure to be less pronounced.
- Establish 100 m buffer (measured from the eastern boundary of the Rohill site) with indigenous vegetation, including individuals or 'clumps' of trees suited to screening. *It is noted that a coastal forest, as recommended in the Visual Impact Assessment, is not suitable for this site as it will conflict with conservation and rehabilitation requirements for the site.*
- Reduce size and height of proposed buildings so that they are less imposing on the landscape.
- Landscaping to include planting of fast growing trees and shrubs at same level as buildings to screen buildings/soften visual impact – trees to grow to height of at least 11 m. The planting of vegetation should start during the construction phase if possible to reduce the period during which buildings will be unscreened and it is preferable if indigenous plants can be used to landscape the site.
- The colour of all proposed infrastructure should be aimed at blending in with existing infrastructure, and be consistent with natural colours, in the surrounding area. Therefore only building materials and colours that will minimize visual impact must be used.
- The glare of reflective surface can be reduced through making the external surfaces of the warehouses matte and using shade cloth carports to minimise vehicle glare.
- An aesthetically attractive fence (not concrete palisade) should be used along the boundary of the site.
- Implement light mitigation measures, such as the installation of bulb shields and aligning the bulbs so as to direct light toward the ground and not upwards.

4.8.6 Cultural and Heritage Resources Impacts

a) Impact Description

A First Phase Heritage Impact Assessment has been undertaken (**Appendix E17**), and concluded that no heritage or archaeological sites or features were identified within the construction footprint. However, the potential exists for the construction phase to disturb or destroy cultural artefacts that are of heritage importance, such as graves, tools, paintings etc., which have not yet been found on site.

b) Impact Assessment and Rating

As the Heritage Impact Assessment found no evidence of cultural or heritage resources on site, it is improbable that this impact will occur. The scale of the impact would be localised and it would not occur on an ongoing basis. However, should artefacts be damaged or destroyed, the impact would be permanent. Therefore the significance rating of this impact is **Medium** before mitigation, and **Low** after mitigation. Please refer to Table 4-23 for a summary of impact ratings.

Table 4-23: Social – Cultural and Heritage Resources Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Cultural and Heritage Resources	Potential loss of cultural / heritage resources	-10.2	Medium	-6.2	Low

c) Mitigation Measures

- As detailed in the EMPr, in the event that the construction phase uncovers features or artefacts of heritage value such as graves or fossils, all construction should be halted until such time as AMAFA has been contacted and is able to assess the site. This is required in terms of the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008).
- Should it be confirmed that heritage resources are present on the site, AMAFA must be consulted in terms of the relevant permits required to continue construction works in the area or relocate the object.

4.9 Cumulative Impacts

The NEMA EIA regulations define cumulative impact as follows: "in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area."

The previous sub-sections assessed both the potential positive and negative environmental impacts which could occur as a result of the construction and operation of the proposed Rohill Business Estate. The impacts assessed above are direct and immediate, whereas cumulative impacts may not be significant on their own but become significant when coupled with others.

In order to consider the cumulative impact, the impacts of the proposed development and its intended purpose, as assessed above, must be placed in context. The assessment must take into account the environment in which the Business Estate will be constructed and the socio-economic position of the surrounding community, in addition to considering any secondary or indirect impacts such a development might have. Specific cumulative impacts that have been identified are as follows:

4.9.1 Noise

Baseline industrial and traffic noise in the vicinity of the site, when coupled with anticipated noise levels arising from the Rohill Business Estate (i.e. construction activities and increased traffic and industrial noise in the operational phase), will have a cumulative noise impact. The probability of this occurring is medium. It will extend to the immediate surrounding area and have a long-term duration (i.e. for the life of the project). The impact is assessed as having a **Medium** (negative) significance. Mitigation measures included in Section 4.5.5 apply to this impact. Please refer to Table 4-24 for a summary of impact ratings.

4.9.2 Air Quality

Baseline traffic-related air pollution from the surrounding road network and industrial areas, when coupled with anticipated air pollution arising from increased traffic from the Rohill Business Estate, will have a cumulative air quality impact. The probability of this occurring is low, but should it occur, it will extend to the immediate surrounding area and have a long-term duration (i.e. for the life of the project). The impact is assessed as having a **Medium** (negative) significance. Mitigation measures included in Section 4.5.6 apply to this impact.

Please refer to Table 4-24 for a summary of impact ratings.

Table 4-24: Cumulative Impacts

ENVIRONMENTAL ASPECT	SUMMARY OF POTENTIAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
		Total	Rating	Total	Rating
CONSTRUCTION PHASE					
Cumulative Impacts	Cumulative Noise Impact	-11.0	Medium	-8.8	Medium
	Cumulative Air Quality Impact	-10.0	Medium	-7.8	Medium
OPERATIONAL PHASE					
Cumulative Impacts	Cumulative Noise Impact	-11.0	Medium	-8.8	Medium
	Cumulative Air Quality Impact	-12.0	Medium	-8.8	Medium

4.10 Decommissioning Phase

The operation of the Rohill Business Estate is expected to continue for the foreseeable future, and therefore decommissioning impacts cannot be accurately predicted at this stage. However, should the site be decommissioned, environmental impacts are anticipated to be the same as those identified for the construction phase, specifically in terms of soil management, surface and groundwater contamination, waste management, noise, air quality, and potential ecological impacts.

4.11 No-Go Alternative

In this case the development would not take place and the site would remain in use by Corobrik for clay mining until the resource has been exhausted, and for sugar cane farming.

Certain positive impacts are associated with the no-go alternative, as follows:

- The visual and aesthetic nature of the area will remain undisturbed, provided that mining activities do no extend within the viewshed of sensitive receptors. Associated social aspects such as property value and quality of life should remain unchanged.
- Anticipated traffic congestion associated with the project will not materialise.
- The noise levels of the area are likely to remain as per *status quo*.

However, in the no-go alternative, the potential economic benefits and employment/business opportunities of the Rohill Business Estate would not be available, and the site would remain as an unsecured open space with potential safety impacts to surrounding residents. The condition of the site would remain as per the *status quo*, in terms of an accumulation of litter on site and within watercourses and the D'MOSS area and

vegetation dominated by alien vegetation. The proposed rehabilitation of the wetlands and open space areas on site would not take place, which represents a negative impact. Mining activities by Corobrik would continue until the resource is depleted, and it is likely that this would result in disturbance of ecological habitat for valuable species and the alteration of freshwater ecosystems (i.e. wetlands and watercourses), with the potential for soil erosion and sedimentation.

5 ENVIRONMENTAL IMPACT STATEMENT

5.1 Conclusion

This Draft Environmental Impact Report has been compiled based in accordance with the NEMA and associated EIA Regulations.

The impact assessment followed a Scoping Study which included a technical investigation and a public participation component to identify key issues associated with the project. A Draft Scoping Report was made available for public review for a 40-day comment period. Comments received were recorded, responded to, and addressed in the Comments and Reponses Register of the Final Scoping Report. The Final Scoping Report, which included a PoS for the EIA Phase, was made available for a further 21 day comment period before approval by the DEDTEA.

The Scoping Phase has identified no fatal flaws although a number of key issues were identified which were taken forward to and addressed in the Impact Assessment Phase. These impacts included potential biophysical, ecological, economic and social environmental impacts for both the construction and operational phases of the project.

The Impact Assessment Phase of the study involved a detailed assessment of the key issues in accordance with the Plan of Study for EIA. This included commissioning of a number of specialist studies, and analysis of specialist findings in this (Draft EIA) report. Impact significance was determined through considering the probability of the impact occurring, its duration, intensity, frequency, status (positive/negative) and spatial extent (national, regional, local or limited to the site) of the potential impacts. These potential impacts were then rated as either of low, medium and high environmental significance depending on the overall significance points scored. The scoring system was applied to both potential impacts with and without mitigation. Table 5-1 summarises all the identified impacts and their significance ratings without and with mitigation/enhancement for the preferred alternative.

Table 5-1: Summary of Impact Assessment Matrix

ASPECT	PHASE	POTENTIAL ENVIRONMENTAL IMPACT	Significance Before Mitigation		Significance After Mitigation	
			Total	Rating	Total	Rating
BIOPHYSICAL IMPACTS						
Earthworks and Soil Management	Construction	**Soil Erosion and Sedimentation:** Loss of topsoil and nutrients, inhibit emergence of seeds, scouring of streams, sedimentation affecting water quality and freshwater habitat functioning.	-7.5	Medium	-5.5	Low
	Construction	**Subsoil saturation:** Perched water table leading to groundwater seepage to surface and stability issues underneath platforms.	-9.8	Medium	-6.8	Low
	Construction	**Impacts on Geological Stability:** Shale bedrock prone to subsidence, potential instability of platforms.	-9.8	Medium	-6.8	Low
	Operational	**Soil Erosion and Sedimentation:** Poor management of open space areas / rehabilitated watercourse leading to loss of topsoil and nutrients, inhibit emergence of seeds, scouring of streams, sedimentation affecting water quality and freshwater habitat functioning.	-9.2	Medium	-6.2	Low
	Operational	**Change in Land Use - Cessation of Mining Activities:** Change in land use from invasive excavation of shales in current mining activities and associated environmental degradation, to one of a managed property with rehabilitated open space areas.	13	High		
Soil, Surface and Groundwater Quality	Construction	**Contamination of soils, surface or groundwater** from accidental leaks / spillages of fuels, oils or hazardous chemicals, or mismanagement of hazardous liquid waste.	-9.8	Medium	-6.8	Low
	Construction	**Contamination of watercourses / wetlands via sedimentation:** Mobilisation of sediments arising from soil erosion.	-9.8	Medium	-6.8	Low
	Operational	**Contamination of soils or water by hazardous substances:** Fuel / oil spills on roads or in workshops. Poor handling, storage or disposal of hazardous materials / wastes.	-11.2	Medium	-6.2	Low
	Operational	**Contamination of watercourses / wetlands via sedimentation:** Mobilisation of sediments arising from soil erosion.	-9.2	Medium	-6.2	Low
Groundwater Quantity	Construction	**Reduction in groundwater baseflow:** Creation of platforms covered with an impermeable surface may result in a reduction in recharge to the underlying aquifers.	-7.2	Medium	-4.2	Low
	Operational	**Reduction in groundwater baseflow:** Platforms covered with an impermeable surface may result in a reduction in recharge to the underlying aquifers.	-9.2	Medium	-6.2	Low
Stormwater Management	Construction	**Alteration of stormwater flow regime:** Removal of soil and vegetation, and increase in hardstanding, potentially altering flow, volume and velocity of water runoff and hydrological conditions of watercourses and wetlands. Potential flooding from increase flow and velocity.	-7.2	Medium	-4.2	Low

	Operational	**Alteration of stormwater flow regime: I**ncrease in hardstanding potentially altering flow, volume and velocity of water runoff and hydrological conditions of watercourses and wetlands. Potential for flooding from increase flow and velocity.	-9.2	Medium	-6.2	Low
Noise	Construction	**Traffic noise disturbance:** Increased volumes of traffic in the surrounding area from movement, resulting in noise disturbance to nearby residences and businesses.	-9.0	Medium	-6.8	Low
	Construction	**Construction noise disturbance:** Construction activities resulting in noise disturbance to nearby residences and businesses.	-9.0	Medium	-6.8	Low
	Operational	**Traffic noise disturbance:** Increased volumes of traffic in the surrounding area from movement of delivery vehicles, resulting in noise disturbance to nearby residences and businesses.	-8.0	Medium	-6.5	Low
	Operational	**Operational noise disturbance:** Long-term operational activities resulting in noise disturbance to nearby residences and businesses (potential night-time noise).	-8.0	Medium	-6.5	Low
Air Quality	Construction	**Dust pollution:** Clearing of vegetation, earth-moving activities, storage of soil in stockpiles and clearing of vegetation resulting in dispersal of dust from development site to surrounding residential areas..	-9.8	Medium	-5.8	Low
	Construction	**Air pollution from vehicular emissions:** Dispersal of emissions from construction vehicles on site to surrounding residential areas during construction.	-8.8	Medium	-5.8	Low
	Operational	**Air pollution from industrial activities:** Potential generation of emissions from industrial processes in the operational phase.	-9.8	Medium	-6.8	Low
	Operational	**Air pollution from vehicular emissions:** Dispersal of emissions from delivery vehicles or trucks within and around the site to surrounding residential areas.	-9.8	Medium	-6.8	Low
Waste Management	Construction	**Pollution arising from poor waste management:** Pollution of on-site open space areas, immediate surrounds and final disposal site from incorrect handling, storage or disposal of general, construction or hazardous waste.	-10.0	Medium	-6.0	Low
	Construction	**Pollution arising from poor management of excess soil:** Erosion of stockpiles and sedimentation of surface water on site, or at the final disposal site, as a result of incorrect handling, storage or disposal of excess excavated material from platform creation.	-9.5	Medium	-4.2	Low
	Operational	**Pollution arising from poor waste management:** Improper management of general / hazardous solid or liquid waste, resulting in both direct and indirect soil and water pollution.	-12.0	Medium	-8.0	Medium
ECOLOGICAL IMPACTS						
Flora	Construction	**Loss of ecological habitat and open space** as a result of vegetation clearing, excavation of soils and creation of levelled platforms.	-12.0	Medium	12.0	Medium
	Construction	**Disturbance or loss of wetland / riparian vegetation:** Alteration of hydrological conditions or encroachment of development within wetlands leading to change in wetland habitat.	-12.5	Medium	7.5	Medium

	Construction	**Loss of indigenous and red data species:** Loss of indigenous species in Mixed Woodland Community / *Crinum macowanii*	-12.5	Medium	-6.5	Low
	Construction	**Damage to Northern Coastal Forest** and indigenous vegetation, situated within the D'MOSS area.	-7.2	Medium	-4.2	Low
	Construction	**Spread of alien invasive vegetation:** Disturbance of land leading to spread of invasive plants.	-8.5	Medium	-5.2	Low
	Construction	**Contamination of soil reducing vegetative health:** Spills / leakages / pollution potentially contaminating soil and affecting plant growth.	-8.5	Medium	-4.2	Low
	Operational	**Maintenance of rehabilitated open space and wetland areas** during the operational phase as part of developer's commitments for mitigating loss of habitat and as a visual buffer for Glenhills residential area.	12.0	Medium		
	Operational	**Spread of alien invasive vegetation:** Poor management of alien plants leading to continued spread and poor establishment of indigenous species for rehabilitation.	-9.2	Medium	-5.2	Low
	Operational	**Contamination of soil reducing vegetative health:** Spills / leakages / pollution potentially contaminating soil and affecting plant growth.	-8.2	Medium	-4.2	Low
Fauna	Construction	**Destruction of / disturbance to faunal habitat:** Destruction of natural faunal habitat and disturbance to areas containing natural faunal habitat and fauna as result of ground clearing and earth-moving for platform creation and construction of embankments.	-9.5	Medium	-6.5	Low
	Construction	**Habitat / individual disturbance of protected species:** Direct disturbance to habitat and possible disturbance to individuals of protected species (i.e. *Hemisus guttatus*, Spotted Shovel-nosed Frog) as a result of ground clearing and earth-moving for platform creation and construction of embankments.	-13.5	High	-11.5	Medium
	Construction	**Introduction and spread of alien and domesticated animals** from contractors on site.	-10.2	Medium	-6.0	Low
	Construction	**Pollution of faunal habitats:** Pollution of areas containing natural faunal habitat as a result of poor waste management (handling, storage and disposal).	-10.8	Medium	-6.5	Low
	Operational	**Destruction of / disturbance to faunal habitat:** Destruction of natural faunal habitat and disturbance to areas containing natural faunal habitat and fauna as result of operational activities on site.	-9.5	Medium	-6.5	Low
	Operational	**Habitat / individual disturbance of protected species:** Direct disturbance to habitat and possible disturbance to individuals of protected species (i.e. *Hemisus guttatus*, Spotted Shovel-nosed Frog) as a result of operational activities.	-13.5	High	-11.5	Medium
	Operational	**Introduction and spread of alien and domesticated animals** from human presence on site in the operational phase.	-10.2	Medium	-6.0	Low
	Operational	**Pollution of faunal habitats:** Pollution of areas containing natural faunal habitat as a result of poor waste management (handling, storage and disposal).	-10.8	Medium	-6.5	Low
	Operational	**Creation of ecological corridor:** Maintenance and rehabilitation of a 100m buffer on the east and south side.	12.2	Medium		

	Operational	**Rehabilitation of wetland habitat:** Rehabilitation of wetland habitat associated with the drainage line within the 100m buffer on the east side. This wetland could support species of conservation concern if managed correctly.	12.2	Medium		
Wetlands and Watercourses	Construction	**Direct loss of functional wetland systems** resulting from vegetation-clearing, earth-moving activities for levelling of platforms, creation of soil stockpiles for platforms, creation of access roads and construction of buildings and associated infrastructure.	-13.5	High	-11.5	Medium
	Construction	**Alteration of freshwater instream habitat** as a result of flow modification, bed modification, channel modification and inundation during vegetation-clearing, earth-moving activities for levelling of platforms, creation of soil stockpiles for platforms, creation of access roads and construction of buildings and associated infrastructure.	-9.5	Medium	-6.5	Low
	Construction	**Alteration of freshwater riparian habitat** as a result of vegetation removal, bank erosion, channel modification, flow modification and inundation during vegetation-clearing, earth-moving activities for levelling of platforms, creation of soil stockpiles for platforms, creation of access roads and construction of buildings and associated infrastructure. .	-9.5	Medium	-6.5	Low
	Operational	**Alteration of freshwater instream habitat** as a result of flow modification and inundation from stormwater drainage in central watercourse.	-11.5	Medium	-6.5	Low
	Operational	**Alteration of freshwater riparian habitat** as a result of bank erosion, flow modification and inundation from stormwater drainage in central watercourse.	-11.5	Medium	-6.5	Low
ECONOMIC IMPACTS						
Employment and Business Opportunities	Construction	**Short-term employment opportunities** during the construction phase: unskilled and semi-skilled labour.	12.2	Medium		
	Operational	**Long-term employment opportunities** in the light industrial and retail sectors, as well as support services (security, landscaping, maintenance, cleaning, etc.)	15.2	High		
	Operational	**Local business opportunities** by creating available business premises and increasing local economic growth in the area.	8.2	Medium		
Public Revenue	Construction	**Generation of public revenue** through the payment of rates and taxes, and the purchase of construction materials.	11.2	Medium		
	Operational	**Generation of public revenue** through the payment of rates and taxes.	11.2	Medium		
Property Value	Construction	**Possible decline in residential property values:** Potentially resulting from construction activities and affecting those homes closest to the site or with views of the site.	-8.2	Medium	-6.2	Low
	Operational	**Possible decline in residential property values:** Potentially resulting from the presence of the Business Estate and affecting those homes closest to the site or with views of the site.	-10.2	Medium	-6.2	Low
Agricultural Land Potential	Construction	**Loss of Agricultural Potential:** Loss of viable agricultural land and economic contribution (i.e. sugar cane farming).	-6.2	Low	-6.2	Low

SOCIAL IMPACTS						
Procedural Justice	Planning	**Perceived Lack of Procedural Justice during planning phase** from the EIA process and developer communication with affected parties	-7.2	Medium	-5.2	Low
	Construction	**Perceived Lack of Procedural Justice during construction phase** from developer and contractor communication with affected parties	-7.5	Medium	6.5	Low
	Operational	**Perceived Lack of Procedural Justice during operational phase** from interaction / communication between the developer, managing body and affected parties	-9.5	Medium	7.5	Medium
Traffic	Construction	**Traffic congestion** from increased traffic volumes moving to and from the site and delivering construction materials / removing excess spoil.	-11.8	Medium	-6.8	Low
	Construction	**Increased heavy vehicle traffic** on road network transporting construction materials, excess excavated soils, waste and equipment. Earth-moving vehicles, cranes and concrete mixer trucks are also anticipated to be travelling to and from site in the construction phase.	-10.8	Medium	-6.8	Low
	Operational	**Traffic congestion** from increased traffic volumes moving to and from the site in the operational phase.	-13.8	High	-9.8	Medium
	Operational	**Increased heavy vehicle traffic** from delivery vehicles, which may intrude into residential roads.	-12.8	Medium	-9.8	Medium
Visual and Aesthetic	Construction	**Change in visual / aesthetic character:** Visual and aesthetic impact of construction activities in close proximity to residential suburbs.	-10.0	Medium	6.0	Low
	Operational	**Change in visual / aesthetic character:** Visual and aesthetic impact of large scale industrial warehouses in close proximity to residential suburbs.	-14.0	High	12.0	Medium
Cultural and Heritage Resources	Construction	**Potential loss of cultural / heritage resources** during the construction phase earth-moving activities. (Note: None have been identified on site but the potential exists)	-10.2	Medium	-6.2	Low
Safety	Construction	**Safety risks to pedestrians and motorists** in the area as a result of movement of construction and earth-moving vehicles on nearby road networks.	-9.2	Medium	-6.2	Low
	Construction	**Potential increase in crime** associated with the presence of construction workers in the site, in suburbs where crime is already an issue experienced by residents (i.e. Avoca and Glenhills).	-9.5	Medium	6.2	Low
	Construction	**Safety risks to construction workers** on site as a result of poor training, poorly maintained machinery or human error.	-8.2	Medium	-6.2	Low
	Operational	**Safety risks to pedestrians and motorists** in the area as a result of increased heavy vehicle traffic entering and existing the site.	-12.5	Medium	-8.2	Medium
	Operational	**Increase in crime from creation of open spaces** (100m buffer) between Rohill and Glenhills, as well as the D'MOSS area, which are possible areas for criminals to move through, increasing the safety risk to nearby residents if security is not in place.	-11.8	Medium	10.5	Medium
Quality of Life	Construction	**Erosion of sense of place** from cumulative impact of air, noise and visual pollution of construction activities, as well as possible safety impacts, increase in traffic and growth of informal settlements.	-12.0	Medium	-7.2	Medium

	Construction	**Enhancement of social and community life**: Increased vitality, racial diversity and upgrading of area. Possible upgrades of properties in response to an upgraded site; increased need for housing and education; and increased mixing of races within the community.	10.0	Medium		
	Construction	**Establishment of 100m open space buffer** on the eastern / Glenhills boundary, with a resulting positive impact if re-vegetation, security and visual impacts are sufficiently addressed.	4.2	Low		
	Operational	**Erosion of sense of place** from cumulative impact of air, noise and visual pollution from the proposed Business Estate, as well as possible safety impacts, increase in traffic, growth of informal settlements and decrease in property values..	-14.0	High	-10.0	Medium
	Operational	**Enhancement of social and community life**: Increased vitality, racial diversity and upgrading of area. Possible upgrades of properties in response to an upgraded site; increased need for housing and education; and increased mixing of races within the community.	12.0	Medium		
	Operational	**Establishment of 100m open space buffer** on the eastern / Glenhills boundary, with a resulting positive impact if re-vegetation, security and visual impacts are sufficiently addressed.	13.0	High		
CUMULATIVE IMPACTS						
Cumulative Impacts	Construction	**Cumulative Noise Impact:** Baseline industrial and traffic noise in the vicinity of the site, when coupled with anticipated noise levels arising from the construction activities and associated traffic noise, will have a cumulative noise impact.	-11.0	Medium	-8.8	Medium
	Construction	**Cumulative Air Quality Impact:** Baseline traffic-related air pollution from the surrounding road network and industrial areas, when coupled with anticipated vehicular emissions arising from the construction phase, will have a cumulative air quality impact.	-10.0	Medium	-7.8	Medium
	Operational	**Cumulative Noise Impact**: Baseline industrial and traffic noise in the vicinity of the site, when coupled with anticipated noise levels arising from the Rohill Business Estate (i.e. increased traffic and industrial noise in the operational phase), will have a cumulative noise impact.	-11.0	Medium	-8.8	Medium
	Operational	**Cumulative Air Quality Impact:** Baseline traffic-related air pollution from the surrounding road network and industrial areas, when coupled with anticipated air pollution arising from increased traffic from the Rohill Business Estate, will have a cumulative air quality impact.	-12.0	Medium	-8.8	Medium

5.2 Summary of Key Findings and Recommendations

5.2.1 Key Findings

The following key findings and conclusions are drawn from the EIA:

- JT Ross proposes the development of the Rohill Business Estate in line with sustainable development principles, and incorporating the environmental, social and technical constraints of the project site.
- Infrastructural requirements for roads, electricity, sewerage, water supply, stormwater, security and telecommunications have been investigated and will be designed in accordance with the relevant standards and specifications.
- The project is in line with the eThekwini Municipality's SDF and IDP in terms of the future land use of the site, and will contribute to meeting the objectives of the NDP in terms of providing employment opportunities within the manufacturing, warehousing and logistics sectors.
- A number of land use alternatives have been assessed; with the outcome that the developer's preferred land use (i.e. General Business 2 for industrial, commercial and retail use) is the most viable option for the site.
- A number of layout alternatives were assessed, and the two most viable options (Options 2 and 3) both include a 100 m open space buffer to the Glenhills residential suburb, and preservation of the upper two thirds of the central watercourse.
- The specialist studies commissioned for the project identified the following key aspects of the site:
    - Potential platform stability issues may arise due to the presence of shale bedrock on site.
    - A number of ephemeral watercourses and one perennial central watercourse are present on site. Surface water drainage and hydrological conditions on site stand to be significantly altered by the proposed development in terms of watercourse infilling and the directing of stormwater runoff to the central watercourse (as a result of increased flow and potential sedimentation from soil erosion).
    - A number of hillslope seepage wetlands, as well as one unchannelled valley bottom wetland, were identified on site. Pockets of the central watercourse have been classified as having 'wetland characteristics', and all wetland areas will need careful management and rehabilitation to ensure that valuable hydrological and freshwater ecosystems are not lost.
    - The Vegetation Impact Assessment identified a number of valuable pockets of indigenous vegetation on site, including the Red Data species, *Crinum macowanii*, although the majority of the site is heavily invaded by alien

vegetation. It is noted that *Crinum macowanii*) has likely already been removed as a result of Corobrik mining activities on site.

- Potential habitat for valuable faunal species exists on site, including the Pickersgill's Reed Frog (*Hyperolius pickersgilli)* and the KwaZulu Dwarf Chameleon (*Bradypodion melanocephalum*).
- The Spotted Shovel-nosed Frog (*Hemisus guttatus*) was identified on site, which is a Red Data species and protected by national legislation. These were identified at two locations in close proximity to the upper reaches of the central watercourse. The protection of this species must be ensured during the construction phase of the project.
- The topography of the site and surrounding residential suburbs presents potential visual/aesthetic and noise impacts resulting from the development, which will need to be mitigated by incorporation of suitable visual and noise screening measures.
- A number of upgrades to surrounding road networks and intersections are required as part of the project, in order to ensure that road infrastructure can handle the anticipated increased volumes of heavy traffic in the construction and operational phases of the development.

- The majority of impacts could most probably be effectively mitigated through appropriate mitigation measures introduced during the construction and operation of the Business Estate, as shown in Table 5-1.
- The potential impacts that were rated as **High** without mitigation are as follows:
  - Habitat/individual disturbance of protected faunal species (Construction and Operational phases).
  - Direct loss of functional wetland systems (Construction phase).
  - Potential increased traffic congestion (Operational phase).
  - Change in visual/aesthetic character (Operational phase).
  - Erosion of sense of place (Operational phase).

  The above impacts can be mitigated to a **Medium** significance, and possibly to a **Low** significance depending on the success of rehabilitation.
- A number of positive impacts are associated with the development, namely:
  - Change in land use: Cessation of mining activities (Operational phase).
  - Maintenance of rehabilitated open space and wetland areas (Operational phase).
  - Creation of an ecological corridor (Operational phase).
  - Creation of short-term and long-term employment opportunities (Construction and Operational phases).
  - Creation of local business opportunities (Operational phase).
  - Generation of public revenue (Construction and Operational phases).
  - Improved security on site (Construction and Operational phases).

  - Enhancement of social and community life (Construction and Operational phases).
  - Establishment of 100 m open space buffer (Construction and Operational phases).
- In the case of the No-Go alternative, the development would not take place and the site would remain in use by Corobrik for clay mining until the resource has been exhausted, and for sugar cane farming. Both positive and negative impacts have been identified for this alternative. While the site would remain as per *status quo* and the extensive earthworks and establishment of the Business Estate would not take place, the associated benefits of the project would not materialise (namely, employment opportunities, upgrade of the site, security and rehabilitation).

There are a number of ongoing environmental management commitments that JT Ross and tenants of the operational phase will need to adhere to, to ensure that the construction and operation of the Rohill Business Estate meets acceptable environmental standards. Mitigation measures related to both the construction and operational phase of the project are summarized as follows and further detailed in the EMPr.

5.2.2 Key Recommendations

Biophysical:

- Prevent soil erosion on site at all times, i.e. pre-, during- and post- construction activities. This can be achieved by implementing erosion control measures in areas sensitive to erosion such as near water supply points, soil stockpiles, edges of slopes, etc.
- Specific design measures for stormwater management infrastructure must be implemented according to the SWMP (SMEC, 2014). Stormwater management measures must incorporate reduction of stormwater flow velocity using appropriate attenuation measures. Prior to any physical work proceeding on site, a Stormwater Control Plan detailing the proposed stormwater control measures is to be formulated. This plan must consider, as far as possible, reducing the size of the stormwater attenuation pond and providing suitable attenuation facilities which do not reduce the availability of wetlands or riparian areas for rehabilitation.
- Install pipe network for subsoil drainage underneath constructed platforms, in line with recommendations of the Geotechnical Assessment (Drennan Maud, 2014).
- Construct a suitable foundation along the toe of the proposed embankments in order to ensure long-term stability, as per recommendations made in the Geotechnical Assessment (Drennan Maud, 2014).
- Prepare a detailed Spill Prevention and Management Plan for the construction and operational phases of the project, to be implemented and monitored on an ongoing basis (dependent on types and quantities of potential contaminants stored on site).

- Ensure that waste management and the handling, storage or disposal of potential contaminants (including fuel, oil, chemicals, paints, herbicides, etc.) is undertaken according to best practice and in line with requirements of the EMPr. This includes requirements for training, bunding of storage areas, storage and labelling of containers, as well as records of waste disposal.
- As no surface or groundwater data currently exists for the site, it is recommended that the central watercourse running through the site be sampled on a quarterly basis upstream of the site and down-stream where it leaves the site. In addition, it is recommended that baseline groundwater quality data is obtained prior to commencement of the construction phase.
- Suitable mitigation measures for noise pollution are to be implemented, including: consultation with nearby residents in terms of operating hours; installation or planting of noise screening barriers; ongoing maintenance of noisy vehicles and machinery; noise screening window design and road layout design.
- Implement dust suppression measures in the construction phase, particularly during prolonged periods of dry weather or on windy days. Dust suppression to be undertaken for all bare areas, including platform areas, access roads, borrow pits, construction camp, etc.
- Construction vehicles to be well maintained to reduce emissions, and speed limits to be strictly adhered to. No construction vehicles or trucks will be permitted to travel within residential roads.
- Once the types of industries to be constructed on site have been confirmed, JT Ross must determine whether any further studies or management plans are required, based on whether or not any air pollutants will be emitted. The relevant legislative requirements must also be determined at this stage.
- The management of waste during the construction and operational phase is critical in ensuring that all waste is stored, handled and disposed of in such a manner as to prevent any contamination of the site/surrounding environment, especially considering the sensitive ecological habitats on site. Ensure implementation of the Waste Management Plan included in the EMPr, which is to be updated prior to commencement of the operational phase.

Ecological:

- The Red Data List species identified, *Crinum macowanii*, is protected by the provincial conservation ordinance. These plants may not be damaged or destroyed without permit authorization from Ezemvelo KZN Wildlife. While it is noted that this species is likely no longer on site due to current mining activities, should individuals be identified on site, they must be relocated to other suitable habitat on the site (an open area where soil is not dry or poor but the grass is not tall)

where they will be protected from development. This must be done in consultation with a Vegetation Specialist prior to the commencement of earth-moving activities.

- Rehabilitation of the remaining open space requires the control of alien vegetation, which must be implemented in line with recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014).
- Rehabilitation and re-vegetation of areas to be maintained as open space in line with recommendations of the Rehabilitation and Conservation Management Plan compiled by Themtek cc (2014).
- Recommendations for management of the Spotted Shovel-nosed Frog must be implemented, in terms of undertaking a 'Rescue and Rehabilitation Plan' for the frogs prior to commencement of the construction phase. This must be undertaken by a faunal relocation expert with relevant permit approval, as required by the provincial MEC and Ezemvelo KZN Wildlife.
- Any other faunal species located on the site, which cannot relocate themselves (e.g. burrowing animals), should be moved in an ecologically acceptable manner to a more suitable location. This must be undertaken by a faunal relocation expert with relevant permit approval.
- The proposed 100 m buffer on the east side must be imposed and extend to the end of the property to include the D'MOSS area so as to protect the habitat from future disturbance. Connectivity between the open space and wetland areas must be retained as far as possible to ensure maximum available faunal habitat.
- It is recommended that the developer endeavour to apply the greatest feasible variable buffer to the upper two thirds of the central watercourse, ensuring conservation of as much of the freshwater ecosystem as possible within the constraints of the platforming and embankment requirements. An IWULA for affected watercourses and drainage lines, as well as for the attenuation pond, must be submitted to the DWS in line with requirements of the NWA.
- It is further recommended that a 30 m buffer be applied to the unchannelled valley bottom wetland at the north-east corner of the site, and that the hillslope wetland at the south-eastern corner within the 100 m residential buffer be retained and rehabilitated for increased wetland functionality.
- Implementation of recommendations of the Conceptual Wetland Rehabilitation Plan (Eco-Pulse, 2014) as follows:
    - Construction of intervention mechanisms proposed by Eco-Pulse (structures 1 – 8 as specified in the Rehabilitation Plan, and structures 9 – 10 where possible).
    - Onsite attenuation (within platform footprints) must be maximized as far as possible to minimise the burden of stormwater attenuation placed on the freshwater habitats within the central valley, and ultimately reduce and

minimize the size of the currently planned retention pond.

- All concrete wall enhancement interventions must be designed to incorporate attenuation facility to reduce the size of the downstream retention pond. For these multi-purpose interventions, the 10-50 year flood events must be drained away from the wetland within 24hrs and the 100 year flood within 36hrs to ensure that the enhanced freshwater habitat is not impaired.
- All stormwater attenuation ponds onsite should be designed as detention ponds rather than retention ponds in order to maximize onsite wetland and riparian habitat.
- The interventions must be designed in such a way that the structures must not be back flooded.

- The potential requirements off-site wetland offsets of must be discussed with the DWS and Ezemvelo KZN Wildlife as part of the public participation process during the Draft EIA review period. It is noted that DWS have confirmed that they are in support of the principle of wetland offsets for the project. Should it be determined that off-site offsets are required, appropriate sites must be identified in consultation with a suitably qualified wetland specialist.

Economic:

- The developer should endeavour to employ local labour in the construction phase as far as possible, in consultation with Community Liaison Officers (CLO) from the local settlements.

Social:

- Be open to communication with the local ratepayers association, civic associations and local businesses.
- Where practical, make a dedicated attempt to use local labour through the CLO process to build good relationships with local communities.
- Traffic warning signage, where required, traffic calming measures must be employed during the construction phase to reduce the potential for traffic accidents.
- Construction vehicles will access the site via Old North Coast Road and not via residential roads.
- The transport of machinery or materials onto the site must where possible be done at off peak hours, i.e. from 9:00 to 15:00, so as to prevent unnecessary interruption of traffic flow and access along roads within the project vicinity.
- In the construction phase, the site must be well managed to prevent crime and theft around the site. Installation of a secure boundary fence at the start of the

project is recommended, including the D'MOSS area. Gated entries, electric fencing and CCTV cameras are recommended for the operational phase.

- Ensure implementation of the Traffic Impact Assessment in consultation with the eThekwini Transport Authority, including appropriate upgrades required for the existing road network, in order to ensure that the road links and intersections in the vicinity of the development have adequate capacity to accommodate the estimated additional trips generated by the proposed development and from all other known proposed developments in the studied road network.
- Heavy vehicle logistics management by managing body of the Rohill Business Estate.
- Natural vegetation, wherever possible, should be retained on and around the proposed development site. Establish 100 m buffer (measured from the eastern boundary of the Rohill site) with indigenous vegetation, including individuals or 'clumps' of trees suited to screening. Landscaping to include planting of fast growing trees and shrubs at same level as buildings to screen buildings/soften visual impact – trees to grow to height of at least 11 m. The planting of vegetation should start during the construction phase if possible to reduce the period during which buildings will be unscreened and it is preferable if indigenous plants can be used to landscape the site.
- Reduce size and height of proposed buildings so that they are less imposing on the landscape.
- The colour of all proposed infrastructure should be aimed at blending in with existing infrastructure, and be consistent with natural colours, in the surrounding area.
- The glare of reflective surface can be reduced through making the external surfaces of the warehouses matte and using shade cloth carports to minimise vehicle glare.
- An aesthetically attractive fence (not concrete palisade) should be used along the boundary of the site.
- Communities are to be informed of the procedure for lodging complaints / concerns arising from the proposed development.

5.3 Environmental Management Programme (EMPr)

GCS has prepared a Draft EMPr which is required as part of the EIA submission (Regulation 33). The purpose of the EMPr is to control the impacts of construction and operational activities. The effective implementation of an EMPr will ensure that the required works are conducted in an environmentally sound manner and that the potential negative impacts of construction and operational activities are minimised and/or prevented.

The Draft EMPr document details the responsibilities and authority of the various parties

involved in the project and contains environmental specifications to which the Contractor and tenants are required to adhere throughout the duration of the construction and operational phases. The Draft EMPr covers impacts that have been identified in the EIA Process and which could potentially arise during the construction and/or operation of the Rohill Business Estate. The EMPr covers the following aspects:

- Project background information.
- Identification/listing of project and operational activities.
- Implementation and operational instructions.
- Roles and responsibilities of parties with regard to environmental management.
- Environmental training and awareness material for construction staff.
- Environmental specifications e.g. protection of biodiversity and sensitive environments, rehabilitation, public safety and perceptions, traffic control, material and waste management, litter, containment and disposal of hazardous substances (e.g. paints, waste oils) etc.
- Measurement of compliance with the EMPr.

5.4 Overall Recommendation

The proposed Rohill Business Estate is expected to result in the improvement of site conditions in terms of providing employment opportunities, securing the site, and rehabilitating open space areas to provide valuable ecological habitats. While a number of potential negative impacts are associated with the development, the careful management of these according to recommendations given in this Draft EIA Report and the EMPr is expected to reduce the significance of these impacts within acceptable limits.

It is important to note that although there are numerous alternatives presented in the EIA, Land Use Alternative 1 and Layout Option 3 are recommended as the most suitable options for development.

Based on the conclusion that no environmental fatal flaw was found and that all negative impacts can be effectively mitigated, GCS recommends that Environmental Authorisation be granted for the Rohill Business Estate provided the mitigation measures are implemented and the recommendations are considered.

6 WAY FORWARD

This Draft EIA will be distributed to all key stakeholders and I&APs for a 40 day public comment period. The aim of this public comment period is to allow the public to review the findings of the specialist reports and the findings of the significance assessment, the revised development proposal, and the mitigation measures proposed to minimise the impacts of the proposed development. During this review period, an open day will be held at a suitable location, and all I&APs will be given at least 2 weeks' notice in advance of the meeting. During this open day, the findings of the EIA will be presented to I&APs, an opportunity will be given to lodge further comments/queries.

Thereafter, reasonable and substantiated comments will be incorporated into the assessment and a final EIA Report produced, which will be made available for a 21 day public comment period and submitted to the DEDTEA for acceptance and used to inform the Environmental Authorisation. All I&APs will be informed of the DEDTEA's final decision on the application.

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APPENDICES