Risk Assessment Report

Method of Assessing the Significance of Potential Environmental Impacts

The assessment of the significance of impacts for a proposed development is by its nature, a matter of judgement. To deal with the uncertainty associated with judgement and ensure repeatable results, Zutari rates impacts using a standardised and internationally recognised methodology adhering to ISO 14001 and World Bank/IFC requirements.

For each predicted impact, criteria are applied to establish the **significance** of the impact based on likelihood and consequence, both without mitigation being applied and with the most effective mitigation measure(s) in place.

The criteria that contribute to the **consequence** of the impact are **intensity** (the degree to which pre-development conditions are changed), which also includes the **type** of impact (being either a positive or negative impact); the **duration** (length of time that the impact will continue); and the **extent** (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the examples provided in Table 1, 2 and 3.

below. The consequence is then established using the formula:

Consequence = type x (intensity + duration + extent)

Depending on the numerical result, the impact's consequence would be defined as either extremely, highly, moderately or slightly detrimental; or neutral; or slightly, moderately, highly or extremely beneficial. These categories are provided in Table 5.

To determine the significance of an impact, the **probability** (or likelihood) of that impact occurring is also taken into account. In assigning probability the specialist takes into account the likelihood of occurrence but also takes cognisance of uncertainty and detectability of the impact. The most suitable numerical rating for probability is selected from **Table** 4 below and applied with the consequence according to the following equation:

Significance = consequence x probability

When assigning **probability** to an impact, it is vitally important to distinguish this from the concepts of **frequency and confidence,** with which it is sometimes confused.

- Probability refers to the likelihood that an impact will occur.
- Frequency refers to the regularity with which an impact occurs. To illustrate the difference between frequency and probability, it must be considered that something that happens infrequently may still be a certainty (i.e. have a high probability). For instance, Halley's Comet only comes close to the sun every 75 to 76 years (i.e. it has a very low frequency), but it is still a certainty.
- Confidence (see Table 7) refers to the degree of certainty of a prediction. Confidence may be related to any of the impact assessment criteria (extent, intensity, duration or probability) and is not

necessarily only related to probability. Confidence may be influenced by any factors that introduce uncertainty into a prediction.

Depending on the numerical result of this calculation, the impact would fall into a significance category of negligible, minor, moderate or major, and the type would be either positive or negative. Examples of these categories are provided in Table 6.

Once the significance of an impact occurring without mitigation has been established, the specialist must apply his/her professional judgement to assign ratings for the same impact after the proposed mitigation has been implemented.

Lastly, two further points are important when applying these criteria to impacts:

- Specialists need to assess the impact, **not** the source or origin of the impact (i.e. the activity that causes the impact). For instance, although the activity that causes a specific impact may take place over a long period of time, this does not necessarily imply that the impact itself will persist for the same length of time. The assessment must focus on the impact (the change in the environment) rather than on the activity that causes an impact.
- When assessing impacts, consider the **proposed project design** rather than assuming that the project will necessarily affect highly sensitive resources, even if those resources occur on a part of the site that is left unaffected by the design. If the design of a project avoids an area where a highly sensitive or irreplaceable resource occurs, it would be a mistake to assume that this resource would experience an impact, simply because the resource occurs within the boundaries of the site. As an example, if a wetland or archaeological site occurs on portion A, but the project is located on portion B, then clearly the wetland or archaeological site would not be affected, hence, there would be no direct impact on these resources.

The tables on the following pages show the scales used to classify the above variables and define each of the rating categories.

Table 1 | Definition of Intensity ratings

	Criteria	
Rating	**Negative impact (Type of impact = -1)**	**Positive impacts (Type of impact = +1)**
7	Complete destruction (irreversible and irreplaceable loss) of natural or social systems, resources (e.g. species) and human health. No chance of these processes or resources ever being restored to their pre-impact condition.	Noticeable, sustainable benefits that improve the quality and extent of natural or social system or resources, including formal protection.
6	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	Great improvement to ecosystem or social processes and services or resources.
5	Serious damage to components of natural or social systems or resources and the contravention of legislated standards.	On-going and widespread benefits to natural or social systems or resources.
4	High degree damage to natural or social system components, species or resources.	Average to intense positive benefits for natural or social systems or resources.
3	Moderate damage to natural or social system components, species or resources.	Average, on-going positive benefits for natural or social systems or resources.
2	Minor damage to natural or social system components, species or resources. Likely to recover over time.	Low positive impacts on natural or social systems or resources.

Rating	Criteria	
	Negative impact (Type of impact = -1)	Positive impacts (Type of impact = +1)
	Ecosystems and valuable social processes not affected.	
1	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 2 | Definition of Duration ratings

Rating	Criteria
7	**Permanent:** The impact will remain indefinitely.
6	**Beyond project life**: The impact will remain for some time after the life of the project.
5	**Project life:** The impact will cease after the operational life span of the project
4	**Long-term**: The impact will continue for 6-15 years.
3	**Medium-term:** The impact will continue for 2-5 years.
2	**Short-term:** The impact will continue for between 1 month and 2 years.
1	**Immediate**: The impact will continue for less than 1 month.

Table 3 | Definition of Extent ratings

Rating	Criteria
7	**International:** The effect will occur across international borders.
6	**National:** The impact will affect the entire country.
5	**Province/ Region:** The impact will affect the entire province or region
4	**Municipal Area:** The impact will affect the whole municipal area.
3	**Local:** The impact will extend across the site and to nearby properties.
2	**Limited:** The impact will be limited to the site.
1	**Very limited:** The impact will be limited to the footprint of the development and will not extend to the boundaries of the site.

Table 4 | Definition of Probability ratings

Rating	Criteria
7	**Certain/ Definite:** There are sound scientific reasons to expect that the impact will definitely occur.
6	**Almost certain/Highly probable:** It is most likely that the impact will occur.
5	**Likely:** This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.
4	**Probable:** This impact has occurred here or elsewhere in a similar environment and with a similar type of development and could conceivably occur.
3	**Unlikely:** This impact has not happened yet but could happen.

Rating	Criteria
2	**Rare/ improbable:** The impact is conceivable, but only in extreme circumstances. The possibility of the impact manifesting is very low as a result of design, experience or implementation of adequate mitigation measures.
1	**Highly unlikely/None:** The impact is expected never to happen or has a very low chance of occurring.

Table 5 | Application of Consequence ratings

Range		Significance rating
-21	-18	Extremely detrimental
-17	-14	Highly detrimental
-13	-10	Moderately detrimental
-9	-6	Slightly detrimental
-5	5	Negligible
6	9	Slightly beneficial
10	13	Moderately beneficial
14	17	Highly beneficial
18	21	Extremely beneficial

Table 6 | Application of significance ratings

Range		Significance rating
-147	-109	Major - negative
-108	-73	Moderate - negative
-72	-36	Minor - negative
-35	-1	Negligible - negative
0	0	Neutral
1	35	Negligible - positive
36	72	Minor - positive
73	108	Moderate - positive
109	147	Major - positive

Despite attempts at ensuring objectivity and impartiality, environmental assessment remains an act of judgement and can never escape the subjectivity inherent in attempting to define significance. The determination of the significance of an impact depends on context (spatial and duration) and intensity of that impact. Since the rationalisation of context and intensity will ultimately be prejudiced by the observer, there can be no wholly objective measure by which to judge the components of significance, let alone how they are integrated into a single comparable measure.

This notwithstanding, in order to facilitate informed decision-making, environmental assessments must endeavour to come to terms with the significance of the environmental impacts. Recognising this, Zutari has attempted to address potential subjectivity in the current ESIA process as follows:

- Being explicit about the difficulty of being completely objective in the determination of significance, as outlined above;

- Developing an explicit methodology for assigning significance to impacts and outlining this methodology in detail. Having an explicit methodology not only forces the specialist to come to terms with the various facets that contribute to significance (thereby avoiding arbitrary assessment), but also provides the reader with a clear summary of how the specialist derived the significance;
- Wherever possible, differentiating between the significance of potential environmental impacts as experienced by the various affected parties; and
- Utilising a team approach and internal review of the assessment to facilitate a rigorous and defendable system.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

The specialists appointed to contribute to this impact assessment have empirical knowledge of their respective fields and are thus able to comment on the confidence they have in their findings based on the availability of data and the certainty of their findings (Example provided in Table 7).

Table 7 | Definition of Confidence ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in assessing the impact may prove to be untrue.
Medium	Determination is based on common sense and general knowledge. The assumptions made, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

Phase 1: Construction Phase, wetland, and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
No planned incursions into onsite watercourses	Direct physical loss or modification of wetland and/ or aquatic habitat associated with the onsite watercourses. <u>Description:</u> There is no infrastructure planned within any onsite watercourses as part of this phase of the development. The planned development areas also do not encroach into the preliminary recommended watercourse buffer zones (Section 6.2.1). There are therefore no planned direct impacts to freshwater habitat areas during the construction phase of this development. There is however the potential for accidental direct physical modification to stream or wetland habitat during construction, although such impacts are unlikely under a realistic 'good' mitigation scenario.	Minor Damage	Medium-Term	Limited	Likely	Slightly Detrimental	Minor - Negative	• No areas outside the construction footprint may be cleared and stripped of vegetation. To this end the outer edges of the construction site must be demarcated using a high visibility barrier / fencing. The demarcation must be signed off by the project ECO. • Construction staff should be made aware of the location and extent of all watercourses in the vicinity of the proposed development. These should be considered strict no-go zones for the duration of onsite works. • • Drivers and machine operators must take specific care to avoid watercourses when manoeuvring vehicles and heavy equipment.	Negligible Damage	Immediate	Very Limited	Improbable	Negligible	Negligible - negative
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment). <u>Description:</u> Construction activities in the catchment areas of onsite watercourses will result in a temporary reduction in catchment vegetation cover which could be associated with increased runoff and increased sediment supply to watercourses, especially where bare soils are exposed during peak rainfall periods. These impacts could potentially alter the geomorphic and hydrological regime of onsite watercourses. This could affect freshwater ecosystem condition and indirectly affect fauna and flora through a deterioration in the quality of available habitat. Should these impacts occur they are however likely to be temporary and are unlikely to significantly affect long-term ecological processes associated with onsite watercourses. If poorly managed hydrological and geomorphological impacts on Water Resource Management could be of a 'minor' ecological significance. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), the consequence rating can be reduced from 'moderately detrimental' to 'slightly detrimental'.	High	Medium-term	Local	Definite	Moderately Detrimental	Minor - Negative	• Limit the duration of construction to reduce the risk of prolonged sedimentation and erosion impacts occurring. • Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones. • Demarcate buffers on the ground to avoid incursions into these areas. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with a Rehabilitation & Management Plan. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	High	High	High	High	High	Minor - negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Impacts to water quality. <u>Description:</u> Water quality impacts during construction will be limited to potential increased surface water turbidity due to sediment inputs and / or erosion and physio-chemical pollution related to potential spillages of cement and fuels during construction. Turbidity impacts are likely to be limited given the temporary nature of onsite earthworks, and the maintenance of a well-vegetated buffer around watercourses. Spillages of fuel and other harmful substances could alter the physio-chemical and biological characteristic of surface water and contaminate watercourse substrate (having a direct impact on water resource management), with potential knock-on consequences for both fauna and flora communities (affecting ecosystem and species conservation indirectly). No impact on direct use value is anticipated as watercourses were not rated as important in terms of water supply as a provisioning ecosystem service. If poorly managed, impacts to water quality could be of 'Minor' significance where turbidity and sediment and / or pollution risks are not effectively mitigated. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to a 'Negligible' and an environmentally acceptable level.	Moderate	Short-term	Limited	Unlikely	Slightly detrimental	Negligible - negative	• Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate any spill related impacts as soon as practically possible in accordance with an 'Aquatic Contingency Plan'. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	Moderate	Short-term	Limited	Unlikely	Slightly detrimental	Negligible - negative
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery may create noise and vibration disturbances that may temporarily disturb amphibians, reptiles, birds, and small mammals. These disturbances will be minor, and fauna will likely revisit the site once construction has ceased, and the disturbance has halted. If poorly managed, disturbance impacts could be of 'Negligible' significance. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), the consequence rating can be reduced from slightly detrimental to negligible.	Minor	Medium-term	Local	Likely	Slightly detrimental	Minor - Negative	• Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones, • Demarcate buffers on the ground to avoid incursions into these areas. • Implement road/pipeline Method Statement to specification. • Restrict worker and machinery access to the construction site and site camp only. • Prohibit poaching or collection of plants and biota from natural areas, including riparian areas and wetlands. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with the 'Rehabilitation & Management Plan'.	Minor	Short-term	Local	Probable	Slightly detrimental	Negligible - negative

Operational Phase, wetland and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance	Key recommended mitigation measures	Post-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment). <u>Description:</u> The development will result in an increase in hardened catchment surfaces, and an associated increase in surface runoff which will largely be released into the environment as part of the operation of the formal stormwater management system. This could potentially result in erosion and sedimentation along onsite watercourses and thereby inhibit their ability to provide regulating services such as flood attenuation or toxicant assimilation through the creation of concentrated flow paths, thus influencing water resource management objectives. Similarly, erosion and sedimentation can lead to a deterioration in habitat condition or loss of important habitat thereby having implications for ecosystem conservation targets and indirectly on species of conservation concern. While the attenuation and controlled release of high stormwater runoff volumes (during storms etc.) will aid in preventing erosion and sedimentation associated with increased flow volumes, the presence of stormwater attenuation structures will also serve to alter natural flow and sediment regimes. It is vital that a stormwater attenuation system be designed to have a limited impact on base / low flows to mitigate operation phase hydrological and geomorphological impacts associated with the development. The development will most likely increase peak flows due to urbanisation in the catchment, which increases the rainfall-runoff coefficient of the land surface area. Watercourses may be subjected to flooding damage. Areas where culverts will be installed at watercourse crossings may be prone to becoming blocked and are higher risk due to the momentum of flow from the prevailing flow direction and this poses a risk of undercutting and rapid erosion/bank failing during peak events. It is assumed that domestic water will be obtained from the local municipality, and there will be no reduction in water within the onsite and downstream watercourses (no direct abstraction of water). The proposed onsite sewerage package plant will release treated	Complete loss	Permanent	Local	Highly Probable	Highly detrimental	Moderate - Negative	• Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Stormwater and energy dampening systems to be designed and implemented to decrease the risk of stream bank erosion. • Maintain storm water infrastructure as necessary. • Implement and adhere to 33m and 31m buffer zones for wetlands and riparian areas, respectively. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement aquatic biomonitoring and water quality monitoring during operation and use findings to inform site management.	Complete loss	Permanent	Limited	Probable	Highly detrimental	Minor - Negative

Applicable Area	Potential Impact	Pre-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance	Key recommended mitigation measures	Post-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	effluent into R03 which transitions into W12. This will increase flow along this system above natural volumes which could impact sediment and hydrological dynamics. This is a notable risk along W12 as this wetland is currently characterised by a central drain and associated high concentrated flows. The planned discharge volume of the plant is currently unknown so the intensity of the impact of the associated freshwater ecosystems cannot be fully understood at this time. A Hydrological Risk Assessment should be undertaken to better understand post-development hydrological risks and impacts. It will be important for the hydrological modelling and risk assessment for each development phase, and for the cumulative development, to consider the effluent discharge volume from the proposed sewage plant. If not mitigated through appropriate stormwater outfall and attenuation structure design, this impact could be of 'Moderate' significance. Where best practical ecological design is incorporated to allows flows and sediment fluxes to remain largely unimpeded, this impact can be potentially reduced to a 'Moderately Low' and acceptable level.												
The study area	Impacts to water quality. <u>Description:</u> Any impacts to water quality will have a direct impact on water resource management as higher levels of pollution feeding into downstream watercourses could compromise the assimilative capacity of affected wetlands. Any harmful substance spill events or pollutants feeding into watercourses can result in the die-off of plants and fauna in the vicinity and immediately downstream of a spill affecting wetland and aquatic habitat and species of conservation concern. Die-back of vegetation due to spills could reduce the amount of grazing available for livestock within the watercourses affected but is unlikely to have a significant impact on this direct use value given that alternative sources of grazing available in the area. The onsite sewage treatment is being designed to treat 2 Mℓ / day of influent. Water pollution impacts during operation are likely to relate to the discharge of treated effluent into the environment and possible leakage of raw sewage from sewer pipeline infrastructure. The wetland	Very High	Beyond Project	Local	Definite	Highly detrimental	Moderate - Negative	• Sewage Treatment Plant: ○ implement best practice design and operation according to an approved management plan that accounts for expected biological and hydraulic loads, makes provision for system failures. ○ Develop a maintenance programme that includes regular inspections for wear and tear of mechanical and electrical plant components. ○ Develop a discharge water quality monitoring programme. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Maintain storm water infrastructure as necessary. • Implement and adhere to buffer zones wetlands and riparian areas. • Implement bi-monthly aquatic biomonitoring and water quality monitoring in accordance with the 'Aquatic Monitoring Plan' during construction and use findings to inform site management. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management.	High	Long-term	Limited	Unlikely	Moderately detrimental	Negligible - Negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	into which the treated effluent is to be discharged (W12) is characterised by concentrated flows along a central drain. This increases the possibility of poor-quality water advancing along the watercourse system relative to if this wetland was characterised by low energy diffuse flow, which will have a "polishing" secondary treatment effect on the discharged effluent. Where pipelines and raw sewage pump stations are properly designed and installed with adequate risk mitigation, the probability of spillage of raw sewage into onsite watercourses is likely to be low. The system should be designed, at a minimum, to meet General Limit Values (GLVs) as stipulated in the National Water Act. However, even if these limits values are consistently met, effluent discharge will still raise background bacterial, salinity, and nutrient levels within the receiving watercourses (R03 and W12). This may result in reduced water quality and a biotic ecological response. Notably, this could result in a change in plant species composition and structure (e.g., increased growth of nutrient-tolerant and opportunistic wetland plant species such as Typha capensis. Increased water turbidity due to sediment inputs and / or erosion could occur. Potential spillages of cement and fuels during maintenance and repair of road infrastructure in the vicinity of watercourses could also alter water physio-chemical quality. There is also potential for contaminated surface runoff / stormwater flows from roads to enter wetlands and rivers. If turbidity and / or pollution risks are not effectively mitigated, impacts to water quality associated with the operation of onsite infrastructure could be of 'Moderate - negative' significance. Where best practical mitigation is implemented (*as listed below and explained in detail in Chapter 6 of this report)*, this can be potentially reduced to a 'Negligible - negative' and acceptable level.							• Rehabilitate wetlands, riparian areas, and buffer zones and in accordance with a 'Wetland Rehabilitation & Management Plan'						

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery operating at the individual sites may create ecological noise and vibration disturbances that can disturb amphibians, reptiles, birds, and small mammals which use watercourses for movement and refugia. Where impacts and risks are poorly managed, this impact could be of 'Minor-negative' significance and where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to 'Negligible - negative' significance and an environmentally acceptable level.	Minor	Project Life	Local	Likely	Moderately detrimental	Minor - Negative	• Implement and adhere to buffer zones for wetlands and riparian areas. • Limit instream habitat disturbance. • Restrict worker and machinery access to the repair/maintenance area. • Prohibit poaching or collection of plants and biota during repair and maintenance.	Minor	Project Life	Limited	Unlikely	Slightly detrimental	Negligible - negative

Phase 2: Construction Phase, wetland and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance	Key recommended mitigation measures	Post-mitigation: Intensity	Duration	Extent	Probability	Consequence	Impact Significance
No planned incursions into onsite watercourses	Direct physical loss or modification of wetland and/ or aquatic habitat associated with the onsite watercourses. Description: There is no infrastructure planned within any onsite watercourses as part of this phase of the development. The planned development areas also do not encroach into the preliminary recommended watercourse buffer zones (Section 6.2.1). There are therefore no planned direct impacts to freshwater habitat areas during the construction phase of this development. There is however the potential for accidental direct physical modification to stream or wetland habitat during construction, although such impacts are unlikely under a realistic 'good' mitigation scenario.	Minor Damage	Medium-Term	Limited	Likely	Slightly Detrimental	Minor - Negative	• No areas outside the construction footprint may be cleared and stripped of vegetation. To this end the outer edges of the construction site must be demarcated using a high visibility barrier / fencing. The demarcation must be signed off by the project ECO. • • Construction staff should be made aware of the location and extent of all watercourses in the vicinity of the proposed development. These should be considered strict no-go zones for the duration of onsite works. • • Drivers and machine operators must take specific care to avoid watercourses when manoeuvring vehicles and heavy equipment.	Negligible Damage	Immediate	Very Limited	Improbable	Negligible	Negligible - negative
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment) Description: Construction activities in the catchment areas of onsite watercourses will result in a temporary reduction in catchment vegetation cover which could be associated with increased runoff and increased sediment supply to watercourses, especially where bare soils are exposed during peak rainfall periods. These impacts could potentially alter the geomorphic and hydrological regime of onsite watercourses. This could affect freshwater ecosystem condition and indirectly affect fauna and flora through a deterioration in the quality of available habitat. Should these impacts occur they are however likely to be temporary and are unlikely to significantly affect long-term ecological processes associated with onsite watercourses. If poorly managed hydrological and geomorphological impacts on Water Resource Management could be of a 'minor' ecological significance. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), the consequence rating can be reduced from 'moderately detrimental' to 'slightly detrimental'.	Intensity	Duration	Extent	Probability	Consequence	Minor - Negative	• Limit the duration of construction to reduce the risk of prolonged sedimentation and erosion impacts occurring. • Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones. • Demarcate buffers on the ground to avoid incursions into these areas. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with a Rehabilitation & Management Plan. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management	High	Short-term	Limited	Likely	Slightly detrimental	Impact Significance

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Impacts to water quality. <u>Description:</u> Water quality impacts during construction will be limited to potential increased surface water turbidity due to sediment inputs and / or erosion and physio-chemical pollution related to potential spillages of cement and fuels during construction. Turbidity impacts are likely to be limited given the temporary nature of onsite earthworks, and the maintenance of a well-vegetated buffer around watercourses. Spillages of fuel and other harmful substances could alter the physio-chemical and biological characteristic of surface water and contaminate watercourse substrate (having a direct impact on water resource management), with potential knock-on consequences for both fauna and flora communities (affecting ecosystem and species conservation indirectly). No impact on direct use value is anticipated as watercourses were not rated as important in terms of water supply as a provisioning ecosystem service. If poorly managed, impacts to water quality could be of 'Minor' significance where turbidity and sediment and / or pollution risks are not effectively mitigated. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to a 'Negligible' and an environmentally acceptable level.	Moderate	Medium-term	Local	Highly Probable	Slightly detrimental		• Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate any spill related impacts as soon as practically possible in accordance with an 'Aquatic Contingency Plan'. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	Moderate	Short-term	Limited	Unlikely	Slightly detrimental	Negligible - negative
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery may create noise and vibration disturbances that may temporarily disturb amphibians, reptiles, birds, and small mammals. These disturbances will be minor, and fauna will likely revisit the site once construction has ceased, and the disturbance has halted. If poorly managed, disturbance impacts could be of 'Negligible' significance. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), the consequence rating can be reduced from slightly detrimental to negligible.	Minor	Medium-term	Local	Likely	Slightly detrimental	Minor - Negative	• Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones, • Demarcate buffers on the ground to avoid incursions into these areas. • Implement road/pipeline Method Statement to specification. • Restrict workers and machinery access to the construction site and site camp only. • Prohibit poaching or collection of plants and biota from natural areas, including riparian areas and wetlands. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with the 'Rehabilitation & Management Plan'.	Minor	Short-term	Local	Probable	Slightly detrimental	Negligible - negative

Phase 2: Operational Phase, wetland and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment) <u>Description:</u> The development will result in an increase in hardened catchment surfaces, and an associated increase in surface runoff which will largely be released into the environment as part of the operation of the formal stormwater management system. This could potentially result in erosion and sedimentation along onsite watercourses and thereby inhibit their ability to provide regulating services such as flood attenuation or toxicant assimilation through the creation of concentrated flow paths, thus influencing water resource management objectives. Similarly, erosion and sedimentation can lead to a deterioration in habitat condition or loss of important habitat thereby having implications for ecosystem conservation targets and indirectly on species of conservation concern. While the attenuation and controlled release of high stormwater runoff volumes (during storms etc.) will aid in preventing erosion and sedimentation associated with increased flow volumes, the presence of stormwater attenuation structures will also serve to alter natural flow and sediment regimes. It is vital that a stormwater attenuation system be designed to have a limited impact on base / low flows to mitigate operation phase hydrological and geomorphological impacts associated with the development. The development will most likely increase peak flows due to urbanisation in the catchment, which increases the rainfall-runoff coefficient of the land surface area. Watercourses may be subjected to flooding damage. Areas where culverts will be installed at watercourse crossings may be prone to becoming blocked and are higher risk due to the momentum of flow from the prevailing flow direction and this poses a risk of undercutting and rapid erosion/bank failing during peak events. It is assumed that	Complete loss	Complete loss	Complete loss	Complete loss	Complete loss	Moderate - Negative	• Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Stormwater and energy dampening systems to be designed and implemented to decrease the risk of stream bank erosion. • Maintain storm water infrastructure as necessary. • Implement and adhere to 33m and 31m buffer zones for wetlands and riparian areas, respectively. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement aquatic biomonitoring and water quality monitoring during operation and use findings to inform site management. Below is the assessment of the potential construction and operation phase impacts and risks associated with Phase 1 of the development (shown in Figure 2). Each of the potential impact consequences are discussed and assessed separately for the construction and operational phases under a ‘realistic poor’ and ‘realistic good’ or ‘best practice’ mitigation scenarios	Complete loss	Permanent	Limited	Probable	Highly detrimental	Minor - Negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	domestic water will be obtained from the local municipality, and there will be no reduction in water within the onsite and downstream watercourses (no direct abstraction of water). The proposed onsite sewerage package plant will release treated effluent into R03 which transitions into W12. This will increase flow along this system above natural volumes which could impact sediment and hydrological dynamics. This is a notable risk along W12 as this wetland is currently characterised by a central drain and associated high concentrated flows. The planned discharge volume of the plant is currently unknown so the intensity of the impact of the associated freshwater ecosystems cannot be fully understood at this time. A Hydrological Risk Assessment should be undertaken to better understand post-development hydrological risks and impacts. It will be important for the hydrological modelling and risk assessment for each development phase, and for the cumulative development, to consider the effluent discharge volume from the proposed sewage plant. If not mitigated through appropriate stormwater outfall and attenuation structure design, this impact could be of "moderate significance. Where best practical ecological design is incorporated to allow flows and sediment fluxes to remain largely unimpeded, this impact can be potentially reduced to a "moderately Low" and acceptable level.													
The study area	Impacts to water quality. <u>Description:</u> Any impacts to water quality will have a direct impact on water resource management as higher levels of pollution feeding into downstream watercourses could compromise the assimilative capacity of affected wetlands. Any harmful substance spill events or pollutants feeding into watercourses can result in the die-off of plants and fauna in the vicinity and immediately downstream of a spill affecting wetland and aquatic habitat and species of conservation concern. Die-back of vegetation due to spills could reduce the amount of grazing available for livestock within the watercourses affected	Very High	Beyond Project	Local	Definite	Highly detrimental	Moderate - Negative	Sewage Treatment Plant: o implement best practice design and operation according to an approved management plan that accounts for expected biological and hydraulic loads, makes provision for system failures. o Develop a maintenance programme that includes regular inspections for wear and tear of mechanical and electrical plant components. o Develop a discharge water quality monitoring programme. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Maintain storm water infrastructure as necessary, • Implement and adhere to buffer zones for wetlands and riparian areas.	High	Long-term	Limited	Unlikely	Moderately detrimental	Negligible - Negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	but is unlikely to have a significant impact on this direct use value given that alternative sources of grazing available in the area. The onsite sewage treatment is being designed to treat 2 Mℓ / day of influent. Water pollution impacts during operation are likely to relate to the discharge of treated effluent into the environment and possible leakage of raw sewage from sewer pipeline infrastructure. The wetland into which the treated effluent is to be discharged (W12) is characterised by concentrated flows along a central drain. This increases the possibility of poor-quality water advancing along the watercourse system relative to if this wetland was characterised by low energy diffuse flow, which will have a "polishing" secondary treatment effect on the discharged effluent. Where pipelines and raw sewage pump stations are properly designed and installed with adequate risk mitigation, the probability of spillage of raw sewage into onsite watercourses is likely to be low. The system should be designed, at a minimum, to meet General Limit Values (GLVs) as stipulated in the National Water Act. However, even if these limits values are consistently met, effluent discharge will still raise background bacterial, salinity, and nutrient levels within the receiving watercourses (R03 and W12). This may result in reduced water quality and a biotic ecological response. Notably, this could result in a change in plant species composition and structure (e.g., increased growth of nutrient-tolerant and opportunistic wetland plant species such as Typha capensis. Increased water turbidity due to sediment inputs and / or erosion could occur. Potential spillages of cement and fuels during maintenance and repair of road infrastructure in the vicinity of watercourses could also alter water physio-chemical quality. There is also potential for contaminated surface runoff / stormwater flows from roads to enter wetlands and rivers. If turbidity and / or pollution risks are not effectively mitigated, impacts to water quality associated with the operation of onsite infrastructure could be of 'Moderate - negative'							• Implement bi-monthly aquatic biomonitoring and water quality monitoring in accordance with the 'Aquatic Monitoring Plan' during construction and use findings to inform site management. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate wetlands, riparian areas, and buffer zones and in accordance with a 'Wetland Rehabilitation & Management Plan'						

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	significance. Where best practical mitigation is implemented (*as listed below and explained in detail in Chapter 6 of this report)*, this can be potentially reduced to a 'Negligible - negative' and acceptable level													
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery operating at the individual sites may create ecological noise and vibration disturbances that can disturb amphibians, reptiles, birds, and small mammals which use watercourses for movement and refugia. Where impacts and risks are poorly managed, this impact could be of 'Minor-negative' significance and where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to 'Negligible - negative' significance and an environmentally acceptable level.	Intensity	Duration	Extent	Probability	Consequence	Intensity	• Implement and adhere to buffer zones for wetlands and riparian areas. • Limit instream habitat disturbance. • Restrict workers and machinery access to the repair/maintenance area. • Prohibit poaching or collection of plants and biota during repair and maintenance.	Minor	Project Life	Limited	Unlikely	Slightly detrimental	Negligible - negative

Phase 3: Construction Phase, wetland and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Direct physical loss or modification of wetland and/ or aquatic habitat associated with the onsite watercourses. <u>Description:</u> Development phase 3 encroaches into a large seep wetland (W15 – Figure 9). W15 was assessed as being in the C PES category but is of High ecological importance and sensitivity. This is because the unit is an example of a critically endangered wetland ecosystem type (seep in the sub-escarpment grassland bioregion) (National Biodiversity Assessment, 2018). The total area of wetland impacted by the encroachment is approximately 3.12ha. There are no other planned direct impacts to freshwater habitat areas during the construction phase of this development. There is however the potential for accidental direct physical modification to stream or wetland habitat during construction, although such impacts are unlikely under a realistic 'good' mitigation scenario.	Damage	Permanent	Limited	Definite	Highly Detrimental	Major - Negative	• void encroachment and infilling of Wetland W15. • No areas outside the construction footprint may be cleared and stripped of vegetation. To this end the outer edges of the construction site must be demarcated using a high visibility barrier / fencing. The demarcation must be signed off by the project ECO. • Construction staff should be made aware of the location and extent of all watercourses in the vicinity of the proposed development. These should be considered strict no-go zones for the duration of onsite works. • Drivers and machine operators must take specific care to avoid watercourses when manoeuvring vehicles and heavy equipment.	Negligible Damage	Immediate	Very Limited	Improbable	Negligible	Negligible - negative
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment). <u>Description:</u> Construction activities in the catchment areas of onsite watercourses will result in a temporary reduction in catchment vegetation cover which could be associated with increased runoff and increased sediment supply to watercourses, especially where bare soils are exposed during peak rainfall periods. These impacts could potentially alter the geomorphic and hydrological regime of onsite watercourses. This could affect freshwater ecosystem condition and indirectly affect fauna and flora through a deterioration in the quality of available habitat. Should these impacts occur they are however likely to be temporary and are unlikely to significantly affect long-term ecological processes associated with onsite watercourses. If poorly managed hydrological and geomorphological impacts on Water Resource Management could be of a 'minor' ecological significance. Where best practical mitigation is implemented (as listed below and explained in detail	High	Medium-term	Local	Definite	Moderately Detrimental	Minor - Negative	• Limit the duration of construction to reduce the risk of prolonged sedimentation and erosion impacts occurring. • Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones. • Demarcate buffers on the ground to avoid incursions into these areas. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with a Rehabilitation & Management Plan.	High	Short-term	Limited	Likely	Slightly detrimental	Minor - negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	in Chapter 6 of this report), the consequence rating can be reduced from 'moderately detrimental' to 'slightly detrimental'.													
The study area	Impacts to water quality. <u>Description:</u> Water quality impacts during construction will be limited to potential increased surface water turbidity due to sediment inputs and / or erosion and physio-chemical pollution related to potential spillages of cement and fuels during construction. Turbidity impacts are likely to be limited given the temporary nature of onsite earthworks, and the maintenance of a well-vegetated buffer around watercourses. Spillages of fuel and other harmful substances could alter the physio-chemical and biological characteristic of surface water and contaminate watercourse substrate (having a direct impact on water resource management), with potential knock-on consequences for both fauna and flora communities (affecting ecosystem and species conservation indirectly). No impact on direct use value is anticipated as watercourses were not rated as important in terms of water supply as a provisioning ecosystem service. If poorly managed, impacts to water quality could be of 'Minor' significance where turbidity and sediment and / or pollution risks are not effectively mitigated. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to a 'Negligible' and an environmentally acceptable level.	Moderate	Medium-term	Local	Highly Probable	Slightly detrimental	Minor - Negative	• Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate any spill related impacts as soon as practically possible in accordance with an 'Aquatic Contingency Plan'. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	Moderate	Short-term	Limited	Unlikely	Slightly detrimental	Negligible - negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery may create noise and vibration disturbances that may temporarily disturb amphibians, reptiles, birds, and small mammals. These disturbances will be minor, and fauna will likely revisit the site once construction has ceased, and the disturbance has halted. If poorly managed, disturbance impacts could be of 'Negligible' significance. Where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), the consequence rating can be reduced from slightly detrimental to negligible.	Minor	Medium-term	Local	Likely	Slightly detrimental	Minor - Negative	• Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones, • Demarcate buffers on the ground to avoid incursions into these areas. • Implement road/pipeline Method Statement to specification. • Restrict workers and machinery access to the construction site and site camp only. • Prohibit poaching or collection of plants and biota from natural areas, including riparian areas and wetlands. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with the 'Rehabilitation & Management Plan'.	Minor	Short-term	Local	Probable	Slightly detrimental	Negligible - negative

Phase 3: Operational Phase, wetland and aquatic ecosystems risk

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Alteration of hydrological and geomorphological processes (erosion and sediment). Description: The development will result in an increase in hardened catchment surfaces, and an associated increase in surface runoff which will largely be released into the environment as part of the operation of the formal stormwater management system. This could potentially result in erosion and sedimentation along onsite watercourses and thereby inhibit their ability to provide regulating services such as flood attenuation or toxicant assimilation through the creation of concentrated flow paths, thus influencing water resource management objectives. Similarly, erosion and sedimentation can lead to a deterioration in habitat condition or loss of important habitat thereby having implications for ecosystem conservation targets and indirectly on species of conservation concern. While the attenuation and controlled release of high stormwater runoff volumes (during storms etc.) will aid in preventing erosion and sedimentation associated with increased flow volumes, the presence of stormwater attenuation structures will also serve to alter natural flow and sediment regimes. It is vital that a stormwater attenuation system be designed to have a limited impact on base / low flows to mitigate operation phase hydrological and geomorphological impacts associated with the development. The development will most likely increase peak flows due to urbanisation in the catchment, which increases the rainfall-runoff coefficient of the land surface area. Watercourses may be subjected to flooding damage. Areas where culverts will be installed at watercourse crossings may be prone to becoming blocked and are higher risk due to the momentum of flow from the prevailing flow direction and this poses a risk of undercutting and rapid erosion/bank failing during peak events. It is assumed that domestic water will be obtained from the local municipality, and there will be no reduction in water within the onsite and downstream	Complete loss	Permanent	Local	Highly Probable	Highly detrimental	Moderate - Negative	• Stormwater and energy dampening systems to be designed and implemented to decrease the risk of stream bank erosion. • Maintain storm water infrastructure as necessary. • Implement and adhere to 33m and 31m buffer zones for wetlands and riparian areas, respectively. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement aquatic biomonitoring and water quality monitoring during operation and use findings to inform site management.	Complete loss	Permanent	Limited	Probable	Highly detrimental	Minor - Negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	watercourses (no direct abstraction of water). The proposed onsite sewerage package plant will release treated effluent into R03 which transitions into W12. This will increase flow along this system above natural volumes which will could sediment and hydrological dynamics. This is a notable risk along W12 as this wetland is currently characterised by a central drain and associated high concentrated flows. The planned discharge volume of the plant is currently unknown so the intensity of the impact of the associated freshwater ecosystems cannot be fully understood at this time. A Hydrological Risk Assessment should be undertaken to better understand post-development hydrological risks and impacts. It will be important for the hydrological modelling and risk assessment for each development phase, and for the cumulative development, to consider the effluent discharge volume from the proposed sewage plant. If not mitigated through appropriate stormwater outfall and attenuation structure design, this impact could be of 'Moderate' significance. Where best practical ecological design is incorporated to allows flows and sediment fluxes to remain largely unimpeded, this impact can be potentially reduced to a 'Moderately Low' and acceptable level.													
The study area	Impacts to water quality. <u>Description:</u> Any impacts to water quality will have a direct impact on water resource management as higher levels of pollution feeding into downstream watercourses could compromise the assimilative capacity of affected wetlands. Any harmful substance spill events or pollutants feeding into watercourses can result in the die-off of plants and fauna in the vicinity and immediately downstream of a spill affecting wetland and aquatic habitat and species of conservation concern. Die-back of vegetation due to spills could reduce the amount of grazing available for livestock within the watercourses affected but is unlikely to have a significant impact on this direct use value given that alternative sources of grazing available in the area. The onsite sewage treatment is being designed to treat 2 Mℓ / day of influent. Water pollution impacts during operation are likely to relate	Very High	Beyond Project	Local	Definite	Highly detrimental	Moderate - Negative	• Sewage Treatment Plant: ○ implement best practice design and operation according to an approved management plan that accounts for expected biological and hydraulic loads, makes provision for system failures. ○ Develop a maintenance programme that includes regular inspections for wear and tear of mechanical and electrical plant components. ○ Develop a discharge water quality monitoring programme. • Wetland rehabilitation along Wetland W12 focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Maintain storm water infrastructure as necessary, • Implement and adhere to buffer zones for wetlands and riparian areas. • Implement bi-monthly aquatic biomonitoring and water quality monitoring in accordance with the 'Aquatic Monitoring Plan' during construction and use findings to inform site management. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control.	High	Long-term	Limited	Unlikely	Moderately detrimental	Negligible - Negative

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
	to the discharge of treated effluent into the environment and possible leakage of raw sewage from sewer pipeline infrastructure. The wetland into which the treated effluent is to be discharged (W12) is characterised by concentrated flows along a central drain. This increases the possibility of poor-quality water advancing along the watercourse system relative to if this wetland was characterised by low energy diffuse flow, which will have a "polishing" secondary treatment effect on the discharged effluent. Where pipelines and raw sewage pump stations are properly designed and installed with adequate risk mitigation, the probability of spillage of raw sewage into onsite watercourses is likely to be low. The system should be designed, at a minimum, to meet General Limit Values (GLVs) as stipulated in the National Water Act. However, even if these limits values are consistently met, effluent discharge will still raise background bacterial, salinity, and nutrient levels within the receiving watercourses (R03 and W12). This may result in reduced water quality and a biotic ecological response. Notably, this could result in a change in plant species composition and structure (e.g., increased growth of nutrient-tolerant and opportunistic wetland plant species such as Typha capensis. Increased water turbidity due to sediment inputs and / or erosion could occur. Potential spillages of cement and fuels during maintenance and repair of road infrastructure in the vicinity of watercourses could also alter water physio-chemical quality. There is also potential for contaminated surface runoff / stormwater flows from roads to enter wetlands and rivers. If turbidity and / or pollution risks are not effectively mitigated, impacts to water quality associated with the operation of onsite infrastructure could be of 'Moderate - negative' significance. Where best practical mitigation is implemented (*as listed below and explained in detail in Chapter 6 of this report)*, this can be potentially reduced to a 'Negligible - negative' and acceptable level.							• Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate wetlands, riparian areas, and buffer zones and in accordance with a 'Wetland Rehabilitation & Management Plan'						

Applicable Area	Potential Impact	Pre-mitigation:						Key recommended mitigation measures	Post-mitigation:					
		Intensity	Duration	Extent	Probability	Consequence	Impact Significance		Intensity	Duration	Extent	Probability	Consequence	Impact Significance
The study area	Impacts to ecological connectivity and/or ecological disturbance impacts. <u>Description:</u> The presence of workers and machinery operating at the individual sites may create ecological noise and vibration disturbances that can disturb amphibians, reptiles, birds, and small mammals which use watercourses for movement and refugia. Where impacts and risks are poorly managed, this impact could be of 'Minor-negative' significance and where best practical mitigation is implemented (as listed below and explained in detail in Chapter 6 of this report), this can be potentially reduced to 'Negligible - negative' significance and an environmentally acceptable level.	Minor	Project Life	Local	Likely	Moderately detrimental	Minor - Negative	• Implement and adhere to buffer zones for wetlands and riparian areas. • Limit instream habitat disturbance. • Restrict workers and machinery access to the repair/maintenance area. • Prohibit poaching or collection of plants and biota during repair and maintenance.	Minor	Project Life	Limited	Unlikely	Slightly detrimental	Negligible - negative

Construction Phase: Hydropedology risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Psrobability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
The study area Activity: Earthworks	Impact on soil interflow, soil structure & land capability, and soil quality <u>Description:</u> Site preparation, including placement of contractor laydown areas and storage (i.e., temporary stockpiles, bunded areas etc.) facilities. Disturbing vadose zone during soil excavations/infilling activities. Vegetation clearing & soil stockpiling.	Medium	Site	Yes	Low	Slightly detrimental	Definite	Low	• Only excavated areas applicable to the project area. • Backfill the material in the same order it was excavated to reduce contamination of deeper soils with shallow oxidised soils. • Cover excavated soils with a temporary liner to prevent contamination. • Keep the site clean of all general and domestic wastes. • All development footprint areas are to remain as small as possible and vegetation clearing is to be limited to what is essential. • Retain as much indigenous vegetation as possible. • Existing roads should be used as far as practical to gain access to the site, and crossing watercourses in areas where no existing crossing is apparent should be unnecessary, but if it is essential crossings should be made at right angles. • Have emergency fuel & oil spill kits on site. • Soil quality monitoring & visual assessments – monthly basis. If obvious pollution is noted (visually) then it is advised that soil screening be undertaken.	Medium	Site	Yes	Negligible	Negligible	Probable	Negligible
The study area Activity: Earthworks	Impact on soil quality. <u>Description:</u> Seepage/leakages/overland flow from the sewer lines may cause soil degradation. Moreover, oil & fuel spills from vehicles parked at the site may compromise soil quality.	Medium	Site	Yes	Low	Slightly detrimental	Definite	Low	• Ensure the sewer system is monitored for leakages. • Routine visual inspections of sewer infrastructure and resident parking areas for signs of soil contamination. • Have emergency fuel & oil spill kits on site.	Medium	Site	Yes	Negligible	Negligible	Probable	Negligible

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Psrobability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
	Prolonged pollution may migrate to the nearby watercourse and/or percolate into the groundwater table.															
The study area Activity: Earthworks	Impact on primary surface water receivers: Non-perennial stream Wetland units. <u>Description:</u> Surface water contamination and sedimentation from the following activities: • Equipment and vehicles are washed in the water bodies (when there is water). • Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather); and • Alteration of natural drainage lines which may lead to ponding or increased runoff patterns (i.e., may cause stagnant water levels or increase erosion).	Medium	Site	Yes	Low	Slightly detrimental	Definite	Low	• Water quality monitoring and visual assessments. • Install a temporary cut-off trench to contain poor-quality runoff (if required). • Routine (monthly) inspections of all sewer-related infrastructure (hydraulic monitoring) • Ensure that stormwater systems conveying water to the nearby river are fitted with silt and oil traps, as well as that surface drains, are isolated from any potential surface pollution sources.	Medium	Site	Yes	Negligible	Negligible	Probable	Negligible
The study area Activity: Earthworks	Impact on Perched Water Table Dewatering. <u>Description:</u> Temporary dewatering of perched groundwater (only expected during intense storm events and shortly thereafter).	Medium	Site	Yes	Low	Slightly detrimental	Definite	Low	• Water quality monitoring and routine visual assessment for contamination. • Discharge dewatered / rainwater collected into the nearby stream. May require authorisation. If water is contaminated, discharge to the closest greywater system (depending on the extent of contamination)	Medium	Site	Yes	Negligible	Negligible	Probable	Negligible

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Psrobability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance

Operational Phase: Hydropedology risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
The study area Activity: Site Activity	Impact on Vadose zone soils and subsequent aquifer (groundwater table) <u>Description:</u> Poor quality seepage and runoff from vehicles parked at the site and from ruptured sewer lines.	Long term	Site	Yes	Low	Slightly detrimental	Probable	Negligable	• Keep the site clean of all general and domestic wastes. • Water quality of the streams and sewer line monitoring.	Long term	Site	Yes	Negligible	Negligible	Probable	Negligible
The study area Activity: Site Activity	Impact on Soil Interflow: • Alteration to natural hydropedological flow paths. • Impacts on the macro-soil structure. • Impacts on the hydropedological processes supporting the watercourses. <u>Description:</u> Disturbing the inner-soil architecture of the original soil profile will disturb natural flow processes (i.e., a result of infilling or cut-and-fill activities).	Long term	Site	Yes	Low	Slightly detrimental	Definite	Low	• Revegetate areas (with vegetation growing at the site) where heavy machinery movement takes place to prevent erosion. • Establish where excavated soils will be placed during the construction phase, and if the area is suitable to receive the excavated soils. • Cover excavated soils to be protected using a suitable covering.	Long term	Site	Yes	Negligible	Negligible	Probable	Negligible

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
	Excavated soil will be placed in other areas (i.e., on top of other soils) and will have an impact on the flow dynamics of the soil it is dumped on top of. This may reduce rainfall infiltration and induce runoff. Impermeable areas (urbanisation) may decrease rainfall infiltration into recharge soils, and hence reduce interflow (A/B and A/bedrock) or lateral flow to downstream wetland areas.															
The study area Activity: Site Activity	Impact on Soil Interflow: • Alteration to natural hydropedological flow paths. • Impacts on the macro-soil structure. • Impacts on the hydropedological processes supporting the watercourses. <u>Description:</u> Treated effluent discharge into rivers/streams/wetland units, may improve or maintain hydropedological flow functions. Stormwater attenuation of accumulated rainwater back into the environment will help maintain or improve hydropedology functions.	Long term	Site	Yes	High	Highly beneficial	Definite	High-positive	• No mitigation is required.							

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
The study area Activity: Activities / Net Result of Earthworks and Development	Impact on soil structure & land capability: • Exposure of soils, leading to increased runoff from cleared areas and erosion of the watercourses, thus increasing the potential for sedimentation of the watercourses. • Vegetation loss. • Soil compaction; and Soil erosion. <u>Description:</u> Areas which were backfilled with collapsible soils; water leakages from the stormwater system or sewer leakages may cause soil subsidence/erosion. Likely associated with soil structure comptonization.	Long term	Site	Yes	Low	Slightly detrimental	Definite	Low	• Hydraulic monitoring of stormwater systems to ensure that the system operates as per design specifications. • Retain as much indigenous vegetation as possible. • Ensure the sewer system is monitored for leakages. • Routine visual inspections of sewer infrastructure and parking areas for signs of soil contamination. • Have emergency fuel & oil spill kits on site.	Long term	Site	Yes	Negligible	Negligible	Probable	Negligible
The study area Activity: Site Activity	Impact on soil quality. <u>Description:</u> Seepage/leakages/overland flow from the sewer lines may cause soil degradation. Moreover, oil & fuel spills from vehicles parked at the site may compromise soil quality. Prolonged pollution may migrate to the nearby watercourse and/or percolate into the groundwater table.	Long term	Site	Yes	Negligible	Slightly detrimental	Definite	Low	• Ensure the sewer system is monitored for leakages. • Routine visual inspections of sewer infrastructure and resident parking areas for signs of soil contamination. • Have emergency fuel & oil spill kits on site.	Long term	Site	Yes	Negligible	Negligible	Probable	Negligible

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance		Duration	Extent	Potential for impact on irreplaceable resources	Severity	Consequence	Probability	Impact Significance
The study area Activity: Net Result of Earthworks and Development	Impact on primary surface water receivers: • Non-perennial stream • Wetland units. <u>Description:</u> Stormwater runoff Potential surface water contamination as a result of poor stormwater drainage on-site. Increased erosion due to vegetation loss. Contaminated runoff water into nearby streams from parked vehicles at the site. Sedimentation of watercourses due to altered runoff patterns.	Long term	Site	Yes	Low	Slightly detrimental	Definite	Low	• Water quality monitoring and visual assessments. • Install a temporary cut-off trench to contain poor-quality runoff (if required and pre-determined by visual assessments). • Routine hydraulic monitoring of the stormwater system (monthly)	Long term	Site	Yes	Negligible	Negligible	Definite	Negligible
The study area Activity: Net Result of Earthworks	Impact on primary surface water receivers: • Non-perennial stream • Wetland units. <u>Description:</u> Sewer lines (waterborne sanitation) • Poor quality seepage into the subsoils from sewer lines may impact soil quality and eventually lead to poor quality seepage into the surroundings.	Long term	Site	Yes	Moderate	Negligible	Definite	Moderate	• Water quality monitoring and visual assessments. • Routine inspections of all sewer-related infrastructure (hydraulic monitoring	Long term	Site	Yes	Negligible	Negligible	Definite	Negligible

Phase 1,2 & 3 Construction: Hydrological risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
The study area Activity: Construction of roads, buildings and services	Alteration of hydrological and geomorphological processes (erosion and sediment)	5	3	Neg	4	12	5	-60	• Limit the duration of construction to reduce the risk of prolonged sedimentation and erosion impacts occurring. • Implement and adhere to buffer zones for wetlands and riparian areas, with planned development infrastructure to remain outside of the buffer zones. • Demarcate buffers on the ground to avoid incursions into these areas. • Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Rehabilitate any erosion or vegetation clearing impacts as soon as practically possible and in accordance with a Rehabilitation & Management Plan. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	5	3	Neg	4	12	4	-48
The study area Activity: Hardened/Impervious construction surfaces	Increase in Surface Runoff	6	4	Neg	5	15	5	-75	• Manage storm water on site (the post development discharge should equal the pre-development discharge). This can be done through attenuation structures below significant impervious areas/disturbed areas, silt traps and water storage structures; • Stop activities during and immediately after rainfall events until accumulated water has dissipated and soils have become stable; •	5	4	Neg	5	14	4	**-56**

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
									• Identify and rectify erosion areas immediately should they occur; • Preserve topsoil for use in rehabilitation during and after construction completion; and • Revegetate disturbed areas during and after construction completion to the pre-development state.							
The study area Activity: Potential for Contamination from Machinery and Stored Petro-chemicals	Impacts to water quality	6	4	Neg	5	15	5	-75	• Address potential erosion and sedimentation risks on site through the implementation of Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate any spill related impacts as soon as practically possible in accordance with an 'Aquatic Contingency Plan'. • Implement bi-monthly aquatic biomonitoring and water quality monitoring during construction and use findings to inform site management.	6	3	Neg	4	13	5	-65

Phase 1,2 & 3 Operation: Hydrological risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
The study area Activity: Operation of industries, roads and businesses	Alteration of hydrological and geomorphological processes (erosion and sediment)	5	4	Neg	4	13	5	-65	• Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Stormwater and energy dampening systems to be designed and implemented to decrease the risk of stream bank erosion. • Maintain storm water infrastructure as necessary. • Implement and adhere to 33m and 31m buffer zones for wetlands and riparian areas, respectively. • Wetland rehabilitation focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement aquatic biomonitoring and water quality monitoring during operation and use findings to inform site management.	5	3	Neg	4	12	5	-60
The study area Activity: Hardened/Impervious construction surfaces (roofs, roads etc)	Increase in Surface Runoff	5	4	Neg	5	14	6	-84	• An adequate storm water management plan to be designed by an appropriate engineer. Here, the engineer should account for both natural run-off (that which can be released into the natural landscape with no detrimental effect) and excess artificial run-off generated by the proposed development structures. • Other structures that may be considered are semi-permeable surfaces that can absorb artificial run-off but releases a certain amount into the landscape.	5	4	Neg	5	14	5	**-70**

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
									Energy dissipating structures can also be used.							
The study area Activity: Potential contamination from industries, businesses, vehicles etc.	Water Quality: Increase in contaminated runoff from hardened surfaces	5	4	Neg	6	15	5	-75	• Sewage Treatment Plant: implement best practice design and operation according to an approved management plan that accounts for expected biological and hydraulic loads, makes provision for system failures. • Develop a maintenance programme that includes regular inspections for wear and tear of mechanical and electrical plant components. • Develop a discharge water quality monitoring programme. • Wetland rehabilitation focused on re-establishing low energy diffuse flow along the system, rather than concentrated flow along the central drain, as it currently the situation. • Implement best practice stormwater management design, including erosion protection at outfalls and allow for unimpeded base flows along watercourses. • Maintain storm water infrastructure as necessary. • Implement and adhere to buffer zones for wetlands and riparian areas. • Implement bi-monthly aquatic biomonitoring and water quality monitoring in accordance with the 'Aquatic Monitoring Plan' during construction and use findings to inform site management. • Address potential erosion and sedimentation risks on site through the implementation of	5	4	Neg	5	14	5	-70

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
									Best Management Practices (BMPs) in erosion and sediment control. • Address potential spill and pollution risks on site through the implementation of Best Management Practices (BMPs) in spill and pollution control and hazardous substances management. • Rehabilitate wetlands, riparian areas, and buffer zones and in accordance with a 'Wetland Rehabilitation & Management Plan'							

Phase 1,2 & 3 Construction: Socio-economic risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
The study area All Phases Construction activities associated with the proposed project.	Employment opportunities	4	6	Positive	6	112	7	Major Positive	• Develop and implement local recruitment policy and identify segments that might benefit informal opportunities	4	6	Positive	7	119	7	Major Positive
	Skills development and capacity building	4	3	Positive	6	77	7	Moderate Positive	• A skills training programme should be in developed and implemented	4	3	Positive	6	119	7	Moderate Positive
	Increased economic revenue	4	3	Positive	6	112	7	Major Positive	• All businesses should be registered for VAT • All employees should be registered for UIF and personal income tax	4	6	Positive	6	119	7	Major Positive
	Procurement of goods and services	4	6	Positive	6		6	Major Positive	• Develop and implement local procurement plan	4	6	Positive	6		7	Major Positive
	improved infrastructure	7	4	Positive	6	119	7	Major Positive	• Monitor and maintain existing, upgraded, and new infrastructure	7	4	Positive	7	126	7	Major Positive
	Population influx	4	3	Negative	7	-98	7	Moderate-negative	• Develop and implement influx management plan	4	4	Negative	2	-36	4	Minor-negative
	Physical Intrusion	4	3	Negative	6	-91	7	Moderate-negative	• The physical intrusion impacts associated with anticipated vibration, noise and dust should be mitigated as per the recommendations of the associated specialist studies undertaken by Zutari. Additionally, where possible ensure that access to fields and grazing areas are uninterrupted by providing alternative access routes and/or temporary access points during construction activities	4	3	Negative	3	-40	4	Minor-negative
	Loss of income	7	3	Negative	7	-119	7	Major Negative	• Skills development programmes should be implemented to capacitate employees, construction workers and community members with the skills necessary to secure other employment opportunities	7	3	Negative	5	105	7	Moderate-negative

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
The study area All Phases Construction activities associated with the proposed project.	Community healthy, security and safety plan	4	3	Negative	7	-98	7	Moderate-negative	• Develop and implement a community health, safety and security plan	4	3	Negative	4	-44	4	Minor-negative

Phase 1,2 & 3 Operation: Socio-economic risk

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
The study area All Phases Operation phase activities associated with the proposed Project	Employment opportunities	7	3	Positive	6	112	7	Major Positive	• Local employment opportunities should be maximised as far as possible	7	3	Positive	7	119	7	Major-Positive
	Skills development and capacity building	4	3	Positive	4	77	7	Moderate Positive	• A skills training programme should be in developed and implemented	4	3	Positive	6	91	7	Moderate Positive
	Procurement of goods and services	6	7	Positive	6	112	7	Major-Positive	• All businesses should be registered for VAT • All employees should be registered for UIF and personal income tax	4	6	Positive	6	119	7	Major-Positive
	Access to services and improved infrastructure	7	7	Positive	6	112	7	Major-Positive	• The officials who will be authorizing the land use options application process should authorize land use options which will be of great need and benefit to the overall development area. • The Successful Developers should appoint qualified contractors to design and build high-end facilities which will be of benefit to the Cato Ridge area	7	3	Positive	7	119	7	Major-Positive
	Increased property values	6	3	Positive	4	52	4	Minor-Positive	• The facilities in the developed area should always be maintained accordingly.	6	3	Positive	5	84	6	Moderate Positive
The study area	Increased local, regional and national revenue	4	6	Positive	6	112	7	Major-Positive	• Develop and implement local procurement plan	4	6	Positive	6	119	7	Major-Positive

Applicable Area	Potential Impact	Pre-mitigation:							Key recommended mitigation measures	Post-mitigation:						
		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance		Duration	Extent	Status (Pos/Neg))	Intensity	Total	Probability	Impact Significance
All Phases Operation phase activities associated with the proposed Project	Visual impacts	4	3	Positive	6	-91	7	Negative	• During the operational phase, the landscape architect is to be retained to monitor the landscape development on private open space and to advise landowners on landscape and visual aspects. This appointment and performance are to be monitored by the ECO/EAP/Environmental Authority.	4	3	Negative	3	-40	4	Minor-negative
	Community Health, Safety and Security	6	3	Negative	6	-90	6	Moderate-Negative	• A community health and Safety Plan should be implemented	6	3	Negative	4	-65	5	Minor-negative