Ekōløgīk

Environmental Science & Consulting

SPECIES SPECIASLIST ASSESSMENT (Amphibians, Anura), FOR THE PROPOSED VILLAGE RIDGE HOUSING DEVELOPMENT, ERVEN 21108 AND 21109 KING GEORGE PARK, GEORGE, WESTERN CAPE

FOR

POWER CONSTRUCTION (PTY) LTD

December 2021

F. de Lange

(MSc. Conservation Ecology) Pr.Sci.Nat (Ecologist), Amphibian specialist, Bio-acoustic scientist

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INDEX:

1 SPECIALIST DETAILS

- Ferdi De Lange (Phone: +27 (0) 465 5119; email: ferdi@ekologik.co.za)
- SACNASP registration for Ecological Science (member #117017).
- Experience: 5 years of consulting, primary expertise in Amphibian studies, Bioacoustics and Wetland ecology.
- Curriculum vitae attached.

2 STATEMENT OF INDEPENDENCE

I, Ferdi de Lange, as the appointed Amphibian Species Specialist, hereby declare/affirm that the information herein provided is correct as per this compliance statement, and that I meet the general independency requirements to do this assessment and have no personal, business, financial, or other interest in the proposed activity herein assessed and that no circumstances herein compromised my objectivity. I am also aware that a false declaration herein is an offence in terms of regulation 48 of the EIA Regulations (2014).

3 INTRODUCTION

3.1 Background

Power Construction (Pty) Ltd obtained approval for the construction of a mixed housing development on Erven 21108 and 21109 George. Final approval for the development was obtained during 2020. This approval was for:

"Subdivision in terms of Section 15(2)(d) of the Land Use Planning Bylaw for George Municipality, 2015 of the subdivisional Areas as Follows:

- *99 Single Residential Zone I erven;*
- *86 General Residential Zone III erven:*
- *3 Business Zone III erven;*
- *1 Community Zone 1 erf (crèche);*
- *11 Public Open Space Zone I erven; and*
- *1 Transport Zone II erf (public streets and parking)"*

Construction on site commenced in 2021. The development activities was however re-evaluated as result of community objections, and this resulted in fresh assessments of the construction site. The presence of a wetland flat within the construction site was identified during the assessments with this area being largely disturbed and destroyed as result of construction activities. A freshwater

consultant was appointed to assess the condition of the wetlands on site and POAI (Project area of influence). This appointment also required consideration of the terrestrial fauna and flora species present at the project site and POAI. In pursuance hereof, Ekologik (Pty) Ltd was appointed to assess the amphibian species at the development site and POAI. This initial assessment, (Ekologik: Rapid Frog Survey, 2021), determined the presence of a species of conservation concern (SCC) *Afrixalus knysnae*, and this current Specialist report have been commissioned to evaluate the impacts of the activity on the SCC.

3.2 Other and current assessments

This assesment follows on the previous report, *Ekologik: Specialist Assessment Report, 2021*, and must be read in conjunction therewith as well as the Aquatic Specialist Report, (Confluent: Environmental Aquatic Specialist Report, 2022). A subsequent hydrological report have been commissioned for the site, DHS Groundwater Consulting: Hydrological Desktop Assessment and has an impact on the findings herein.

Assessments regarding the floral diversity and other environmental authorisations have not been studied for the purposes of this assessment. This Specialist report relates to the current development property where construction activity have commenced and is concerned solely with the assessment of impacts on the Species of Conservation Concern and frog diversity at the site and POAI. The impacts can however not be assessed without assessing the current ecological component of the site and POAI and the ecological interactions of the total amphibian community herein.

The national web-based screening tool have been employed for the site in relation to this Specialist report and assessment. To comply with the minimum requirements required by the Protocols for Specialist Species Assessment, in terms of NEMA, the tool was used to identify and categorise the type of reporting required herein. Although the use of the tool at this stage would not alter prior assessments, the tool will form a foundational part of the report compiled herewith.

3.3 Scope of Study

The scope of this study and the *Ekologik: Specialist Assessment Report, 2021,* report included:

a. report and confirm the presence of *Afrixalus knysnae* as Species of Conservation Concern;

b. ascertain the population size of the SCC in the wetland-flat at the site and possible distribution within the adjacent environments;
c. Identify the possible impacts of the current activity and proposed alternative layouts of the development;
d. describe the importance of conservation of the SCC at the wetland-flat locality and adjacent larger connected wetland systems
e. Review literature and relevant databases and studies regarding conservation of the SCC and determine compliance of the construction and development activity with conservation guidelines and priorities of the SCC
f. Examine and describe dynamic ecological processes and connectivity within the study area and broader adjacent environment to inform on the impact of the activity on the SCC conservation and viability of its survival at the locality;
g. Assess these impacts during the construction phase and subsequent residential occupation phase and determine buffer zones or areas to minimise or avoid detrimental impacts for the SCC and it's habitat;
h. Make recommendations regarding suitability of the alternative layouts or advise on other layout proposals and management processes during the construction and subsequent residential occupation phases to achieve conservation of ecological processes for the SCC and its habitat;

3.4 Assumptions and Limitations

Distribution records as available from on-line databases, field-guides and other literature are as reliable as the sampling effort in obtaining these records. Sampling within private properties are often not possible, thus causing gaps in resolution of distribution records. Presence records of actual species at survey sites may therefore often be lacking, and therefore requires adequate assessments during environmental authorisation processes. In this instance two main approaches was employed to minimise the limitations presented by current distribution record availability: 1) the desktop study was expanded to include all the species known within a larger geographical area surrounding the site, focussing on areas with similar habitat, geography, elevational and vegetation features; and 2) doing a rapid survey of the site and extended survey of the larger area found around the subject site.

The methodologies employed in compiling the Specialist Species Assessment (*Ekologik: Specialist Assessment Report, 2021*) may not have complied with the Species Environmental Assessment Guidelines. This limitation is not however considered to compromise the outcome of the impact assessment as the on-site experience gathered during the rapid assessment offered a greater understanding of the species biodiversity relevant to the larger area and the current development footprint considered in this report. The methodology also

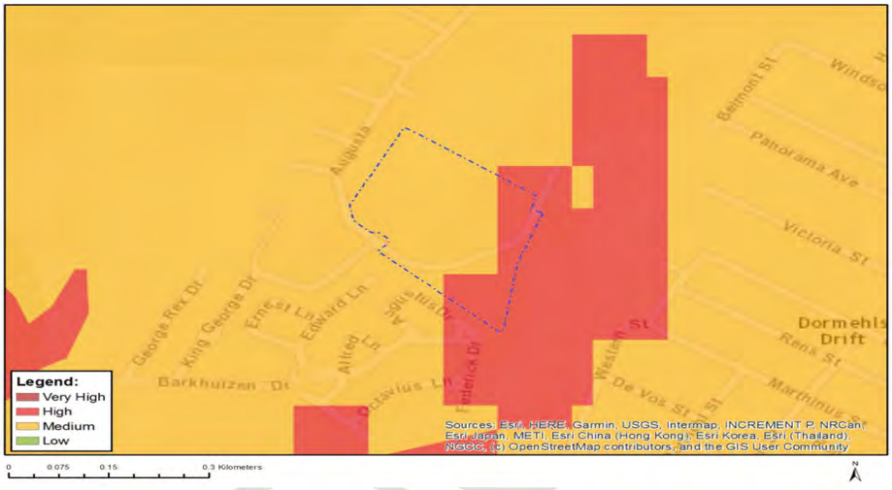
complies with the precautionary approach prescribed the National Environmental Management Act, Act No. 107 of 1998 (NEMA).

3.5 Legislative Context

The Government Gazette, No. 43855 (Published in Government Notice No. 1150) of 30 October, 2020: "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species" is of particular relevance to the production of this report. Assessment and minimum reporting requirements, as stipulated by the Protocol is governed by the level of environmental sensitivity which would normally be identified through the use of the web-based screening tool.

The current project activity falls within an area identified by the screening tool as "High sensitivity" and "Medium sensitivity". The Terrestrial Animal Species Theme classification was assessed during site-sensitivity verification. An excerpt of the report is indicated in Figure 1. The current assessment is therefore based on the applicability of this verification. The Terrestrial Animal Species Site Sensitivity Verification Report attached as Appendix 1.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
High	Aves-Bradypterus sylvaticus
Medium	Invertebrate-Aneuryphymus montanus
Medium	Amphibia-Afrixalus knysnae
Medium	Aves-Neotis denhami
Medium	Sensitive species 7

Figure 1: Excerpt from Screening Tool Report - The Terrestrial Animal Species Site Sensitivity Verification Report

4 METHODOLOGY

General methods followed in preparing the report and this assessment consisted of consulting records of distribution from various available databases during a desk-top study to determine the potential anuran species that could occur at the site and PAOI. Descriptions of these resources are described in more detail below. Detailed methods to ascertain the diversity of amphibian species at the site and surrounds including habitats and inter-connected eco-geographical areas have been described in the *Ekologik: Specialist Assessment Report*, 2021, to which this report refers.

Additional to the desk-top study physical walk through site inspections were conducted between 31 October and 3 November 2021 and again on 22 November 2021, after a major flooding event in George. Important habitats or potential habitats and species presence or potential presence was assessed on site and in a valley bottom wetland area within approximately 200 m of the construction site. The different habitats, biodiversity features and landscape units were investigated and their position and sensitivity were mapped in the field. Field notes were transcribed onto publicly available satellite imagery and mapped in GIS. Active searches for amphibians were also conducted within habitats likely to be important for potentially occurring species.

4.1 Desk-top Study

4.1.1 Site Screening

Sensitivity of the project site was determined by following the protocol as listed in the Government Gazette, No. 43855 (Published in Government Notice No. 1150) of 30 October, 2020: "Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species". Critical Biodiversity Areas (CBAs) were also extracted from the SANBI BGIS Database (https://www.sanbi.org/link/bgis-biodiversity-gis/). These data sources incorporate current Protected Areas and Conservation Areas, biodiversity features, their condition, and opportunities and constraints for effective conservation.

4.1.2 Frog Species

This report is only concerned with the amphibian species and specifically the SCC at the site. Information on possible frog species present at the project site

were collated from interrogating multiple databases and sources and specifically the atlas projects of the Virtual Museum (https://vmus.adu.org.za/) network the GBIF (GBIF.org 2021, available from: https://www.gbif.org) and the Frog Atlas (Minter et al. 2004), field guides (Du Preez and Carruthers 2017). The SA Frog Atlas is currently the most comprehensive in mapping frog diversity and biogeography in South Africa and lists 19 frog species, representing six families of anurans that may be present in the Southern Cape Region. Du Preez and Carruthers (2017) furthermore closely followed The Frog Atlas in compiling their comprehensive field guide and extensive use was made of these guides during the collection of field data during the current study.

The species composition as reported by Minter *et al.* (2004) is presented in the *Ekologik: Specialist Assessment Report, 2021*. Although the number of species may seem relatively small, compared to 167 frog species found in South Africa, the area is within an ecotonal environment, making the species assemblages somewhat unique. This include various fossorial species, stream dwelling and wetland species, with only so-called tree dwelling species lacking in the area.

4.1.3 Species of Conservation Concern

Species of Conservation Concern are considered to be that listed by conservation authorities as being on a 'Red List' and at risk of extinction and those listed by National or Regional legislation as being protected.

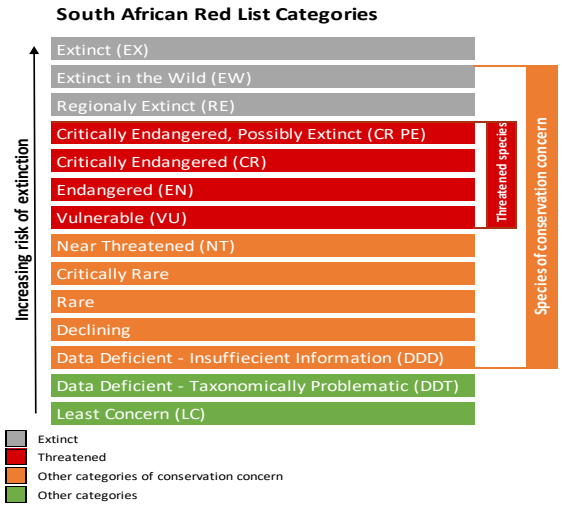


Figure 2: *Species conservation status Categories according to SANBI Red List classification*

Regional threat status for frogs was obtained using The Frog Atlas (Minter et al). The IUCN threat status was also used as ancillary evaluation. South African Red List categories as determined by SANBI is graphically set out hereunder in Figure 2. The SCC, *Afrixalus knysnae* together with other frog species was found to inhabit the wetland-flat within the construction site.

4.1.4 Modelling

No modelling was required.

4.2 Site inspection

- Date: 31 October – 3 November 2021, Construction site, wetland flat and valley bottom wetland
- Date: 22 November 2021
- Duration: 4 Days initially plus 1 day after major flooding event
- Season: Summer
- Season Relevance: Conditions during the first site visits were excellent as the area had received a good amounts of rainfall in the weeks leading to the inspections allowing for a thorough assessment of features such as temporary wetlands, drainage lines, seeps and water-filled depressions. Plant species such as grasses and herbs were flourishing during the site visit increasing the abundance of fauna and flora in general. The visit after the flooding was in bright sunshine with water levels extra-ordinarily high within the wetland flat and obvious flooding damaged caused to the site.

4.3 Assessment of Impacts

In order to assess the impacts, the methodology used follows that of Hacking (2001) and is outlined in Appendix 2. This method considers ranking the significance of impacts of identified environmental aspects (ISO 14000). Significance are ranked as High (H), Medium (M) and Low (L) while considering both negative and positive aspects. Significance of impacts associated with the significant aspects can then be determined. An Overall significance of Impacts are thereby determined in order to provide guidelines for decision making.

5 RESULTS

This section is to confirm the results of the study conducted for the Construction site, PAOI, originally approved Development as well as the alternative Development layout. The findings contained herein are applicable for this assessment of impacts of the proposed Village Ridge Housing Development, George.

5.1 Baseline Description of Amphibian diversity and Habitat

5.1.1 Ecosystem biodiversity

The Existing Biodiversity Areas as applicable to the study site have been investigated and indicates the Garden Route Critical Biodiversity Area (CBA2) in Figure 3 (Excerpted from the Screening Report, Appendix 1).

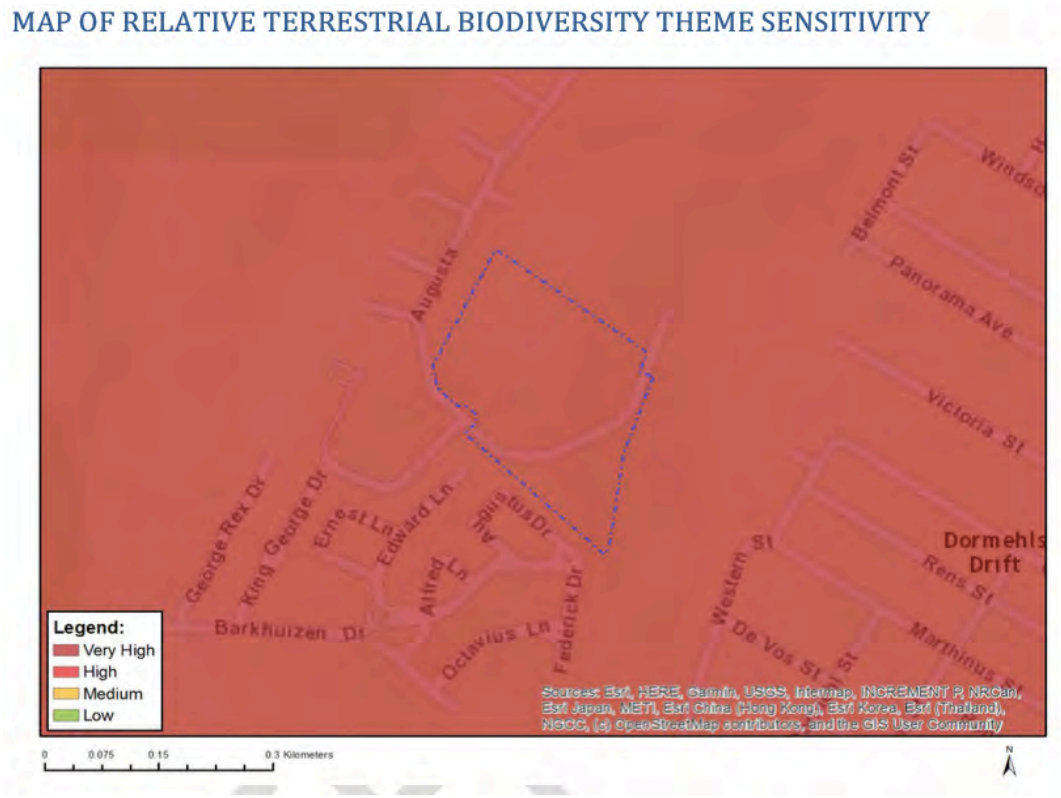
Figure 3: CBA mapping as obtained from SANBI BGIS pertaining to the site and PAOI indicating Ecological support areas and Critical biodiversity areas

The Screening report indicates:

- The locality of the site within the CBA;
- The locality of the site footprint adjacent to Ecological Support Areas
- The area being a Critically Endangered ecosystem

The Screening tool furthermore indicates the PAOI as being within a "Very High" sensitivity area containing Aquatic CBAs, Strategic water source areas and Wetlands. The wetland-flat within the construction site is however not indicated specifically by the screening tool. This wetland is critical habitat for amphibian species.

The position of the proposed development at this locality makes it highly likely that the proposed development will have a significant negative impact on the functioning and goals of the CBAs, ESAs and Aquatic biodiversity CBA and Wetlands in the area.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area 2
Very High	Critically endangered ecosystem
Very High	Strategic Water Source Areas

Figure 4: Screening tool excerpt pertaining to the proposed development and PAOI

5.1.2 Habitat

The vegetation that occurs in the study area represents the Fynbos biome. The current habitat occurs within the Garden Route Granite Fynbos. The habitat was examined and found to have been disturbed extensively. Attempts to halt further disturbance and also intermediate reparation work allowed frog breeding activity at the site to proceed during the survey period. The current development construction activities have however completely transformed the site except for the current remnant of the wetland flat. This contains hydrophytes

and typical wetland vegetation surrounding it. This wetland is the only habitat suitable for the occurrence of anuran species at the site. The connectivity of the site to the adjacent valley bottom wetland have been detailed in the *Ekologik: Specialist Assessment Report, 2021* and the habitats found in this adjacent system is currently intact. Images of the state of the wetland flat at date of the *Ekologik: Specialist Assessment Report, 2021* is attached as Appendix 3.

The wetland flat is a sensitive habitat as an ephemeral depression and subject to large seasonal fluctuations. The relative small size of the wetland also increase its vulnerability to development and other anthropogenic pressures. Deposition of topsoil and silt following rainfall events will also impact the wetland. A recent major flooding event had an extraordinary influence on the wetland due to the construction work and accumulated topsoil and foreign material on site.

The limited wetland habitat present at the proposed development site and adjacent to the development footprint makes it highly likely that the development will have a significant negative impact on amphibian species. The potential impacts can be reduced through the implementation of mitigation measures such as the avoidance of activities within particularly sensitive habitat features, strict observance to environmentally sound construction management plans, and wetland rehabilitation actions prior to, during and after construction. This wetland flat as particularly sensitive have been identified and demarcated in the *Ekologik: Specialist Assessment Report, 2021* with recommendations regarding its conservation.

5.1.3 Amphibian Species

18 frog species are found and is present within the larger geographical distribution of the Garden Route Area. Table 1 of the *Ekologik: Specialist Assessment Report*, 2021, indicates the species occurring within this geographical area as well as its conservation status. The species observed and confirmed at the site or PAOI (and habitat type) is indicated in Table 2 of *Ekologik: Specialist Assessment Report, 2021*.

The Knysnae Leaf-folding frog (*Afrixalus knysnae*) as located on the construction site is the only Endangered anuran species as listed by the IUCN and SANBI within the Garden Route area. The identification of the species was confirmed and photographic evidence and uploaded to iNaturalist (Figure 5). The species seems to be sensitive to habitat alteration, and will not tolerate urbanisation. The potential impacts of the development to this species are therefore considered to be high if sensitive areas are destroyed or significantly altered and associated mitigation measures are not adhered to.

Figure 5: Photos form the proposed development site of a young male *Afrixalus knysnae* specimen on young Typha spp. leaf and a folded leaf nest containing *A. knysnae* eggs.

6 IDENTIFICATION OF POTENTIAL IMPACTS

Potential impacts of the development on the Amphibian Species at the construction site and PAOI are as follows:

6.1 Impacts on biodiversity:

Any impacts on species' individuals, populations or communities. These includes the following:

- Possible alteration population size of the SCC and other present frog species;
- overall species richness and genetic variability;
- population dynamics.

6.2 Impacts on ecosystem functions:

Any impacts on processes or factors that maintain ecosystem health and character. These includes the following:

- Habitat fragmentation and disruption to ecological connectivity;
- Changes to abiotic environmental conditions (*temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography*)
- Changes to biotic environmental factors (*predation, food resources, pathogens, competition*)

7 ASSESSMENT OF IMPACTS

Assessment of current impacts on the SCC of the already commenced construction activities have been investigated and reported on in *Ekologik: Specialist Assessment Report, 2021*. This Specialist report assesses the possible impacts on the SCC according to the various phases that the project will progress through and which impacts may be expected and what its significance will be. All impacts are also assessed at a cumulative point where not only the current project is assessed but also its impact resulting from the addition of the housing development to existing or other new developments in the area. These phases being assessed are the Rehabilitation phase (Wetland flat), Construction phase, Occupation phase and Cumulative phase.

7.1 Rehabilitation Phase Impacts

The wetland flat have been severely disturbed currently and will require rehabilitation. During this phase impacts on biodiversity as well as ecosystem functioning are expected. This phase is however necessary and required in order mitigate the impact of already initiated construction disturbance and to minimise further impacts in the Construction and Occupation phases

7.2 Construction Phase Impacts

Construction phase impacts for this project will be the most severe as it will be deliberate and over an intense programmed and determined time period. Activities are robust and involves large numbers of people and the operation of machinery in altering the character of the site and PAOI.

7.3 Occupation Phase Impacts

This phase is the longest lasting and will continue effectively in perpetuity. The development will consist of homes to many human inhabitants and be effected by such anthropogenic activities normally associated with residential living, gardening, building alterations and maintenance over extended and undetermined periods of time. Impacts will also be of a longer lasting and permanent nature.

7.4 Cumulative Impacts

The development is within an existing residential area with established infrastructure. Impacts on amphibian populations, particularly of the species of conservation concern due to the cumulative effects of increased anthropogenic activities, vehicle traffic, alteration of geography, altered land use and general environmental changes will be of a permanent nature and over an indefinite period.

8 ORIGINAL DEVELOPMENT LAYOUT

The original development layout did not take into account any conservation measures of the wetland flat habitat or that of any frog species present. The footprint encroached completely over the sensitive habitat area and as such caused impacts on biodiversity aspects as well as ecosystem functionality of the wetland and POAI (Figure 6). Figure indicates the development layout superimposed over the wetland flat area and the required buffer of the valley bottom wetland. Assessment of this original layout was made with recommendations contained in the *Ekologik: Specialist Assessment Report, 2021*. These recommendations was heavily centred around the protection and conservation of the wetland flat habitat. The SCC is a habitat specialists and require habitat features and conditions that are clearly explained in the Assessments Report.

Figure 6: Original proposed layout of the housing units in relation to the wetland flat and valley bottom wetland reserve

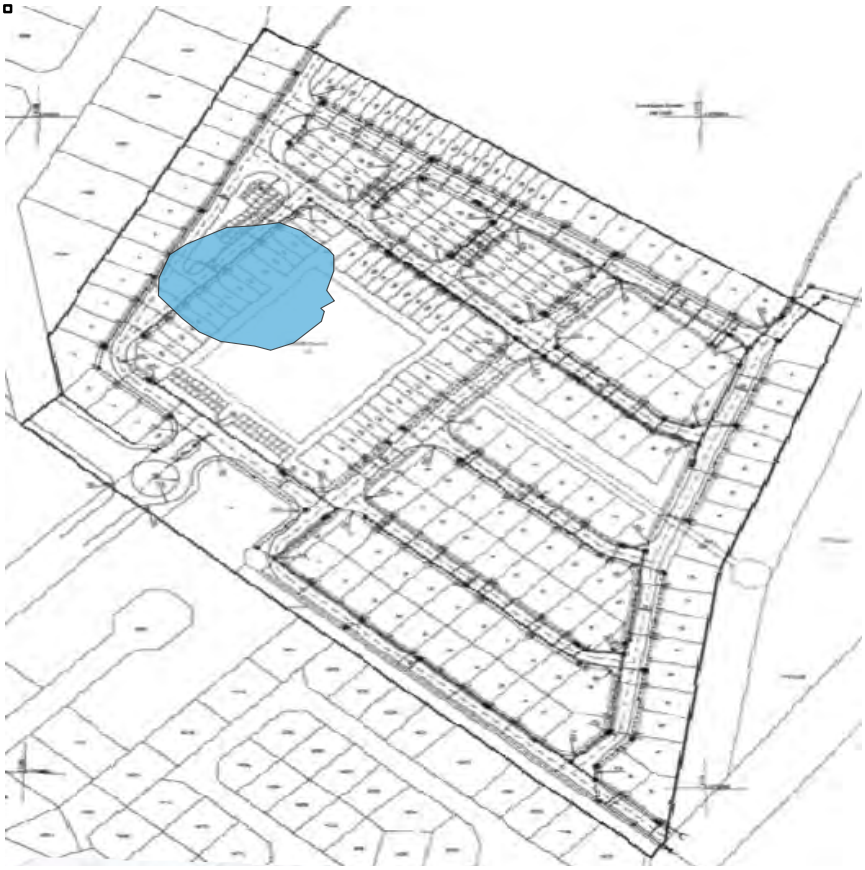


Figure 7: Original layout services diagram in relation to the wetlands

The recommendations made in the *Ekologik: Specialist Assessment Report, 2021* remains relevant and the specific references to the critical actions to be taken and conservation strategies to be implemented are cross-referenced as follow:

- *"4.2.1. In Situ conservation*

  … All the habitat requirements for A. knysnae are available within the site and the current breeding activity and number of tadpoles present during field surveys indicated a healthy system. Restoration of the habitat will however need to be done after the breeding season and well into the drier winter months. This restoration would need to be carefully designed and undertaken to ensure sustained habitat availability for the next season and at the same time not cause mortality of individuals based on the assumptions of its estivation strategy in the wetland substrate."

- *"4.2.3. Habitat protection*

Protecting the habitat by physically isolating this area from deliberate or accidental human encroachment, domestic animals, and pollution will be the most effective manner to achieve its conservation. Cognizance must be taken of the behaviour of the typical frog species described herein. Built environments do not hamper frog movement or isolate them from other natural areas. Frog mortalities are mainly the result of habitats and environments being polluted or indiscriminately travelled through. Predation by domestic animals on amphibians is a major threat for amphibian survival. Human intrusion, effluent and pollutants into the wetland are the major habitat threat and must therefore be limited or completely avoided."

- *"4.3 Development layout amendment recommendations*

  … Recommendations for alternative development proposals based on the information from this assessment with a view of conserving the anuran habitat at the site and the SCC is stipulated as follows:

  a. *The wetland must be restored to function as originally situated on the site, slowly filling, and draining from ground water resources and rainwater runoff. Draining of the wetland system through alternative channelling systems cannot be designed or implemented. The wetland-flat character should be preserved. Drainage channelling, even extremely slow drainage, will not assist conservation of the SCC and other resident frog species but rather place pressure on tadpole survival. Restoration of the wetland-flat is the first phase to achieve habitat conservation, but this must only be commissioned in the drier months when frog breeding activity has ceased…*

  …..
  c. Pollutants contaminating the wetland originating from housing structures and the end-user occupants of the housing estate must be diverted away from this conserved area….

  d. Construction of a berm structure demarcating the 19 m buffer will assist in avoiding pollutant runoff from the adjacent residential development into the conserved area if constructed carefully…

  e. A barrier structure, either in the form of a "see-through" fence with or without densely growing indigenous hedge type plants should be installed beyond the berm and around the wetland flat. This must however give adequate protection against human and domestic animal encroachment and be at least 1,8m high. Ensuring that fencing is not of a type designed to isolate either the wetland or perimeter of the development will allow all the species in the community to freely traverse the area…

….

f. The location of the barrier should at a minimum be at or close to the outside of the constructed berm, but practicality need to be considered as illustrated in Figure 7. The exact final demarcation will be dictated by the re-designed development and is to be assessed at that stage

…. it suggested that the planting of a tree barrier be investigated along the edge of the fence barrier. These should be fast and tall growing species with the intention of dispersing the largest part of the sound emanating from the wetland. This will allow for even higher levels of "isolation" of the wetland and ease acoustic "nuisance" for residents and probably assist with achieving less animosity towards the conservation programme. Trees do however use large volumes of water, and this impact must first be investigated before a decision in this regard is taken.

- *…5. CONCLUSION AND SUMMARY*

The design and layout of the housing development require a buffer zone around the wetland with a barrier or fencing system to act as deterrent to human and domestic animal intrusion in the conserved area. The barrier needs to allow movement and migratory behaviour of other frog species and wildlife into and out of the wetland area as well as towards the other natural areas around the development. These refugia and foraging areas for frogs exist in various recreational areas, golf courses and residential gardens beyond the development area and must be able to be accessed by the various anuran species identified at site. Allowing this normal traversing behaviour of the frog species will ensure the wetland-flat's continued viability as ecological service provider for these species and the SCC

9 ALTERNATIVE DEVELOPMENT LAYOUT

A proposed amended development layout as depicted in Figure 7 have been submitted and represents a first alternative to the original approved plan referred to in 8 above. Services diagrams pertaining to this new proposed development footprint have also been submitted and is indicated in Figure 9.

Assessment of impacts on the SCC and other frog species is discussed and described based on the revised housing structure placements and the service infrastructure for the development. The assessment is based on the known morphology, ethology, ecology and population dynamics of frog species found in the Garden Route area. Impacts are described in an ecological format as the development is proposed within a critical biodiversity area and affects ecological support corridors.

Figure 8: Proposed alternative layout plan depicting residential units and road infrastructure at the site.

The Impact phases, Rehabilitation, Construction, Occupation and Cumulative effect for this Alternative layout is reported by way of Assessment matrices. Confidence in the impact relevance is indicated in these matrices and these confidence factors are based on available knowledge of the relevant frog species encountered at the site. Studies on the SCC is however ongoing and as such the precautionary principle is implemented where knowledge regarding this species is lacking. Opinions regarding impacts are also based on experience in these types of developments, construction and frog community structures and dynamics within wetlands in close proximity to urban areas.

Figure 9: Diagram of new service layout on proposed development

9.1 Rehabilitation Phase Impacts

9.1.1 Impacts on biodiversity:

Possible alteration in population size of the SCC and other present frog species, overall species richness and genetic variability and population dynamics (**Table 1**)

The wetland flat area have been largely disturbed through construction works and heavy machinery, causing the area to be altered from its natural state. The SCC managed to continue its breeding season as a result of intervention in the construction activities. The SCC requires this area as habitat and as it is a habitat specialist, the conditions at this site is excellent as a breeding locality for *A. knysnae*.

The site must be restored and this process must be carefully undertaken in order to avoid direct impact on the SCC population size, individuals in proses of aestivation as well as other local sympatric species and conspecifics. Population dynamics must be maintained and species mortalities avoided during this phase. The locality seems to be a disjunct population of the SCC within the larger geographic area and as such the locality specimens must be protected and preserved to ensure genetic viability. Preservation of the

individuals at other possible localities within close proximity of the PAOI have been assessed in the *Ekologik: Specialist Assessment Report, 2021* and these will not suffice as *ex situ* conservation localities.

Disturbance and degradation of the wetland during the rehabilitation process will have the effect of diminishing the overall frog population abundance and dynamics with individuals retreating from the habitat over time. The probability that unmitigated disturbance or displacement of the SCC and other frog species associated with the habitat at this phase will have a negative impact on the species long-term persistence and viability in the area is medium, and therefore the impact significance is medium. These impacts can be further reduced following the implementation of mitigation measures.

Table 1: Impact Matrix for the Wetland Rehabilitation Phase: SCC, frog communities and population dynamics

IMPACT PHASE:	**Rehabilitation Phase**						
Potential impact description: Impacts on biodiversity	Possible alteration in population size of the SCC and other present frog species, overall species richness and genetic variability and population dynamics						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**L**	**Negative**	**M**	**M**	**H**
Can the impact be reversed without mitigation?	No. The SCC is already Endangered due to AOO and EOO and reduction in population size will further diminish genetic pools and occurrence						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. The SCC is a cryptic species and needs to co-exist with sympatric species to minimise predation on only it's individuals. The SCC populations are not large at its localities and any further loss will result in irreplaceble losses.						
Can the impact be avoided, managed or mitigated?	Yes. Rehabilitation is absolutely required and will be a mitigation measure in itself. Rehabilitation must however be done with care, expertise and be as little machinery-driven as possible.						
Mitigation measures to reduce residual risk or enhance opportunities: Rehabilitation of wetland flat must only commence after breeding season and in the drier months. Breeding occurs between August and March Contamination of habitat be minimised during rehabilitation process Large areas of disturbance and alteration must be carefully restored, mainly with manual labour, and from the outside of the wetland moving inwards Encounters with specimens during this work must be reported to EC and specialist							
Impact/s to be further investigated or addressed:	Rehabilitation processes must be monitored and done with care and expert input to ensure the viability of the wetland as habitat and at the same time not injure or kill any individuals present.						

9.1.2 Impacts on ecosystem functions:

- Habitat fragmentation and disruption to ecological connectivity (**Table 2**)

The area surrounding the wetland flat within the project site is currently cpmpletely transformed with little contiguous suitable natural habitat. Rehabilitation of the habitat will result in alteration of the habitat from its current disturbed state, this creating habitat alteration once more. Restoration should therefore be as close as possible to the original wetland locality and character to allow for the natural ecological services to continue.

Water depleting alien vegetation should be removed to allow groundwater to be retained throughout summer breeding seasons and allow for wetland functioning. Geographic features must be carefully restored and or removed where required. Rehabilitation should aim to have connectivity of the habitat fit in with the future connectivity corridors as per the development construction layout.

Table 2: Impact Matrix for Rehabilitation Phase: Ecosystem Functions – Habitat ecology

IMPACT PHASE:	**Rehabilitation Phase**						
Potential impact description: Impacts on ecosystem functions	Habitat fragmentation and disruption to ecological connectivity						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**M**	**Negative**	**M**	**H**	**H**
Can the impact be reversed without mitigation?	No. Habitat loss at this site will result in complete destruction of the ecosystem function required by the SCC.						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. The ecosystem and its resources required for ecosystem functioning will be lost for at least the SCC.						
Can the impact be avoided, managed or mitigated?	Yes. Rehabilitation will cause the entire ecosytem at micro-level to persist and revive						
Mitigation measures to reduce residual risk or enhance opportunities: Works at the site to be guided by scientific knowledge to insure the ecosystem remains in tact or is resored adequately. Removal of allien plants will assist in keeping habitat unfragmented, but must be underatken with care as to not cause species mortalities Connectivity to fringe environments and larger connected ecosystem must be resored but with care as to not allow ingress of effluent Buffer required for the wetland protection must be constructed during this phase							
Impact/s to be further investigated or addressed:	Buffer construction to be designed correctly with cognisance of height and longevity. Placement critical.						

The probability that habitat fragmentation and diminished ecological functions associated with the restoration of the habitat will have a negative impact on the species and other frog populations in terms of their long-term persistence and viability in the area is medium, and therefore the impact significance is medium. These impacts can be further reduced

following the implementation of mitigation measures. Mitigation measures implemented during this phase will have a largely positive effect on the habitat and the future ecological corridors to be designed as per the alternative layout plan.

- Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography) (**Table 3**)

  The largest impact during rehabilitation will be the disturbance of the bottom of the wetland flat. Rehabilitation must be carefully undertaken to minimise external soil ingress into the wetland that may cause silt-build up when the wetland fills with water in the rainy season again. Clearing of the vegetation should not cause an unnatural increase of wetland depth when water levels rise again. Water movement regimes from ground water sources must be maintained by not compacting the substrate more than required and also allowing precipitation to add to the water table reserves from the low gradient slopes at the site.

  Rehabilitation should be done according to the current wetland waterbody character, size and shape to ensure that future flooding events or drought periods does not unnaturally threaten the sustainability of the wetland. Cognisance must be taken of the fact that a buffer zone will be constructed around the wetland in future and this will also have an impact on the rehabilitated design of the wetland.

  The probability that abiotic environmental changes to the habitat associated with the rehabilitation of the wetland flat without mitigation will have a negative impact on the SCC and other frog populations in terms of their long-term persistence and viability in the area is High, and therefore the impact significance is High. Rehabilitation is however a mitigation action in context of the entire development and implementation thereof with proper mitigation efforts will have long term low impact and be of a positive nature.

Table 3: Impact Matrix: Rehabilitation Phase – Abiotic environmental conditions

IMPACT PHASE:	Rehabilitation Phase						
Potential impact description: Impacts on ecosystem functions	Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**L**	**Positive**	**L**	**L**	**H**
Can the impact be reversed without mitigation?	No. Altering habitat conditions, water quality and water flow regimes and geograpy will cause the habitat to deteriorate and ultimately fail						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. Unreplenished water tables draining during rehabiliation will cause the rest of the ecosystem resources also to cease.						
Can the impact be avoided, managed or mitigated?	The rehabilitation must be intent on mitigating the loss of abiotic resources and as such will restore the current desturbance reserving the natural availability thereof in future						
Mitigation measures to reduce residual risk or enhance opportunities: Water quality at the wetland must be monitored and kept within prefferred parrameters Botanical restoration at the site will aslo enhance the abiotic resources in maintaining water filtration, air quality and soils temperatures and chemical compositions Work within the water nody must be avoided or kept to a very minimum							
Impact/s to be further investigated or addressed:	Water quality, volume and surface extent must be montored and rehabilitation should ensure that these parameters will be achieved at the habitat in future						

- Changes to biotic environmental factors (predation, food resources, pathogens, competition) (**Table 4**)

Amphibians across the globe are subject to various pathogens and viruses as result of their environmental susceptibility. These pathogens are often introduced into habitats through human and animal activity. The Rehabilitation phase will result in many workmen accessing the area. Handling of material in and around the wetland and the probable ingress of pollutants as result may have an unseen impact initially, but can devastate the entire wetland habitat and the species within.

Working with pesticides or with workwear that have been in contact with chemicals, fuels or food articles are not to be allowed while working on the wetland rehabilitation. The work needs to be accomplished under strict hygienic conditions guarding against contaminants entering the wetland flat area and surrounding soils.

Food sources at the site for frogs consists mainly of invertebrates and insects and the refuge areas and breeding sites of these organisms must also be preserved during rehabilitation. Vegetation mainly required for healthy insect populations and ecology must be preserved within the site.

The significance of this impact is high without proper planning processes and care. The impact is not immediately visible during rehabilitation, but incorrect management will have a long lasting effect on the SCC and frog populations. The probability that changes to biotic environmental conditions at the habitat will have a negative impact on the SCC and frog populations in terms of their long-term persistence and viability in the area is medium, and therefore the impact significance is medium. These impacts can be further reduced following the implementation of mitigation measures.

Table 4: Impact Matrix: Rehabilitation Phase – Biotic environmental conditions

IMPACT PHASE:	**Rehabilitation Phase**						
Potential impact description: Impacts on ecosystem functions	Changes to biotic environmental factors (predation, food resources, pathogens, competition)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**L**	**P**	**M**	**L**	**H**
Can the impact be reversed without mitigation?	No. The unrehabilitatwd wetland van exist at the current state, but no further development will then be possible. Development will require rehabilitation failing wich the resources will be entirly lost						
Will unmitigated impact result in irreplaceble loss of resources?	Yes.The SCC and other frog species at the site use the entire development area for foraging and refugia from predators which will be lost if the wetland is not rehabilitated						
Can the impact be avoided, managed or mitigated?	Yes. Rehabilitation will ensure predation, foraging and food sorces are available to the entire frog community						
Mitigation measures to reduce residual risk or enhance opportunities: The wetland flat's natural locality was rather isolated and this will assist in pathogens not easily entering the habitat. This The community at the wetland is dependent on each other and therefore not only the SCC but all other fauna and flora							
Impact/s to be further investigated or addressed:	The EC must record anomolies or exceptions regarding predators not naturally encounterd at the site and manage such intrusions. All encounters with fauna at the site must be managed with care and reported.						

9.2 Construction Phase Impacts

9.2.1 Impacts on biodiversity:

Possible alteration in population size of the SCC, other present frog species, overall species richness and genetic variability and population dynamics (**Table 5**)

Frogs are naturally sensitive for any habitat, behavioural and environmental disturbances and are likely to cause individuals to move away from the affected areas during construction. Increased traffic during construction will pose a risk

of collisions with susceptible species. Frogs will also be vulnerable to illegal collection or poaching during the construction phase. Disturbances and noise from staff and construction activities can impact anuran species, resulting in a perceived increase in predation risk. Disturbance may cause the species to be displaced, either temporarily or permanently, into less suitable habitat which may reduce their ability to survive and reproduce. During species displacements, distances covered would incur a great energetic cost and would not allow for rapid return to the site once the disturbance concludes.

The probability that disturbance or displacement of the amphibian species associated with the construction site of the proposed development will have a negative impact on the anuran populations in terms of their long-term persistence and viability in the area is High, and therefore the impact significance is High. Many of these impacts can however be effectively managed or mitigated against.

Table 5: Impact Matrix for Construction phase: SCC, frog communities and population dynamics

IMPACT PHASE:	**Construction Phase**						
Potential impact description: Impacts on biodiversity	Possible alteration in population size of the SCC and other present frog species, overall species richness and genetic variability and population dynamics						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**M**	**Negative**	**M**	**M**	**H**
Can the impact be reversed without mitigation?	No. Mortality of individuals *in situ* will result in diminishing population or complete loss of the locality population.						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. The SCC occurs only in small numbers on the site and resultant mortalities will result in locality popoulation loss resulting in genetic and generational loss						
Can the impact be avoided, managed or mitigated?	Yes. Complete contact can be avoided with an adequate buffer area in place prohibiting construction activities at the population locality and within the wetalnd flat site						
Mitigation measures to reduce residual risk or enhance opportunities: Ensure the wetland and buffer zone are adequately protected and cordoned off No construction vehicles or personnel to be allowed in the wetland and buffer zone Adequate site environmental auditing during construction activities							
Impact/s to be further investigated or addressed:	Observations by ECO of mobile individuals throughout construction period. Buffer adequacy to protect wetland and water quality in wetland to be monitored						

9.2.2 Impacts on ecosystem functions:

- Habitat fragmentation and disruption to ecological connectivity (**Table 6**)

Sections of natural habitat have already been destroyed during the initial land clearing process for the installation of services, access roads, temporary construction facilities and to construct residential units. Disturbance created during construction of the housing units could also leave the disturbed areas vulnerable to soil erosion while new service infrastructure and roads may increase water flow off hard surfaces which can contribute to erosion and effluent ingress to the wetland flat.

Most of the clearing will be of a permanent nature and recovery will not take place once the construction phase is completed. Impacts on the ecological connectivity of the wetland flat to surrounding natural areas.

Table 6: Impact matrix for the Construction Phase – Habitat and ecological connectivity

IMPACT PHASE:	**Construction Phase**						
Potential impact description: Impacts on ecosystem functions	Habitat fragmentation and disruption to ecological connectivity						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**H**	**M**	**M**	**Negative**	**H**	**M**	**H**
Can the impact be reversed without mitigation?	No. Destruction of anuran habitat are mostly permanent as water sources normally dry out where habitas are destoyed.						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. On the current site the wetland will completely be lost						
Can the impact be avoided, managed or mitigated?	Yes. The wetland must be protected with adequate buffer areas in place from the construction activities						
Mitigation measures to reduce residual risk or enhance opportunities: Ensure the wetland and buffer zone are adequately protected and cordoned off No construction vehicles or personnel to be allowed in the wetland and buffer zone Adequate site environmental auditing during construction activities Ensuring cordoned-off area fencing stay in state of repair							
Impact/s to be further investigated or addressed:	Ongoing monitoring by ECO of the wetland buffer functionality and water quality during construction						

While the clearing of habitat during construction is inevitable, the probability that the clearing associated with the proposed development will have a negative impact on the ecological connectivity and functions is High. Habitat fragmentation over a long-term will impact on the wetland flat viability and persistence in the area and the significance of this impact is therefore High. Construction of the buffer berm and installation of the fence structure will mitigate and reduce this impact.

- Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography) – **Table 7**

  Potential risks to the wetland habitat resulting from construction activities and machinery in the form of pollution and contamination (e.g. oil leaks or chemical spills) will have a high significance level on mainly the soil and water quality of the habitat. Deposits of construction material and mounds of infill material and excavated material in and around the construction site have the potential to alter water and air movements to the wetland habitats.

Table 7: Impact matrix for Construction Phase – Abiotic environmental conditions

IMPACT PHASE:	**Construction Phase**						
Potential impact description: Impacts on ecosystem functions	Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**L**	**Negative**	**M**	**L**	**H**
Can the impact be reversed without mitigation?	No. The displacement of the SCC will mainly be as result of habitat alterations and mortality of individuals *in situ*						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. The SCC habitat requirements are very specific with environmental changes usually being very significant.						
Can the impact be avoided, managed or mitigated?	Yes. Alterations to surrounding areas must be done as carefully as possible and the wetland must be protected with adequate buffer areas in place from the construction activities						
Mitigation measures to reduce residual risk or enhance opportunities: Adequte measure to protect the habitat from chemiclas and spill by way of work area management No personell or vehicles in the wetland bufferred area Adequate site environmental auditing Regular testing of water body to ensure no contaminates enter water at this stage							
Impact/s to be further investigated or addressed:	Observations by ECO for environmental quality of habitat and surrounds during construction period						

These impacts should however be short term. Debris on the construction site must also be contained as not cause a fire risk and not be allowed into the wetland habitat and buffered area in order to reduce the significance of this impact.

The probability that disturbance of abiotic environmental conditions associated with the construction of the proposed development will have a negative impact on the SCC and frog populations in terms of their long-term persistence and viability in the area is Medium, and therefore the impact significance is Medium. These impacts can be further reduced following the implementation of mitigation measures. The mitigation

measures regarding the fencing and buffering design will assist in minimising this impact.

- Changes to biotic environmental factors (predation, food resources, pathogens, competition) - **Table 8**

  This phase again will have many workmen and machinery accessing the area. Handling of material in and around the wetland and the probable ingress of pollutants as result may have an unseen impact initially, but can devastate the entire wetland habitat and the species within.

Table 8: Impact Matrix for Construction Phase – biotic environmental conditions

IMPACT PHASE:	**Construction Phase**						
Potential impact description: Impacts on ecosystem functions	Changes to biotic environmental factors (predation, food resources, pathogens, competition)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**H**	**L**	**H**	**Negative**	**H**	**H**	**H**
With Mitigation	**M**	**S**	**L**	**Negative**	**M**	**L**	**H**
Can the impact be reversed without mitigation?	No. Habitat polution and changes in foraging and predation regimes will lead a complete destruction of the habitat.						
Will unmitigated impact result in irreplaceble loss of resources?	Yes. The babitat required by the SCC is specialised and sensitive. This impact will lead to loss hereof without mitigation						
Can the impact be avoided, managed or mitigated?	Yes. Construction of the buffer and the fenced area will have large benefits and may well completely protect the habitat.						
Mitigation measures to reduce residual risk or enhance opportunities: Monitoring of the use of pesticides, fuels and hygiene of workmen on site Unsuring that construction machinery and personell does not enter the cordonned off area. Monitoring water flows into the wetland from the construction site, especially during preperation of concretes and tarmac surfaces.							
Impact/s to be further investigated or addressed:	Monitoring of the ECO will be vital at this phase regarding adherence to monitoring and SHEQ protocols						

Working with pesticides or with workwear that have been in contact with chemicals, fuels or food articles are all potential vectors of pathogens and pollutants. The work area must be monitored to ensure movement is not within the wetland site and buffer area and thus does not contaminate the area unduly.

Vegetation mainly required for healthy insect populations and ecology must be preserved around the construction site as far as possible. The riparian areas of the Valley bottom channelled wetland and the area outside the buffer area, but inside the fenced area critical in this regard.

The significance of this impact is high without proper planning processes and care. The impact will have a long lasting effect on the SCC and frog populations without adequate management of work areas. With mitigation this impact can however have only medium impact significance.

9.3 Occupation Phase Impacts

9.3.1 Impacts on biodiversity:

Possible alteration in population size of the SCC and other present frog species, overall species richness and genetic variability and population dynamics - **Table 9**

Permanent movement of vehicles and people together with ongoing maintenance and landscaping will be a constant in the housing development. The disturbance of frogs during these activities will be continuous and as the position of the proposed development footprint is adjacent to the wetland flat and the valley bottom wetland, the individuals of species that persist in this area are likely to experience varied levels of disturbance associated with these activities.

Mortality of frog species on roads are a well-documented threat to these species. Most of these incidents also occur at night time and where vehicles travel at relatively high speeds and the species or drivers are unable to take effective evasive action. The SCC at the site however tend to migrate less than conspecifics at the locality and mainly remain at the breeding sites and therefore road mortalities of this sensitive Red Data species will be less. Toad species and other larger more mobile species migrating between foraging areas and the water bodies will however be more prone to these threats.

Illegal collection and poaching together with predation from household pets will be another threat to the frog species at the site. The probability of occurrence of the SCC outside of the wetland flat locality outside of the breeding period have not conclusively been investigated, but seems to be low. Household pets roaming outside of residential boundaries may well travel into the wetland locality and as a result place unnatural predation risk on the SCC and other frog species present.

The probability that the disturbance or displacement of individuals of species during the occupation phase, particularly the SCC, will negatively impact the viability and persistence of the species in the area over the long term.

Preservation of the habitat and creating a conservation area will make the significance of the impact Medium. These impacts can be reduced following mitigation measures.

Table 9: Impact Matrix for Occupation phase: SCC, frog communities and population dynamics

IMPACT PHASE:	Occupation Phase						
Potential impact description: Impacts on biodiversity	Possible alteration in population size of the SCC and other present frog species, overall species richness and genetic variability and population dynamics						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**M**	**L**	**M**	**Negative**	**M**	**M**	**H**
With Mitigation	**L**	**L**	**L**	**Negative**	**L**	**M**	**H**
Can the impact be reversed?	Yes. Frog population seems to be saved and will repopulate areas with human assistance and intervention. This could assist with preservation of the area.						
Will the impact result in irreplaceable loss of resources?	No. The area would be demarcated and can be preserved with correct measures and interv						
Can the impact be avoided, managed or mitigated?	Yes. The wetland preservation during the previous phases will be ensure that this phase impacts will be minimal.						
Mitigation measures to reduce residual risk or enhance opportunities: Ensure that collisions are avoided by not having vehicles travel on the green corridors Educate occupants on the uniqueness of the wetland as a neighbour Ensuring that poaching of specimens are not happening through ongoing education.							
Impact/s to be further investigated or addressed:	Ongoing monitoring through stewardship and programmes						

Implementation of mitigation measures to lessen the impacts of direct mortality from the proposed development during the occupation phase can be reduced to acceptable levels and the development is then unlikely to threaten the long-term viability or persistence of species in the area. The post-mitigation impact significance is therefore likely to be low.

9.3.2 Impacts on ecosystem functions:

- Habitat fragmentation and disruption to ecological connectivity - **Table 10**

  The clearing and disturbance of areas for gardening and landscaping during the occupation phase of the project can result in an increased and ongoing risk of invasion of alien plant species, particularly exotic species. The establishment of alien vegetation and possible increased soil erosion has the potential to degrade connected habitat quality if left unchecked. High rainfall events during the wet season increase the probability of erosion as result of run-off from hard concrete and built structures. Alien plant control and erosion can be effectively mitigated against this however.

The impact significance of this occupation phase on habitat of the proposed development should be low.

Table 10: Impact matrix for the Occupation Phase – Habitat and ecological connectivity

IMPACT PHASE:	Occupation Phase						
Potential impact description: Impacts on ecosystem functions	Habitat fragmentation and disruption to ecological connectivity						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
With Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
Can the impact be reversed?	Yes. The design of the wetland according to the report should buffer the habitat and cause the habitat to restore						
Will the impact result in irreplaceble loss of resources?	No. The habitat will be bufferred and should be protected. Any disturbance should be monitored and can be attended to quickly.						
Can the impact be avoided, managed or mitigated?	Yes. Access to the wetland must be prohibited to residents and only allowed for scientific or conservation purposes.						
Mitigation measures to reduce residual risk or enhance opportunities: Ensure that the rules of the housing development protects the wetalnds and prohibit human interference and ingress.							
Impact/s to be further investigated or addressed:	Stewardship programmes should be able to ensure long term viability and monitor this phase.						

- Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography) - **Table 11**

  The measures regarding the buffer and fencing installed during the construction phase should adequately assist in limiting and mitigating these effects. The probability that impacts on abiotic environmental conditions within the habitat associated with the occupation phase of the proposed development will have a negative impact on the frog populations. The impact on the SCC long-term persistence and viability in the area is low, and therefore the impact significance is low. These impacts can be further reduced following the implementation of mitigation measures.

Table 11: Impact matrix for Occupation Phase – Abiotic environmental conditions

IMPACT PHASE:	**Occupation Phase**						
Potential impact description: Impacts on ecosystem functions	Changes to abiotic environmental conditions (temperature, light, wind, water movement and flooding, fire, drought, air quality, soil characteristics, geography)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
With Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
Can the impact be reversed?	Yes. Conservation of the wetland after the construction phase is designed to assist in halting these environmental conditions.						
Will the impact result in irreplaceble loss of resources?	No. rehabilitation will be posssible after small breaches into the habitat as long as this is monitored and identified early.						
Can the impact be avoided, managed or mitigated?	Yes. The fencing and buffer system should function to ensure this impact is mitigated.						
Mitigation measures to reduce residual risk or enhance opportunities: Adequate and regular monitoring and auditing of the area will be required.							
Impact/s to be further investigated or addressed:	Adequate provisions to be entrenched in the Housing Scheme Residents rules.						

- Changes to biotic environmental factors (predation, food resources, pathogens, competition) - **Table 12**

Adequate prohibition of human and animal access to the wetland area would guard against biotic environmental condition impacts. The measures regarding the buffer and fencing installed during the construction phase should adequately assist in limiting and mitigating these effects. The probability that these impacts within the habitat associated with the occupation phase of the proposed development will have a negative impact on the frog populations. The impact on the SCC long-term persistence and viability in the area is low, and therefore the impact significance is low. These impacts can be further reduced following the implementation of mitigation measures.

Table 12 Impact Matrix for Construction Phase – biotic environmental conditions

IMPACT PHASE:	Occupation Phase						
Potential impact description: Impacts on ecosystem functions	Changes to biotic environmental factors (predation, food resources, pathogens, competition)						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**M**	**L**	**M**	**Negative**	**H**	**L**	**H**
With Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
Can the impact be reversed?	Yes. Pets and human instrusions must be prohibited in the habitat. Pet intrusions to be minimised with installation of the correct fencing.						
Will the impact result in irreplaceble loss of resources?	No. Measure should assist in ensuring that breeding season proceed normally which will reverse most impacts						
Can the impact be avoided, managed or mitigated?	Yes. Road construction with bufferred corridors and internal behaviour resident rules may assist in less frequent species mortalities						
Mitigation measures to reduce residual risk or enhance opportunities: Rules regarding pets and recreational areas should refer to this area and its sensitivity.							
Impact/s to be further investigated or addressed:	Stewardship and monitoring will assist in identifying threats early and mitigate the effects						

9.4 Cumulative impacts - **Table 13**

A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other nearby activities as a result of the proposed development. The development will increase the volumes of vehicle traffic on existing road infrastructure in the suburb, placing pressure on road mortalities of frogs in the PAOI. The increase in human inhabitants and visitors enhance the cumulative impact on the species and the habitats. When assessed together with other existing infrastructure facilities nearby the risks of potential cumulatively negative impact on the anuran species of the area.

Presence of the SCC at wetlands within close vicinity of built environments have not been established and as such cumulative impact on the SCC only cannot be determined. The addition of the proposed housing units is likely to significantly increase the cumulative impact on frog species in the area if mitigation measures are not implemented and adhered to.

The probability that the addition of the proposed development will contribute to an increased cumulative negative impact on the long-term viability of the populations of frogs and the SCC and their persistence in the area is therefore high. This can be reduced following the implementation of mitigation measures such as awareness campaigns on frogs and the SCC specifically. There is potential for the proposed conservation of the wetland flat site locality to assist

in conservation of the SCC as well and play a role in monitoring of the species, study and education in this regard.

Table 13 Impact Matrix: Cumulative impacts on SCC, frog populations and Habitat conditions

IMPACT PHASE:	Cumulative						
Potential impact description: Impacts on biodiversity and Impacts on ecosystem functions	Cumulative impacts on SCC, frog populations and Habitat conditions						
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	**M**	**L**	**M**	**Negative**	**M**	**L**	**H**
With Mitigation	**L**	**L**	**L**	**Negative**	**L**	**L**	**H**
Can the impact be reversed?	No. This can only happen if all existing development are re-evaluated and re-developed.						
Will the impact result in irreplaceble loss of resources?	Unlikely. All current residential areas and infrastructure have been in place for a number of years already						
Can the impact be avoided, managed or mitigated?	Partially. Much of the cumulative impact risk already exists in the immediate vicinity and it is unlikely that the proposed development will significantly increase the negative impact already in place. The intensity of the cumulative impact can however be further reduced if mitigation measures are adhered to at the current development site.						
Mitigation measures to reduce residual risk or enhance opportunities: The various mitigation and management plans associated with the development outlined above should be followed and implemented effectively to reduce the cumulative contribution of the current development and enhance opportunities.							
Impact/s to be further investigated or addressed:	Mobility of SCC to be adjacent roads and residential gardens should be investigated.						

9.5 No-go Alternative

The no-go alternative is that the activity does not go ahead, implying a continuation of the current situation or the status quo. The no-go alternative is not an attractive alternative at this stage as construction have started and have progressed relatively far. The no-go alternative is not the preferred alternative as far as the developers and authorities are concerned. The no-go alternative will limit the potential associated with the need for housing, the potential of the area as an income earning residential area for the local council and the realisation of socio-economic and housing targets on a provincial and national scale.

The current activity on the site have also drastically disturbed the landscape and the wetland flat and a no-go alternative will be detrimental to the habitat in the current state. Ensuring that the habitat is rehabilitated, protected and managed may well be the most probable solution for the SCC and its habitat.

10 IMPACT STATEMENT

The proposed housing development and access roads are likely to generate significant negative impacts on Anuran Species without mitigation. The proposed development will have an overall high potential impact to the SCC in the area, and therefore require vigorous mitigation measure to be put in place. The proposed development plan in my opinion still needs to be looked at regarding the proximity of the housing units to the buffer area. Mitigation measures will not succeed if the buffer area is easily compromised and thereby causing the wetland flat to be affected. Figure 10 indicates this proximity of the new layout.

Figure 10: New proposed development Layout indicating proximity to buffer zone/berm

The infrastructure plans for stormwater purposes as presented in Figure 9 is an amendment on the initial diagrams presented for the Preferred layout and have made various amendments to mitigate its impact on the water and effluent regimes and consequent impact on the wetland flat habitat. These impacts still needs to be adequately monitored by the EC and nay significant impact addressed prior timeously. Water discharge must be must be allowed to fill up the wetland in the rainy season and cause the features of the wetland persist

through drier months. The run-off water from natural precipitation must be allowed to fulfil this function and not simply be dissipated by structure and hard concrete surfaces. Flooding must however be attenuated and designed to allow for only natural flooding regimes. The development footprint and services must not act as aggregator of such events and this must be properly designed.

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number:

Project name: Village Ridge Housing Development

Project title: Specialist Amphibian Assessment

Date screening report generated: 02/01/2022 13:50:43

Applicant: Power Construction Pty Ltd

Compiler: F de Lange

Compiler signature:

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Application Category: Any activities within or close to a watercourse

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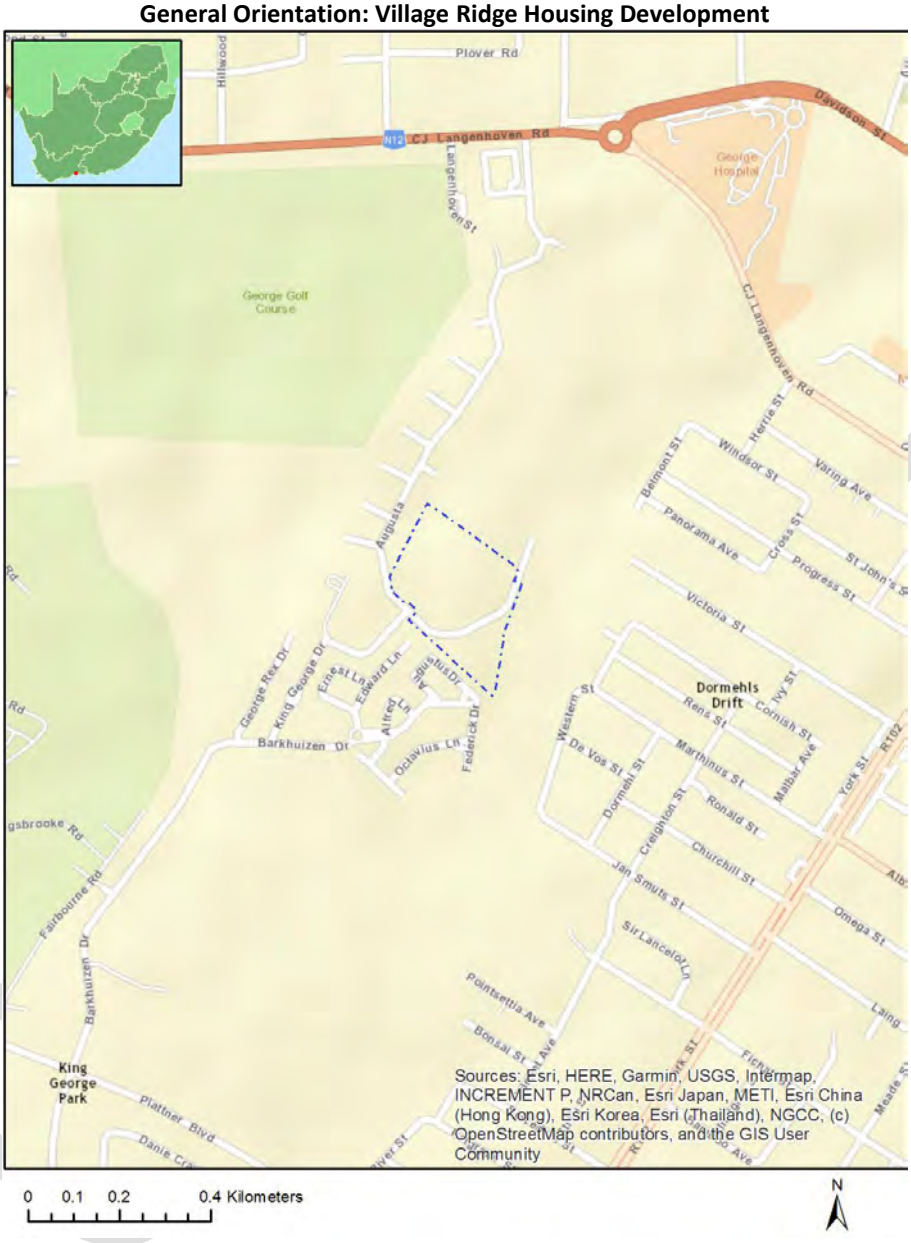
Proposed Project Location

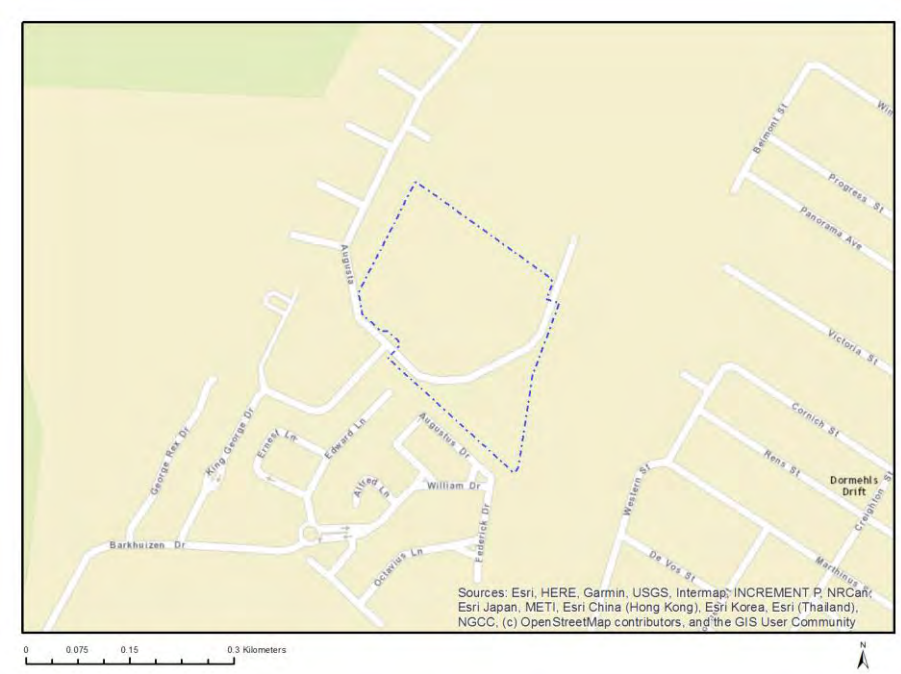
Orientation map 1: General location

General Orientation: Village Ridge Housing Development



Disclaimer applies

Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	GEORGE	28931	0	33°57'33.91S	22°26'42.31E	Erven
2	GEORGE	21029	0	33°57'38.55S	22°26'45.35E	Erven
3	GEORGE	28938	0	33°57'33.26S	22°26'39.86E	Erven
4	GEORGE	28953	0	33°57'33.52S	22°26'41.19E	Erven
5	GEORGE	28957	0	33°57'33S	22°26'41.78E	Erven
6	GEORGE	28974	0	33°57'34.2S	22°26'44.15E	Erven
7	GEORGE	28982	0	33°57'35.38S	22°26'42.87E	Erven
8	GEORGE	28940	0	33°57'33.91S	22°26'39.49E	Erven
9	GEORGE	28950	0	33°57'33.84S	22°26'40.84E	Erven
10	GEORGE	28975	0	33°57'34.61S	22°26'43.69E	Erven
11	GEORGE	28979	0	33°57'35.06S	22°26'43.19E	Erven
12	GEORGE	28984	0	33°57'35.61S	22°26'42.62E	Erven
13	GEORGE	28985	0	33°57'35.78S	22°26'42.4E	Erven
14	GEORGE	28933	0	33°57'31.68S	22°26'40.88E	Erven
15	GEORGE	28939	0	33°57'33.58S	22°26'39.68E	Erven
16	GEORGE	28943	0	33°57'34.99S	22°26'39.86E	Erven
17	GEORGE	28948	0	33°57'34.06S	22°26'40.62E	Erven
18	GEORGE	28962	0	33°57'32.47S	22°26'42.38E	Erven
19	GEORGE	28972	0	33°57'33.98S	22°26'44.37E	Erven
20	GEORGE	28932	0	33°57'31.37S	22°26'41.04E	Erven
21	GEORGE	28935	0	33°57'32.3S	22°26'40.47E	Erven
22	GEORGE	28941	0	33°57'34.32S	22°26'39.36E	Erven
23	GEORGE	28944	0	33°57'35.23S	22°26'40.18E	Erven
24	GEORGE	28949	0	33°57'33.95S	22°26'40.72E	Erven
25	GEORGE	28951	0	33°57'33.74S	22°26'40.95E	Erven
26	GEORGE	28955	0	33°57'33.28S	22°26'41.44E	Erven
27	GEORGE	28959	0	33°57'32.78S	22°26'42.04E	Erven
28	GEORGE	28964	0	33°57'33.03S	22°26'42.91E	Erven

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29	GEORGE	28967	0	33°57'33.33S	22°26'43.29E	Erven
30	GEORGE	28977	0	33°57'34.83S	22°26'43.45E	Erven
31	GEORGE	21028	0	33°57'34.36S	22°26'42.36E	Erven
32	GEORGE	28929	0	33°57'36.81S	22°26'45.58E	Erven
33	GEORGE	28936	0	33°57'32.63S	22°26'40.28E	Erven
34	GEORGE	28947	0	33°57'34.17S	22°26'40.47E	Erven
35	GEORGE	28971	0	33°57'33.76S	22°26'43.83E	Erven
36	GEORGE	28978	0	33°57'34.94S	22°26'43.34E	Erven
37	GEORGE	28980	0	33°57'35.19S	22°26'43.06E	Erven
38	GEORGE	28930	0	33°57'34.46S	22°26'42.36E	Erven
39	GEORGE	28942	0	33°57'34.76S	22°26'39.56E	Erven
40	GEORGE	28960	0	33°57'32.67S	22°26'42.15E	Erven
41	GEORGE	28961	0	33°57'32.58S	22°26'42.26E	Erven
42	GEORGE	28966	0	33°57'33.24S	22°26'43.17E	Erven
43	GEORGE	28969	0	33°57'33.57S	22°26'43.59E	Erven
44	GEORGE	28970	0	33°57'33.63S	22°26'43.72E	Erven
45	GEORGE	28976	0	33°57'34.73S	22°26'43.55E	Erven
46	GEORGE	28931	0	33°57'35.78S	22°26'45.48E	Erven
47	GEORGE	28937	0	33°57'32.95S	22°26'40.07E	Erven
48	GEORGE	28958	0	33°57'32.89S	22°26'41.9E	Erven
49	GEORGE	28981	0	33°57'35.27S	22°26'42.98E	Erven
50	GEORGE	28934	0	33°57'31.99S	22°26'40.66E	Erven
51	GEORGE	28952	0	33°57'33.63S	22°26'41.09E	Erven
52	GEORGE	28954	0	33°57'33.41S	22°26'41.33E	Erven
53	GEORGE	28956	0	33°57'33.17S	22°26'41.58E	Erven
54	GEORGE	28963	0	33°57'32.92S	22°26'42.76E	Erven
55	GEORGE	28965	0	33°57'33.14S	22°26'43.06E	Erven
56	GEORGE	28968	0	33°57'33.46S	22°26'43.45E	Erven
57	GEORGE	28973	0	33°57'34.09S	22°26'44.24E	Erven
58	GEORGE	28983	0	33°57'35.49S	22°26'42.74E	Erven
59	GEORGE	28986	0	33°57'34.9S	22°26'41.52E	Erven
60	GEORGE	28988	0	33°57'36.48S	22°26'41.27E	Erven
61	GEORGE	28987	0	33°57'35.87S	22°26'43.34E	Public Place
62	GEORGE	28990	0	33°57'34.16S	22°26'42.47E	Public Place
63	GEORGE	28945	0	33°57'35.38S	22°26'40.43E	Public Place
64	GEORGE	28989	0	33°57'35.85S	22°26'41.09E	Public Place

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/1/1292	Solar PV	Approved	8.3

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is:
Any activities within or close to a watercourse.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Gas Pipeline Corridors -Phase 2: Mossel Bay to Coega	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf
South African Conservation Areas	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/SACAD_OR_2021_Q3_Metadata.pdf

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Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Village Ridge Housing Development

Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		

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Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme	X			
Civil Aviation Theme		X		
Defence Theme				X
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
6	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Socio-Economic Assessm	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf

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8	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
9	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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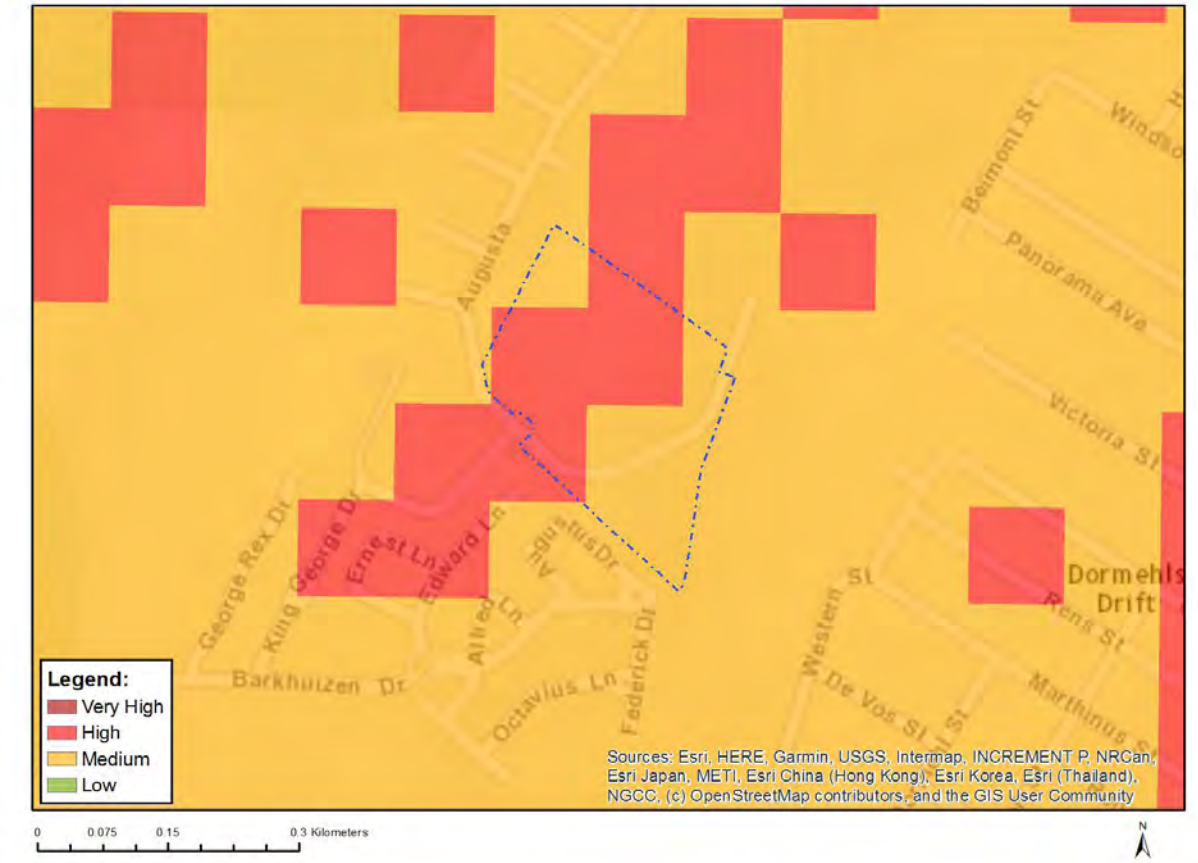
Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

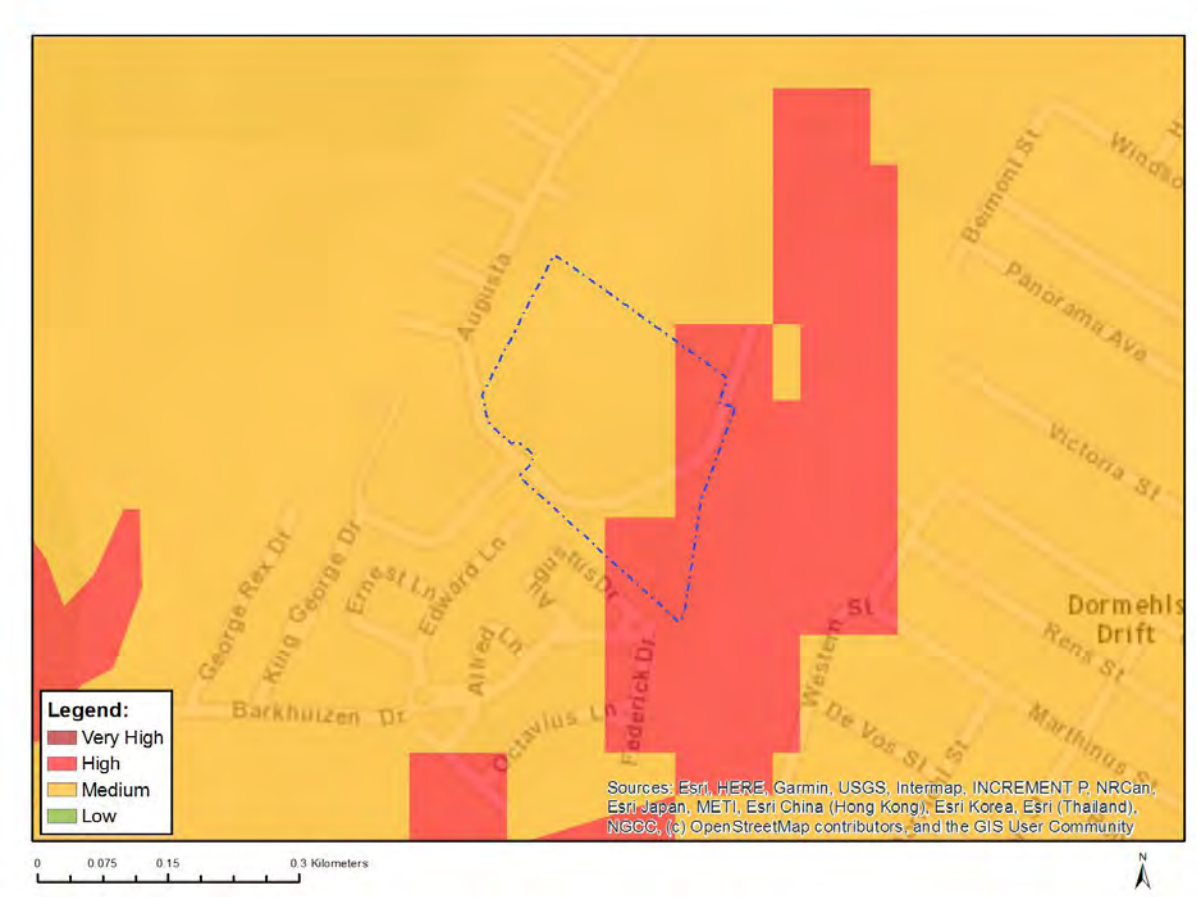


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
High	Aves-Bradypterus sylvaticus
Medium	Invertebrate-Aneuryphymus montanus
Medium	Amphibia-Afrixalus knysnae
Medium	Aves-Neotis denhami
Medium	Sensitive species 7

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Aquatic CBAs
Very High	Strategic water source area
Very High	Wetlands and Estuaries

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Within 2km of a Grade II Heritage site

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Within 15 km of a civil aviation radar
High	Between 8 and 15 km from a major civil aviation aerodrome

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MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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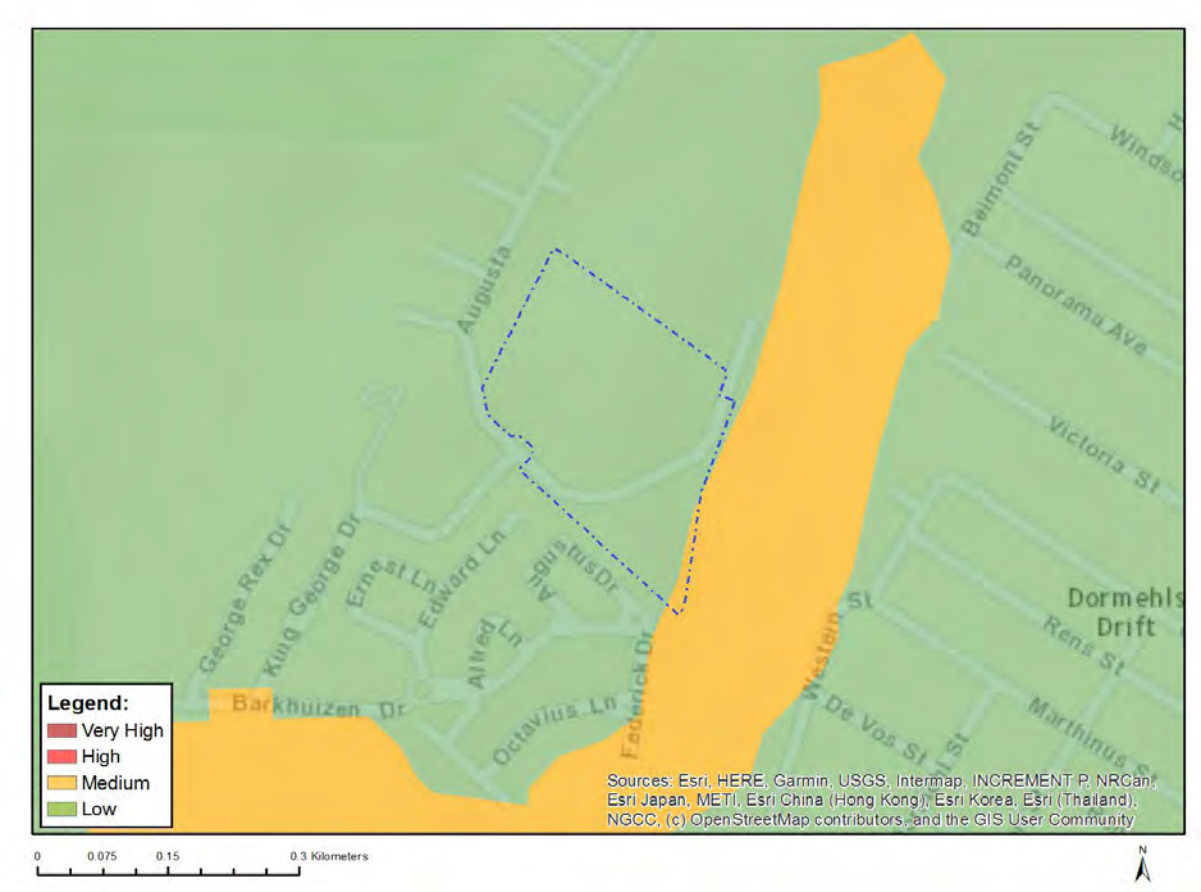
02/01/2022

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Lampranthus pauciflorus
Medium	Leucospermum glabrum
Medium	Selago burchellii
Medium	Sensitive species 1081
Medium	Sensitive species 419
Medium	Erica unicolor subsp. mutica
Medium	Sensitive species 1024
Medium	Sensitive species 1032
Medium	Sensitive species 980
Medium	Sensitive species 800
Medium	Sensitive species 500
Medium	Sensitive species 763

Medium	Diosma passerinoides

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area 2
Very High	Critically endangered ecosystem
Very High	Strategic Water Source Areas

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APPENDIX 2

IMPACT SIGNIFICANCE RATING SYSTEM

The impact significance rating system used in this assessment follows Hacking (2001)[4]. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Table 2: Ranking the Duration and Spatial Scale of impacts

	Ranking Criteria		
	L	M	H
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised	Fairly widespread Beyond site boundary Local	Widespread
	Within site boundary Site		Far beyond site boundary Regional/national

Table 3: Criteria for ranking the Severity of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	L-	M-	H-
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 4: Ranking the Consequence of an impact

SEVERITY = L					
DURATION	Long-term	H			

	Medium-term	M			MODERATE
	Short-term	L	LOW		
SEVERITY = M					
DURATION	Long-term	H			HIGH
	Medium-term	M		MODERATE	
	Short-term	L	LOW		
SEVERITY = H					
DURATION	Long-term	H			
	Medium-term	M			HIGH
	Short-term	L	MODERATE		
			L	M	H
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 5, provides the overall significance (risk) of impacts.

Table 5: Ranking the Overall Significance of impacts

PROBABILITY	Definite Continuous	H	MODERATE		HIGH
	Possible Frequent	M		MODERATE	
	Unlikely Seldom	L	LOW		MODERATE
			L	M	H
			CONSEQUENCE (from Table 4)		

APPENDIX 3