FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

SONTULE CITRUS:
AGRICULTURAL EXPANSION ON REMAINDER OF FARM 632, SUNLAND, SUNDAYS RIVER VALLEY MUNICIPALITY
(DEDEAT REFERENCE: EC06/C/LN2/M/23-2022)

October 2022

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Title:	Final EIA Report: Sontule Citrus - Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality, (October 2022).

Purpose of this report:	This Final EIA Report forms part of a series of reports and information documents that are being provided during the Environmental Impact Assessment (EIA) process for the proposed agricultural expansion on Remainder of Farm 632 (known as Sontule).
	
	As per Appendix 3, Section 2 of GN R326, the objectives of the EIA process are to:
	• Assess how the proposed activity complies with the relevant policy and legislative context;
	• Describe the need and desirability of the proposed activity, including in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report;
	• Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
	• Determine the --
	  ○ Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
	  ○ Degree to which these impacts -
	  ▪ Can be reversed;
	  ▪ May cause irreplaceable loss of resources, and
	  ▪ Can be avoided, managed or mitigated;
	• Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment;
	• Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping Report through the life of the activity;
	• Identify suitable measures to avoid, manage or mitigate identified impacts; and
	• Identify residual risks that need to be managed and monitored.

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KEY CHANGES FROM THE DRAFT EIA REPORT TO THE FINAL EIA REPORT

As per the correspondence from the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), dated 7 June 2022 (point 3.4.2), amendments to the Final EIA (key changes) from the Draft EIA Report are to be clearly outlined in the table below and are indicated in the body of the report by means of underlining.

General changes from the Draft EIA Report to the Final EIA Report e.g., Draft Report to Final Report and associated date changes, have **not been indicated with underlining**. These changes have been made to all relevant Sections, Chapters and Appendices of the Final EIA report.

SECTION	CHANGES
Executive Summary	• Page ii – update on the Public Participation Process for the review of the Draft EIA and submission of the Final EIA to DEDEAT
Chapter 1	• Page 1.2 - update on the Draft EIA review period and submission of the Final EIA • Page 1.8 - 1.9 - update on the Public Participation Process for the review of the Draft EIA and submission of the Draft, as well as Final EIA to DEDEAT
Chapter 2	• Page 2.10 – update on section 2.2.2.5 Electrical Infrastructure.
Chapter 3	• Page 3.31 – Inclusion of Map 3.20 showing the Defence theme sensitivity as indicated in the Screening Tool Report.
Chapter 4	• 4.11 – 4.12 – update on the Scoping and EIA Process overview • Page 4.15 – update on authority consultation during the review of the Draft EIA • Page 4.16 – 4.17 – update on database maintenance during review of the Draft EIA and submission of the Final EIA • Page 4.17- 4.18 – An update on the Review of the Draft EIA and Ongoing Communication. • Page 4.19 - 4.20 – update to “Identification of Issues” • Page 4.20 – Update to Table 4.2 *Summary of Issues Raised during the EIA Process* • Page 4.21 - 4.35 – Update to Comments and Responses Report • Page 4.35 – Page 3.38 – Update to the Comments and Responses Report for comments from DEDEAT • Page 4.39 – Update to concluding remarks
Chapter 5	• Page 5.9 – updated Map 5.3 to indicate adjacent landowner servitude
Appendix B	• Page B.3 - B.12 – Inclusion of Notice of Draft EIA to DEDEAT email, including comment form and executive summary • Page B.32 - B.37 – Inclusion of Acknowledgement of Receipt of the Draft EIA from DEDEAT as well as comments on the Draft EIA & EMPr report
Appendix E	• Page E.16 – E.29 – Inclusion of copies of correspondence to I&APs and Authorities regarding the Draft EIA Comment and review period including a comment form and executive summary
Appendix F	• Page F.2 – F.7 – Inclusion of copies of correspondence received form I&APs during the Draft EIA review period.

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND OVERVIEW

The project applicant, Sun Orange Farms (Pty) Ltd, proposes to expand citrus production at their existing operations on the Remainder of Farm 632, Sundays River Valley Municipality (SRVM), which measures approximately 459ha in extent, hereinafter referred to as Sontule. In order to supply the proposed development with the required irrigation water, an irrigation dam is proposed to be constructed with a storage capacity of approximately 49 000m^3 (3.7ha footprint). The farm is currently zoned Agriculture I and the area to be cultivated, including associated infrastructure, has been determined by the outcome of the various specialist assessments forming part of this Scoping and Environmental Impact Assessment (Scoping and EIA) Process.

Irrigation water for the development is proposed to be supplied from the LSRWUA canal system via an existing dam on the farm and conveyed into the proposed new balancing dam via a ø 315mm uPVC pipeline of approximately 1.4km in length. Irrigation water will be supplied from the new dam with uPVC pipes varying in internal diameter between 250mm and 315mm. Additionally, irrigation water will be reticulated within the orchards via a network of underground PVC irrigation pipes and valves, with varying internal diameters (between ø60mm and ø160mm). No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support.

The Farm Sontule is located ~11km south-east of Kirkwood and ~12km west of Addo (as the crow flies), in the SRVM. The farm can be directly accessed off the tarred R336 (Kirkwood/ Addo Road) which is adjacent to the northern boundary of the farm. The nearest boundary of the Addo Elephant National Park is located more than 11km east of the farm and therefore, project activities proposed to take place on this property do not trigger listed activities which would require the assessment of impacts on the National Park.

A detailed project description is provided in Chapter Two of the EIA report.

In terms of the NEMA EIA Regulations 2014 (as amended), published in GN R326, 327, 325 and 324, promulgated under Chapter Five of the National Environmental Management Act (Act 107 of 1998) (NEMAA), and published in Government Gazette 40772 on the 7 April 2017, the project requires full Scoping and Environmental Impact Assessment (Scoping and EIA), prior to the commencement of any activities on the site due to, amongst others, activities listed in Listing Notice 2 (GN R325) , namely:

"15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for -…"

OVERVIEW OF THE EIA PROCESS AND PUBLIC PARTICIPATION

This Draft EIA has been preceded by a comprehensive Scoping Process with the Final Scoping Report (FSR), including the Plan of Study for EIA, being submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) on the 08 July 2022. On 22 August 2022 acceptance of the FSR and approval of the Plan of Study for EIA was received from the DEDEAT. This marked the end of the Scoping Phase of the EIA Process. The project then moved into the EIA Phase of the assessment.

Separate specialist assessments to address the key issues identified during the Scoping Process, are outlined below:

- Biophysical (Biological and Physical) site assessment including the undertaking of a Terrestrial and Aquatic Biodiversity Impact Assessments to:
  - Identify potential project related impacts on natural vegetation and faunal habitat associated with the area under assessment.
  - Conduct an aquatic survey to identify and map aquatic features associated with the area under assessment, if any.
  - Assign suitable buffers for aquatic features identified, if any.
  - Provide comment on the potential impact of the proposed development on Aquatic and Terrestrial Critical Biodiversity Areas (CBAs), as identified in the Eastern Cape Biodiversity Conservation Plan (ECBCP).
  - Allow for the determination of suitable buffers associated with meeting biodiversity conservation targets specific to the vegetation types associated with the area under assessment, and in line with those targets indicated by the relevant planning frameworks for the area.

- The undertaking of a Phase 1 Paleontological and Phase 1 Archaeological Impact Assessment to identify heritage resources, materials and artefacts that occur within the area under assessment and recommendations regarding the conservation thereof.
- The undertaking of a Traffic Impact Assessment to determine the impact of the additional trip generation and the suitability of the proposed access point to ensure safe access and egress from the site.
- The undertaking of a Soil Suitability Assessment in the form of a Land Capability Study, to determine the suitability of the soil for the establishment of citrus orchards, including slope analysis of the site, to inform the proposed layout.
- The undertaking of a Visual Impact Assessment to determine the potential effect on the visual environment and sense of place of the study area.

The primary objective of EIA Phase of the assessment is to present to I&APs and affected/ Juristic Organs of State and State Departments an overview of the predicted impacts, proposed mitigation measures (both positive and negative), closure outcomes, residual impacts of the activity and management actions required to avoid or mitigate the negative impacts; or enhance the positive impacts of the project. This report is being released for a 32-day I&AP review period to enable the authorities and I&APs to provide input and comment before the report is finalised and submitted to the DEDEAT for their decision-making. The Draft EIA Report and EMPr were released for a 32-day I&AP and Authority review period and comments received during the 32-day review period have been included in the Comments and Responses Report in Chapter Four (4) of the Final EIA Report and copies thereof attached in Appendix F. The assessment is at the stage where the Final EIA Report & EMPr are being submitted to DEDEAT for their decision-making. All I&APs on the project database will be notified via email of the submission of the Final EIA Report, as well as the outcome of the decision-making process. A copy of the Final EIA and Draft EMPr can be downloaded from the website www.publicprocess.co.za.

For further details on the EIA Process and Public Participation see Chapter Four of the EIA Report.

A summary of the identified impacts and recommended mitigation measures from each specialist study is outlined in the relevant sections below.

ECOLOGICAL IMPACTS AND RECOMMENDED MITIGATION

Terrestrial Biodiversity

The following table provides a summary of the key direct and indirect impacts associated with the development. Only impacts that are rated as having a potential *Medium to High or Very High* negative impact are listed below:

Development phase	Impact type	Impact	Rating	
			Without mitigation	With mitigation
Construction:	**Direct:**	Loss of vegetation due to clearing	Medium (-)	Low (-)
		Loss of ESA due to clearing	Medium (-)	Low (-)
		Loss of flora and fauna species of special concern during vegetation clearing	Medium (-)	Low (-)
		Fragmentation of natural habitat due to clearing	Medium (-)	Low (-)
		Loss of flora and faunal habitat due to clearing	Medium (-)	Low (-)
Operational:	**Direct:**	Fragmentation of natural habitat	Medium (-)	Low (-)
		Loss of flora & fauna habitat	Medium (-)	Low (-)
	Indirect	Loss of flora and fauna SCC due to poaching / illegal harvesting	Medium (-)	Low (-)

The following recommendations are made with regards to the mitigation and management of impacts on vegetation:

- Connectivity must be maintained along the watercourses and adjacent slopes, neither of which are suited to citrus orchards.
- Ecological connectivity will be partly retained between the recommended ecological corridors and the surrounding undeveloped farms to the east, west and south; however, perimeter security fencing will restrict free movement of certain faunal groups (larger mammals and tortoises). Faunal movement between corridors on the east and west side of the farm portion will also be impeded by citrus orchards (existing and proposed). Recommended solutions would be to retain a vegetated strip (± 50 m wide) along the western and southern boundary.
- No species of conservation concern having an Endangered, Critically Endangered or Vulnerable status were recorded during the site visit.
- Permits are required to be obtained from DFFE for the removal / damage to tree species protected in terms of the National Forests Act (Act No. 84 of 1998).
- Several flora species are present that are generally more widespread and not under threat but are protected in terms of the Provincial Nature Conservation Ordinance. Similarly, several protected faunal species are also likely present. A flora and fauna search and rescue will enable these species to be identified and relocated before any vegetation clearing commences.

Aquatic Biodiversity Features (Artificial and Natural)

The site assessment confirmed that there are a number of non-perennial tributaries falling with the project area. These non-perennial tributaries likely historically drained into the perennial Sundays River system, however, there has been complete alteration/disconnection of the non-perennial tributaries falling within the project footprint and the Sundays River. Drainage lines appear more pronounced at their source where they are at a steeper gradient (and erosion is also present) and become less pronounced further downslope where the gradient becomes gentler, with the dispersion of potential flow more extensive and uneven making definite drainage paths difficult to detail. No natural wetlands were identified on the property under assessment, and a number of water storage dams occur within and surrounding the project footprint. The following table provides a summary of the key direct and indirect impacts associated with the development. Only impacts that are rated as having a potential *Medium to High or Very High* negative impact are listed below:

Development phase	**Impact type**	**Impact**	**Rating**	
			Without mitigation	**With mitigation**
Planning and Design:	**Direct:**	Loss of riparian habitat at watercourse crossings and habitat around the dams.	Medium (-)	Low (-)
	Indirect:	Potential pollution of ground and surface water.	Medium (-)	Low or Very Low (-)
Construction	**Direct:**	Loss of riparian habitat at watercourse crossings and habitat around the dams	Medium to Low (-)	Low (-)
	Indirect:	Changes to hydrological regimes of the non-perennial rivers and drainage lines.	Medium (-)	Low (-)
	Indirect:	Potential pollution of all water resources within and surrounding the development footprint.	Medium (-)	Low to Very Low (-)
	Indirect:	Increase in sedimentation and turbidity levels of instream habitats (non-perennial rivers and drainage lines).	Medium (-)	Low (-)
Operational:	**Direct:**	Loss of and alteration of riparian habitat	Medium (-)	Low (-)
	Indirect:	Changes to the hydrological regime of the watercourses affected by the development proposals.	Medium (-)	Low (-)

	Indirect:	Increase in sedimentation and turbidity levels of surrounding watercourses and increase in the potential for erosion.	Medium (-)	Very Low (-)
	Indirect:	Potential pollution of all water resources within and surrounding the development footprint.	Medium (-)	Low (-)

The following recommendations are made with regards to the mitigation and management of impacts on Aquatic features:

- Appropriate stormwater protection measures should be incorporated around structures crossing watercourses
- Stormwater management and management of potential runoff as a result of irrigation must be in place. This could be in the form of berms or swales to capture and attenuate the runoff.
- A rehabilitation and alien vegetation management plan must be developed for implementation
- Construction work within areas associated with the pipeline crossings should be short-term with disturbed areas rehabilitated as soon as construction is complete to reduce the possibility of erosion of the areas and resultant sedimentation of the watercourses
- The proposed water storage dam and any other storage facilities should be lined and designed in such a way that prevents contamination of surrounding ground and surface water
- Prevent clearing to no more than the minimum width required
- All hazardous substances and hazardous waste (if any) must be stored in existing impermeable structures placed at the logistical services area
- Temporary stormwater and erosion control infrastructure must be put in place and monitored during the construction phase

All of the Biophysical impacts (vegetation, faunal and aquatic) that have been rated as having a potential *Medium to High Negative* impact can be mitigated to *Medium* or *Low Negative* or *Neutral*. For further information on the Ecological Impact Assessment and the Aquatic Impact Assessment see Chapters Six and Seven, respectively of the EIA Report.

HERITAGE IMPACTS AND RECOMMENDATIONS

Archaeological

The main impact on archaeological sites/remains (if any) will be the physical disturbance of the material and its context. The clearing of the vegetation may expose, disturb and displace archaeological sites/material. However, from the investigation it would appear that the proposed areas earmarked for development are of low archaeological sensitivity. The Middle Stone Age stone tools observed in the area to be developed are considered to be of **low cultural significance**, because they are in secondary context and not associated with any other archaeological remains. Notwithstanding, important materials may be covered by soil and vegetation. There are no known graves or buildings older than 60 years on the area surveyed. The potential impact on buried pre-colonial archaeology sites/remains during the proposed development has been rated **as Low Negative (-)** before mitigation and Neutral (0) after mitigation. The cumulative impact of the developments therefore does not change the overall impact rating of **Low Negative(-).**

Palaeontological

Given (1) the small (partially disturbed) footprint of the proposed agricultural expansion, (2) the likely deeply weathered condition of the underlying Mesozoic bedrocks near-surface, as well as (3) the low palaeontological sensitivity of the overlying superficial sediments, the palaeontological heritage impact significance of all components of the proposed agricultural expansion is assessed as **LOW (negative)** without mitigation. Current impacts on palaeontological heritage within the wider project area involve on-going destruction of newly exposed fossils by natural weathering and erosion processes (Impacts due to farming activities or illegal fossil collection here are likely to be negligible).

Of the fossils found on the Remainder of Farm 632, no fossil sites lie within the project footprint and therefore no mitigation measures are recommended in this regard. Thus, there are no objections on palaeontological heritage grounds to authorisation of the proposed Sontule Citrus agricultural development. No further palaeontological heritage studies or specialist mitigation are required for the proposed developments, pending the potential discovery or exposure of any significant fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, shelly fossil horizons) during the construction phase.

The following actions are recommended:

- Although it would seem unlikely that any significant archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological remains such as freshwater shell middens and historical material may be uncovered during the development. Should such material be exposed during construction, all work must cease in the immediate area (depending on the type of find) and it must be reported to the archaeologist at the Albany Museum in Makhanda (Grahamstown) (Tel: 046 6222 312) or to the Eastern Cape Provincial Heritage Resources Authority (Tel: 043 7450 888), so that a systematic and professional investigation can be undertaken.
- All clearing activities and other developments must be monitored. Managers/foremen should be informed before clearing/construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.
- Should fossil remains such as bones, shells or petrified wood be discovered during construction, these should be safeguarded (preferably in situ) and the ECO should alert the Eastern Cape Provincial Heritage Resources Authority (ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist The specialist involved would require a collection permit from ECPHRA. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013).

For further information on the Heritage Impact Assessment see Chapters Nine (Archeology) and Ten (Paleontology) of the EIA Report.

TRAFFIC IMPACTS AND RECOMMENDATIONS

The following conclusions can be drawn from the traffic specialist study:

- Access to the proposed orchard expansion can be provided directly from MR00471 (R336) via the existing access point at km 34.700; and
- A total of between 6 and 8 trips per day during the harvesting season (equating to between 604 and 756 trips per harvesting season) will be generated during the operational phase of the full development. This will result in a 1% increase in traffic per day for the R336.
- The impacts will have minimal impact on the operational capacity of the adjacent road network should regular maintenance be conducted.

The table below provides a summary of the key direct and indirect impacts associated with the development that have been identified by the traffic specialist. Only impacts that are rated as having a potential *Medium to High or Very High* negative impact are listed below:

Development Phase	Impact	Rating	
		Without mitigation	With mitigation
Construction	Additional traffic volumes	Medium (-)	Low (-)
Construction	Traffic Safety Impact due to slow moving traffic	High (-)	Medium (-)
Operational	Traffic safety due to additional traffic	High (-)	Medium (-)
Operational	Deterioration of Public Road Network	Medium (-)	Low (-)
Operational	Generation of Dust on Gravel Access Road	Medium (-)	Neutral (o)

In view of the findings of this study, it is recommended that:

- This TIA be approved by SANRAL SOC;
- Access to the proposed development be gained via the existing access point at km 34.700 on MR00471 (R336) as indicated on Figure 2 (in Chapter Eleven); and
- Suitable warning signage be erected on the approaches to the access point as indicated on Figure 2 (in Chapter Eleven).

For further information on the Traffic Impact Assessment see Chapter Eleven of the EIA Report.

VISUAL IMPACTS AND RECOMMENDATIONS

The Project's visual impact will cause changes in the landscape that are noticeable to receptors living in and visiting residences, tourist areas, and public roads to the south, north and east of the project site. It has been established that the most sensitive receptors are visitors to and residents of the property immediately to the south of the site. Tourism (hunting and a small guest lodge) and sporting (long-range target shooting) activities occur here. However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project.

The significance of the worst-case scenario impact on the various sensitive receptor areas during the Construction Phase is a direct negative impact that is partially reversible (should the project not proceed to the Operational Phase). The impact is predicted to be **Medium Negative** (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment continues to function but in a modified manner. It will have an influence on decision-making if not mitigated. The impact can be reduced with the implementation of the appropriate mitigation measures, but the significance of the impact is likely to remain Medium (-).

During the Operational Phase, a direct, partially reversible (should the shade cloth structures be removed) negative impact is predicted. The long-term impact is assessed as **Medium Negative** (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment continues to function but in a modified manner. The impact would remain Medium (-) even with the effective implementation of mitigation measures.

When taken together with the negative impacts of existing citrus orchards under shade cloth, which occur across the study area and the sub-region, the negative cumulative effect would remain **Medium Negative** (-). However, the proposed Sontule project would not appear uncharacteristic when set against the visual attributes of the site's immediate surroundings and the dominant land use of the sub-region.

The following recommendations of significance have been provided by the visual specialist:

- Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.
- Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.
- Maintain shade cloth in a good condition.
    - Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.
- Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured.

ASSESSMENT OF ALTERNATIVES

The following alternatives were identified for consideration in this assessment:

- No-Go alternative
- Property/ Location alternatives
- Land-Use alternatives
    - Grazing/ game
    - Citrus orchard establishment
- Layout alternatives (development footprints)

The No-Go option would entail not clearing the site for the proposed expansion of citrus orchards and a new off-stream farm dam, whilst retaining the remainder of the Sundays Valley Thicket. This will include the continued encroachment of exotic and invasive vegetation, if not actively controlled, and the resultant continued degradation of the vegetation over time. Conversely the No-Go option would result in the loss of potentially productive agricultural land in an area known for citrus production and at a site that forms part of an existing working citrus farm. The No-Go option would result in the loss of a capital investment estimated to be approximately R25 million. The operational phase of the project will result in the creation of 97 employment opportunities with an annual income of approximately ~R3 million. In addition, since the applicant, Sun Orange Farms (Pty) Ltd forms part of a broad-based black ownership scheme, the No-Go option would mean that several historically disadvantaged individuals do not receive the benefits of the proposed expansion. The No-Go option would result in a loss of these economic opportunities, as well as the increased production of food for local and international markets, which is considered to be a negative impact.

While the No-Go option will have no significant negative biophysical environmental impacts, it will result in the loss of positive social and economic benefits which are associated with the Go option. Finally, the No-Go option will result in the farm not being optimally utilized for agriculture, for which it is zoned and well positioned. Therefore, the **No-Go option is not the preferred alternative**.

Sontule was considered suitable for the agricultural expansion of this nature due to amongst others, the fact that there is existing citrus and associated infrastructure on the farm, the availability of the land, soil suitability, and biophysical attributes (vegetation and aquatic) which would allow for cultivation, as well as conservation. In addition, the proposed site was identified due to its close proximity to existing irrigation infrastructure, access to irrigation water (LSRWUA canal system) and the logistical services area on the same farm which will be required to service the additional orchards.

The preferred land-use, layout and technical alternatives are described in full in Chapter Five of the EIA Report. Positive impacts associated with the **Go option** are maximizing the use of available agricultural land whilst generating income from foreign currency (through export of citrus), thereby contributing to local economic growth, as well as assist in stimulating local markets. The proposed development footprint has been informed by the relevant specialist assessments and mitigation measures have been recommended in order to reduce the impact of the proposed development on the biophysical environment.

OVERALL EVALUATION OF IMPACTS

The proposed agricultural development is in line with the Sustainable Development Goals adopted by South Africa in 2015 as well as the objectives of the National Development Plan (2030).

In addition, agriculture was highlighted in President Ramaphosa's State of the Nation Address in 2020 as one of the areas with the highest growth potential. Similarly, the 2019 South African SDG Country Report identified targets addressing SDG objectives in the food and beverage sector as having the most enabling conditions. Investments in this sector – particularly agriculture – are strongly linked with ending poverty, living dignified lives, and the ability to make the most of educational and economic opportunities. The following extracts from the South Africa SDG Investor Map (UNDP, 2020[1]) have reference:

- *"The sector is also fairly resilient to economic shocks, has high potential for job creation and is important for export-led growth."*
- *"The sector has remained relatively protected during COVID-19, with limited job losses."*
- *"As a key link between people and planet, investments in agriculture can help achieve multiple SDGs. Although primary agriculture only constitutes 2.9% of GDP (2018), the broader value chain is estimated to contribute 12% to GDP. Furthermore, it is significant to the broader development agenda as a driver of employment (9% of the total workforce works in this sector) and future job creation."*

With regards to citrus as a subsector of labour-intensive agriculture, The NDP (2030; Page 222), states the following:

"There are about 60 000 hectares of citrus trees in South Africa. The employment requirement to produce citrus fruit is estimated at one worker per hectare, about 60 000 workers are employed on citrus farms. Direct downstream labour requirements for citrus are estimated at one labourer per 2 500 cartons packed: with about 100 million cartons packed per year, some 40 000 jobs are created in packing plants for a period of six months, or 20 000 full-time equivalents. In addition, there are labour requirements for transportation, warehousing, port handling, research and development, and processing. From 2000 to 2010, the citrus-farming area increased by 28 percent, from 47 000 to 60 000 hectares."

The Final Integrated Development Plan for the SRVM (SRVM IDP 2016/ 2017), indicates that the current unemployment rate in the municipal area may be as high as 38.54%. The Agricultural sector provides room for growth in terms of employment opportunities, as it currently represents ~11% of the employment for the SRVM area (Final SRVM IDP 2015/ 2016). Additionally, the SRVM IDP (2015/ 2016; Page 36) states that: *"The municipality can boast its ecotourism and agricultural potential."* Finally, the following statement is given by the SRVM Spatial Development Framework (SRVM SDF 2013; Page 8): *"The agricultural sector is one of the key economic drivers of the Sundays River Valley Municipality*."

It is the applicant's intention to build on this economic base in the SRVM, by making optimum use of the available resources in the area, i.e. available land zoned as agriculture, the availability of a sustainable supply of irrigation water from the LSRWUA canal system, the suitability/ fertility of the soils, as well as the available work force from local communities. By making use of this labour market, the proposed development would also support the vision of the Sundays River Valley Local Economic

[1] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, Pg 47, 49.

Strategy as outlined in the SRVM SDF (2013) which indicates agriculture, as a Local Economic Development Priority and identifies the need *to "…expand the agricultural section in the region."*, as an Economic Development Objective.

The proposed agricultural expansion will create additional direct permanent, as well as seasonal employment opportunities. In addition, a number of indirect, employment opportunities associated with the fruit packing industry, transportation and logistical companies, purchasing, as well as hiring of various products (chemicals, pallets, cartons), are anticipated to be created. During the operational phase of the development, it is estimated that 12 new skilled and 85 unskilled employment opportunities will be created at a value of ~R3 million per annum. Labour will be sourced locally from communities in the SRVM and Nelson Mandela Bay Municipality (NMBM).

Based on the experience of the EAP, land available for cultivation, which is situated adjacent to existing agricultural areas, is zoned for agricultural use, has existing water use rights, suitable soils, and is near the LSRWUA canal system, is becoming scarce in the Sundays River Valley.

The additional clearance of ~147ha will result in **~38%** (175ha) of the original extent of the near-natural and degraded vegetation on the farm being **retained**. By adopting the proposed no-go areas and all mitigation measures recommended by the Biodiversity Specialists, the biodiversity pattern target area for the various vegetation types, and the ecological and hydrological process areas on the farm will be safeguarded.

By applying the mitigatory measures proposed for the *Construction Phase* direct and indirect impacts of medium to high significance can be reduced to impacts of *medium to low negative impacts*. The key direct and indirect impacts associated with the *Operational Phase* of the development can, by applying the mitigatory measures proposed be reduced from negative impacts of high to medium significance to impacts of *medium to low negative or neutral impacts.*

The Environmental Assessment process has not identified any negative impacts that should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project. Taking into consideration the findings of the EIA process, it is the opinion of the Environmental Assessment Practitioner that the project benefits outweigh the negative residual environmental impacts, provided that the specified mitigation measures are applied effectively, it is proposed that the project receive environmental authorization in terms of the EIA process.

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APPENDICES

ABBREVIATIONS

CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CSR	Consultation Scoping Report
DFFE	Department of Forestry, Fisheries and Environment
DEDEAT	Provincial Department of Economic Development, Environmental Affairs and Tourism
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECPHRA	Eastern Cape Provincial Heritage Resources Agency
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ESA	Ecologically Sensitive Area
FEPAs	Freshwater Ecosystems Priority Areas
FSR	Final Scoping Report
I&AP	Interested and Affected Party
LSRWUA	Lower Sundays River Water Users Association
NBA	Nation Biodiversity Assessment (2011)
NEMA	National Environmental Management Act (Act 107 of 1998), as amended
NEMAA	National Environmental Management Amendment Act (Act 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NPAES	National Protected Areas Expansion Strategy
PES	Present Ecological State
PoS	Plan of Study
SABIF	South African Biodiversity Information Facility
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
STEP	Subtropical Thicket Ecosystem Project
SRVM	Sundays River Valley Municipality
S24G	Section 24G Assessment
ToR	Terms of Reference

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND AND PROJECT OVERVIEW

The project applicant, Sun Orange Farms (Pty) Ltd, proposes to clear approximately 147ha for the expansion of the existing agricultural development on Remainder of Farm 632, near Sunland in the Sundays River Valley Municipality (SRVM), hereafter referred to as **Sontule**. The proposed expansion will include the establishment of citrus orchards and associated infrastructure (internal roads, internal irrigation pipes) and construction of a new irrigation water balancing dam. The farm is currently zoned as Agriculture I and the area to be cultivated, including associated infrastructure, has been determined by the outcome of the various specialist assessments forming part of this Scoping and Environmental Impact Assessment (Scoping and EIA) Process.

Irrigation water for the development is proposed to be supplied from the Lower Sundays River Water Users Association (LSRWUA) canal system via an existing dam on the farm, and conveyed into the proposed new balancing dam via a ø 315mm uPVC pipeline of approximately 1.4km in length. The existing dam has a capacity to store 20 000m³ and the new dam is proposed to have a storage capacity of ~49 000m³ (~31 800m² footprint). Irrigation water will be supplied from the dam with uPVC pipes varying in diameter between 250mm and 315mm. Additionally, irrigation water will be reticulated within the orchards via a network of underground PVC irrigation pipes and valves, with varying internal diameters (between ø 150mm and ø 250mm). No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support.

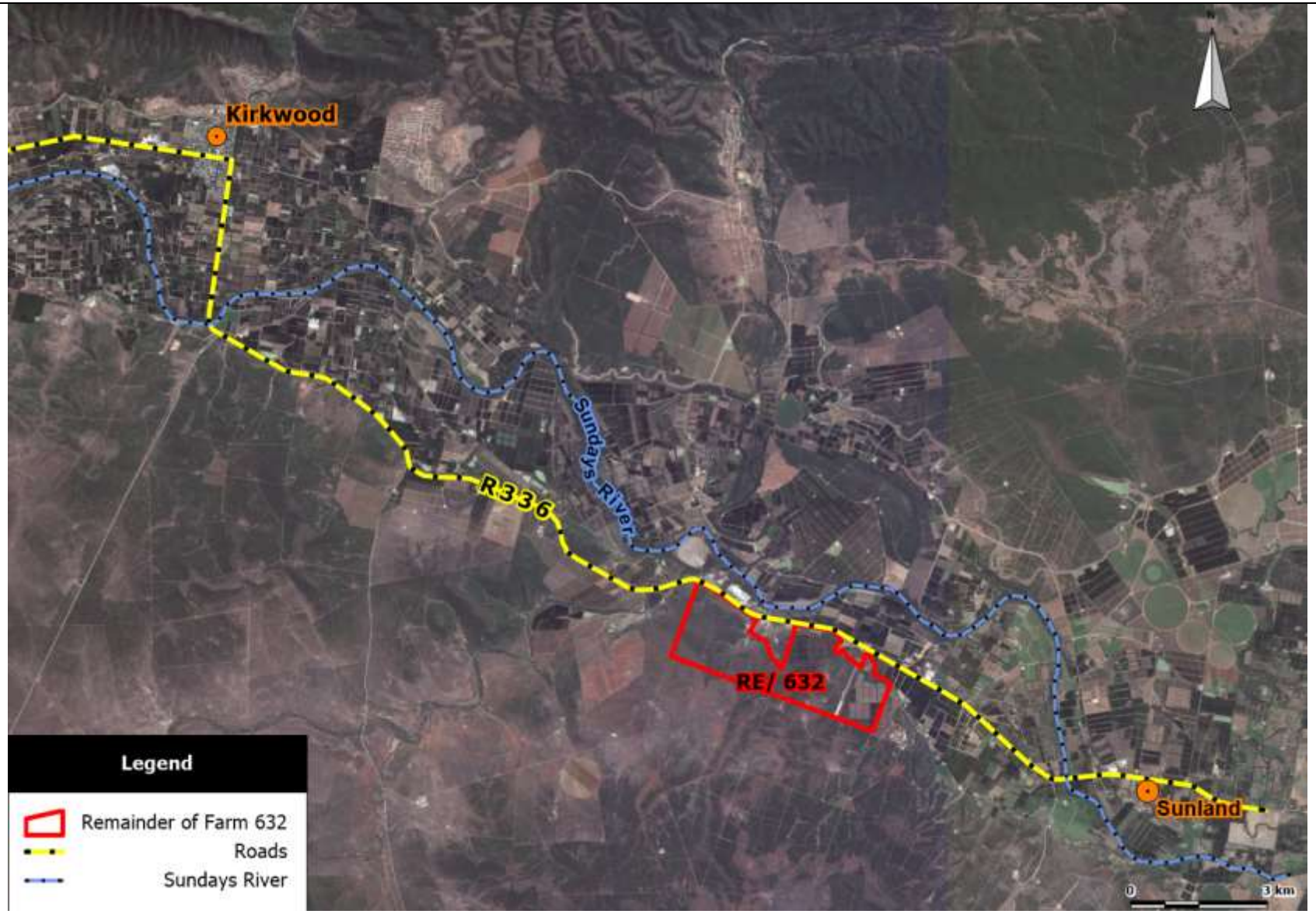
In terms of the NEMA EIA Regulations, 2014 (as amended), published in GN R326, 327, 325 and 324, promulgated under Chapter Five of the National Environmental Management Act (Act 107 of 1998) (NEMAA), and published in Government Gazette 40772 on the 7 April 2017, the project requires full Scoping and EIA, prior to the commencement of any activities on the site due to, amongst others, activities listed in GN R325, namely:

"15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for -…"

Chapter Four of this report provides details of the listed activities which require Environmental Authorisation. The project applicant has appointed Public Process Consultants as the independent Environmental Assessment Practitioner (EAP) to undertake the Scoping and EIA for the project. The competent authority who must consider and decide upon this application is the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), Sarah Baartman Region.

Notice of Intention to commence with Scoping and EIA was initially submitted to the competent authority (DEDEAT) on 21 August 2019 and sent to all identified Interested and Affected Parties (I&APs) and Organs of State on 22 August 2019. Subsequent to the initiation of the assessment process, it was determined that an existing Environmental Authorisation had been issued for agricultural development on RE/632, dated 13 February 2002 (Reference: EC06/2d/96-01). Therefore, DEDEAT requested that a compliance audit be undertaken for the site to determine any instances of non-compliance. Due to the delay that occurred as a result of undertaking the compliance audit, as well as to accommodate certain legislative changes that occurred in the interim, an additional Project Announcement and Registration comment period was provided. Therefore, the assessment process was reinitiated and the competent authority as well as all I&APs and Organs of State on the project database were again notified of the intention to

commence the assessment process on 23 September 2021. An Application Form for Environmental Authorisation was submitted to the competent authority on 1 June 2022 and the reference number **EC06/C/LN2/M/23-2022** was assigned by DEDEAT to this application. The Final Scoping Report, including the Plan of Study for the EIA, was submitted to the competent authority on 8 July 2022 and acknowledgement of receipt was received later that same day. An official acceptance of the Final Scoping Report and the Plan of Study for EIA, was received from DEDEAT on the **22 August 2022**. The Draft EIA and EMPr was released for a 32-day comment period which extended from the **8 September to the 10 October 2022**. This assessment is at a stage where the Final EIA Report and EMPr is being prepared for submission to DEDEAT for decision making.



Map 1.1: The location of Remainder of Farm 632 (Sontule), in relation to the nearest town, Sunland, Sundays River Valley Municipality.

1.2 PROJECT NEED AND DESIRABILITY

As per the Guideline on Need and Desirability, published by The Department of Environmental Affairs (2017), Pretoria, South Africa, ISBN: 978-0-9802694-4-4: "*The need for and the desirability of a proposed development forms a key component of any EIA application*." Therefore, an important objective of the Scoping Process is to, through a consultative process, "*motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location*."

The following extract from The Guideline on Need and Desirability (2017), has reference:

"The National Strategy for Sustainable Development and Action Plan 2011 – 2014 (NSSD 1) (2011) states the following:

Although the concept of sustainable development has been on the international agenda since the United Nations Conference on the Human Environment in Stockholm in 1972, the terms 'sustainability' and 'sustainable development' have been used and interpreted in widely different ways. In developing this strategy for sustainable development, a fixed definition of these terms has been accepted in a South African context.

***Sustainability** (or a sustainable society) is seen as the overall goal of the NSSD 1. Sustainability in this context implies **ecological sustainability**. In the first instance, it recognises that the maintenance of healthy ecosystems and natural resources are preconditions for human wellbeing. In the second instance, it recognises that there are limits to the goods and services that can be provided. In other words, ecological sustainability acknowledges that human beings are part of nature and not a separate entity.*

***Sustainable development** is the process that is followed to achieve the goal of sustainability. Sustainable development implies the selection and implementation of a development option, which allows for appropriate and justifiable social and economic goals to be achieved, based on the meeting of basic needs and equity, without compromising the natural system on which it is based."*

In 2015, the 2030 Agenda for Sustainable Development was adopted by South Africa and 192 other countries at the Sustainable Development Summit. The new agenda, entitled "Transforming Our World: The 2030 Agenda for Sustainable Development", was agreed upon by the 193 member states of the United Nations, and includes 17 **Sustainable Development Goals** (SDGs) and 169 targets.

In addition, agriculture was highlighted in President Ramaphosa's State of the Nation Address in 2020 as one of the areas with the highest growth potential. Similarly, the 2019 South African SDG Country Report identified targets addressing SDG objectives in the food and beverage sector as having the most enabling conditions. Investments in this sector – particularly agriculture – are strongly linked with ending poverty, living dignified lives, and the ability to make the most of educational and economic opportunities. The following extracts from the South Africa SDG Investor Map (UNDP, 2020[1]) have reference:

- *"The sector is also fairly resilient to economic shocks, has high potential for job creation and is important for export-led growth."*
- *"The sector has remained relatively protected during COVID-19, with limited job losses."*

[1] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, Pg 47, 49.

- *"As a key link between people and planet, investments in agriculture can help achieve multiple SDGs. Although primary agriculture only constitutes 2.9% of GDP (2018), the broader value chain is estimated to contribute 12% to GDP. Furthermore, it is significant to the broader development agenda as a driver of employment (9% of the total workforce works in this sector) and future job creation."*

Although the National Development Plan (NDP) pre-dates the adoption of the 2030 Sustainable Development Agenda, there is alignment between the development priorities highlighted in the NDP and the SDGs. As such, the NDP provides a roadmap for South Africa's efforts to achieve the SDGs, as well as the development priorities identified in the NDP itself.

South Africa has made progress in addressing SDG 2, which aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture by 2030. A 2017 study conducted by StatsSA indicates that there was a decline in the number of households that were vulnerable to hunger from 24.2% in 2002 to 10.4% in 2017.[2] The proposed agricultural project is in line with SDG 1 (No Poverty), 2 (Zero Hunger) and 8 (Decent Work and Economic Growth). In addition, the proposed development must take into account SDG 12 (Responsible Consumption and Production) and 15 (Life on Land).

South Africa's National Development Plan (NDP, 2030) has as one of its focal points, the expansion of agriculture in order to facilitate job creation. Figure 1.1 below is an extract from the NDP (2030; page 219). The NDP (2030; page 222), further notes the following:

"Expanding commercial agriculture has the potential to create 250 000 direct jobs and a further 130 000 indirect jobs. This can be achieved by picking winning agricultural sub-sectors where the expansion in production and further value-adding processes are sustainable over the long term. Expansion is not only driven by higher levels of productivity, but also supported by foreign and domestic demand. Without boosted demand, increased production will depress domestic price, which is bad for employment creation in the sector.".

With regards to citrus as a subsector of labour-intensive agriculture, The NDP (2030; Page 222), states the following:

"There are about 60 000 hectares of citrus trees in South Africa. The employment requirement to produce citrus fruit is estimated at one worker per hectare, about 60 000 workers are employed on citrus farms. Direct downstream labour requirements for citrus are estimated at one labourer per 2 500 cartons packed: with about 100 million cartons packed per year, some 40 000 jobs are created in packing plants for a period of six months, or 20 000 full-time equivalents. In addition, there are labour requirements for transportation, warehousing, port handling, research and development, and processing. From 2000 to 2010, the citrus-farming area increased by 28 percent, from 47 000 to 60 000 hectares."

[2] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, Pg 47.

- that the 1.5 million hectares under irrigation (which produce virtually all South Africa's horticultural harvest and some field crops) can be expanded by at least 500 000 hectares through the better use of existing water resources and developing new water schemes.
- Use some underused land in communal areas and land-reform projects for commercial production.
- Pick and support commercial agriculture sectors and regions that have the highest potential for growth and employment.
- Support job creation in the upstream and downstream industries. Potential employment will come from the growth in output resulting from the first three strategies.
- Find creative combinations between opportunities. For example, emphasis should be placed on land that has the potential to benefit from irrigation infrastructure; priority should be given to successful farmers in communal areas, which would support further improvement of the area; and industries and areas with high potential to create jobs should receive the most support. All these will increase collaboration between existing farmers and the beneficiaries of land reform.
- Develop strategies that give new entrants access to product value chains and support from better-resourced players.

Figure 1.1: Extract from the National Development Plan (2030; Page 219).

Sontule measures ~459ha in extent and is currently zoned Agriculture I. Sontule is an existing working citrus farm and approximately 133ha of the farm has been transformed for citrus orchards and associated infrastructure (dam, logistical services area, roads and lay down areas). In addition, ~4ha of the farm has been transformed to accommodate an airstrip and associated infrastructure. The area proposed for expansion of agriculture, including associated infrastructure, measures approximately 147ha in extent. Thus, the cumulative total area that will be transformed on Sontule will measure approximately 285 ha, or 62%, should this current application receive environmental authorisation.

The current remaining vegetation on Sontule (~321ha) is relatively intact and near-natural, although some modification is evident, in patches, in the form of cut lines and vehicle tracks, as

well as quarrying for road surface material. Sontule is surrounded by agricultural developments (orchards) and support infrastructure (Unifrutti Packhouse) to the west, north and east. The property adjacent to the southern boundary is utilised predominantly for game farming, although some citrus orchards and other agricultural activities are also present.

Based on the experience of the EAP, land available for cultivation, which is situated adjacent to existing agricultural areas, is zoned for agricultural use, has existing water use rights, suitable soils, and is near the LSRWUA canal system, is becoming scarce in the Sundays River Valley.

Chapter Three of this report provides further detail of the surrounding land use activities.

The Final Integrated Development Plan for the SRVM (SRVM IDP 2016/ 2017), indicates that the current unemployment rate in the municipal area may be as high as 38.54%. The Agricultural sector provides room for growth in terms of employment opportunities, as it currently represents ~11% of the employment for the SRVM area (Final SRVM IDP 2015/ 2016). Additionally, the SRVM IDP (2015/ 2016; Page 36) states that: *"The municipality can boast its ecotourism and agricultural potential."* Finally, the following statement is given by the SRVM Spatial Development Framework (SRVM SDF 2013; Page 8): *"The agricultural sector is one of the key economic drivers of the Sundays River Valley Municipality*."

The proposed agricultural development will require the capital investment of approximately R25 million and will create additional direct permanent, as well as seasonal employment opportunities. In addition, a number of indirect, employment opportunities associated with the fruit packing industry, transportation and logistical companies, purchasing, as well as hiring of various products (chemicals, pallets, cartons), are anticipated to be created. In addition, since the applicant, Sun Orange Farms (Pty) Ltd forms part of a broad-based black ownership scheme, the proposed agricultural expansion on Sontule will result in benefits for historically disadvantaged individuals (HDIs).

During the operational phase of the development, it is estimated that 12 new skilled and 85 unskilled employment opportunities will be created at a value of ~R3 million per annum. Labour will be sourced locally from communities in the SRVM and Nelson Mandela Bay Municipality (NMBM).

It is the applicant's intention to build on this economic base in the SRVM, by making optimum use of the available resources in the area, i.e., the availability of a sustainable supply of irrigation water from the LSRWUA canal system, the suitability/ fertility of the soils, as well as the available work force from local communities. By making use of this labour market, the proposed development would also support the vision of the Sundays River Valley Local Economic Strategy as outlined in the SRVM SDF (2013) which indicates agriculture, as a Local Economic Development Priority and identifies the need *to "…expand the agricultural section in the region."*, as an Economic Development Objective.

As per the DEA Guideline on Need and Desirability (2017), the relevant questions to be engaged with when considering need and desirability have been taken into account by the various specialist studies undertaken for this assessment.

1.3 REQUIREMENTS FOR SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

In terms of the NEMA EIA Regulations, 2014 (as amended), published in GN R326, 327, 325 and 324, promulgated under Chapter Five of the National Environmental Management Act (Act 107 of

1998) (NEMAA), and published in Government Gazette 40772 on the 7 April 2017, the project requires full Scoping and EIA, prior to the commencement of any activities on the site due to amongst others, activities listed in GN R325, namely:

"15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for -…"

Chapter Four of this report includes a list of the activities contained in GN R327, 325 and 324, which may be triggered by the project components and thus, form part of this Scoping and EIA process. These listed activities require authorisation from the competent authority, DEDEAT Sarah Baartman Region, prior to the commencement of any activities on site.

The purpose of the Scoping and EIA process is to identify, assess and report on the impact project activities may have of the receiving environment, if implemented. An important element of this process is to identify potential impacts, both positive and negative, and make recommendations for the mitigation of impacts, to reduce potentially negative impacts and enhance potentially positive impacts. The EIA needs to show the competent authority, I&APs and the project applicant what the consequences of their choices will be in terms of impacts on the social, economic and biophysical environments.

In compliance with the above legislation and regulations, this Scoping and EIA process is being implemented in four phases, the details of which are outlined in Chapter Four of this report:

- Pre-Application Scoping Phase
- Application and Scoping Phase
- Environmental Impact Assessment Phase
- Decision Making and Appeal Period (**CURRENT STAGE**)

As part of the Pre-Application Scoping phase, Notice of Intention to commence with Scoping and EIA was initially submitted to the competent authority (DEDEAT) on 21 August 2019 and sent to all identified Interested and Affected Parties (I&APs) and Organs of State on 22 August 2019. Subsequent to the initiation of the assessment process, it was determined that an existing Environmental Authorisation had been issued for agricultural development on RE/632, dated 13 February 2002 (Reference: EC06/2d/96-01). Therefore, DEDEAT requested that a compliance audit be undertaken for the site to determine any instances of non-compliance. Due to the delay that occurred as a result of undertaking the compliance audit, as well as to accommodate certain legislative changes that occurred in the interim, an additional Project Announcement and Registration comment period was provided. Therefore, the assessment process was reinitiated and the competent authority as well as all I&APs and Organs of State on the project database were again notified of the intention to commence the assessment process on 23 September 2021.

An Application Form for Environmental Authorisation, in order to commence with the legislated portion of the Scoping and EIA Process in terms of the NEMA EIA Regulations, 2014 (as amended), was submitted to the competent authority prior to the release of the Consultation Scoping Report (CSR) and the legislated 30-day consultation period, on 1 June 2022. Correspondence was received from DEDEAT on 2 June 2022 confirming that the application is deemed to be complete and confirming that Reference Number **EC06/C/LN2/M/23-2022** had been assigned to the application. All I&APs including affected/ Juristic Organs of State and State Departments on the project database were notified in writing, via email, of the legislated minimum 30-day comment and review period for the CSR, which extended from the 3 June to 4 July 2022. The Final Scoping Report, including the Plan of Study for the EIA, was submitted to the competent

authority on 8 July 2022 and acknowledgement of receipt was received later that same day. No comment period was provided for the FSR. An official acceptance of the Final Scoping Report and the Plan of Study for EIA, was received from DEDEAT on the **22 August 2022**.

The Draft EIA and the EMPr were released for a 32-day comment and review period, which extended from the **8 September 2022 to the 10 October 2022.** Notification of the 32-day comment period for the Draft EIA was submitted to DEDEAT on the 8 September 2022, which included an Executive summary and comment form. All I&APs and affected / Juristic Organs of State and State Departments were provided with a link to the project website where reports could be downloaded or provided with a copy of the report in the preferred format, as agreed to with the respective Departments.

The EIA is currently at a stage where the Final EIA and EMPr, inclusive of Appendices is being submitted to the competent authority for their decision-making. All I&APs on the project database will be notified, via email, of the submission of the Final EIA inclusive of Appendices and Draft EMPr, to DEDEAT, as well as the outcome of the decision-making process. Copies of the correspondence with DEDEAT are included in Appendix B of this report and copies of correspondence to and from I&APs are contained in Appendices E and F, respectively.

1.3.1 Assumptions and Limitations

- This EIA report has been prepared based on the project information provided by the applicant, which is assumed to be true and accurate.
- The opinions, conclusions and any recommendations by the authors, contained in this report are based on the aforementioned project information as well as input from the respective specialists.
- The proposed layout including the various specifications for the irrigation infrastructure, roads and laydown areas has been provided by the applicant's technical team.
- Mapping and associated area calculations undertaken during the assessment process ***are not based on surveyed contours*** but are done in Geographical Information System mapping software (Manifold® System 8.0 Ultimate Edition) using heads up digitizing on outdated aerial imagery. ***Some inaccuracy in area calculations can therefore be expected***.

1.4 EIA TEAM

This section of the report provides an overview of the EIA project team under the management of Public Process Consultants.

Table 1.1: EIA Team and Specialists.

EIA PROJECT TEAM		
Team Member	**Company**	**Role**
Sandy Wren	Public Process Consultants	EIA Team Leader (Registered EAP No *(No: 2019/1242)*
Marisa Jacoby	Public Process Consultants	Environmental Assessment Practitioner
JP Hechter	Public Process Consultants	Candidate Assessment Practitioner
Emily Whitfield	Public Process Consultants	Trainee Environmental Assessment Practitioner
Geena Pringle	Public Process Consultants	Trainee Environmental Assessment Practitioner

Wandile Junundu	Public Process Consultants	Community Consultation
Jamie Pote	Private	Terrestrial Biodiversity Specialist Assessment
Jaclyn Smith	JS Environmental Consulting	Aquatic Biodiversity Specialist Assessment
Dr Johan Binneman and Kobus Reichert	Eastern Cape Heritage Consultants	Phase 1 Archaeological Impact Assessment
Dr John Almond	Natura Viva cc	Phase 1 Palaeontological Impact Assessment
Bruno Herrmann	Agrimotion	Soil Suitability Assessment
Cary Hastie	Engineering Advice and Services	Traffic Impact Assessment
Graham A Young	Graham A Young Landscape Architect	Visual Impact Assessment
TECHNICAL TEAM		
Kim Rudman	Sun Orange Farms (Pty) Ltd	Applicant Representative
Louis Grobler	CFT Irrigation Solutions	Irrigation infrastructure and planting plan design

1.5 DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER AND EXPERTISE TO CARRY OUT SCOPING AND EIA

Public Process Consultants was established in 1997 by Sandy Wren. Initially the company was established to focus on the overarching management and integration of the public participation component for Scoping Reports, EIAs and Strategic Environmental Assessments (SEAs). Under this role, Sandy was actively involved in projects such as the SEA for the expansion of Addo Elephant National Park, SEA for the Coega Industrial Development Zone and Port of Ngqura, the EIA for the Boardwalk Casino and development of a Sustainable Coastal Development Policy for SA. This management and integration role expanded through years of experience to include the management of Basic Assessments, Scoping and EIA Reports. Sandy has over 20 years of experience in the management of Scoping and EIA's, as well as Basic Assessment reports for numerous projects within the Nelson Mandela Bay Metropolitan Area and beyond, for both public and private clients.

Sandy Wren, is a graduate from the University of Port Elizabeth, majoring in Political Science, Sociology and Industrial and Organisational Psychology. Sandy obtained a BA Honours Degree in Development Studies in 2003 for which she obtained distinctions in courses in Environmental Management. Sandy is a former Regional Director of Idasa (Institute for Democracy in SA). Sandy's EIA project management experience includes, proposed new housing and "estate" type developments, expansion of agricultural related activities (broiler house facilities and citrus production), bulk infrastructure related projects (sewer, stormwater, sewage reticulation works and pump stations), as well as industrial type developments (SA Breweries IBhayi Biogas facility, NiRoVe Paint Stripping and increase in LNG for Umicore). Sandy continues to play a key role in the management of various public participation processes associated with the Coega Project (Proposed Regional Hazardous Waste Site Facility; Proposed Bulk Liquid Storage and Handling Facility in the Coega IDZ: Marine Servitude and Pipelines in the Coega IDZ), as well as various renewable energy projects (wind and solar). See Appendix A for curriculum vitae.

The application for the project EIA team is being led by Sandy Wren who will be supported by Marisa Jacoby, JP Hechter and Emily Whitfield.

Marisa Jacoby, Senior EAP, obtained a BSc Honours in Botany (*cum laude*) from the Nelson Mandela Metropolitan University. Marisa has worked as an EAP, as well as a biophysical specialist (fauna and flora) on various Basic Assessments, Scoping and EIA Processes for new residential

developments, expansion of agricultural activities, broiler production facilities, and bulk infrastructure projects. See Appendix A for curriculum vitae.

JP Hechter, Candidate EAP, obtained a BSc Masters in Geography (Environmental Geography) from the Nelson Mandela University. In partial fulfilment of the requirements for this degree he completed a treatise entitled: “Assessing the Social Sustainability of Wind Energy in the Karoo”. JP has worked as an EAP, on various Basic Assessments and Scoping and EIA Processes for agricultural developments.

Emily Whitfield obtained a BSc Honours in Botany (*cum laude*, Environmental Management) from the Nelson Mandela University. In partial fulfilment of the requirements for this degree she completed a treatise entitled: “The uptake of silica by Harmful Algal Blooms within the Sundays Estuary” and completed a vegetation specialist study on Portion 4 of Farm 632, SRVM. She has worked on several Terrestrial Biodiversity Specialist Studies in South Africa.

1.6 OBJECTIVES OF THE ENVIRONMENTAL IMPACTS ASSESSMENT PROCESS

This Draft EIA Report forms part of a series of reports and information documents that are prepared during the EIA process for the proposed agricultural development. The EIA Report must be undertaken in line with the approved Plan of Study for EIA as contained in the accepted FSR. The primary objective of EIA phase of the assessment is to present to I&APs and affected/juristic Organs of State and State Departments, an overview of the predicted impacts, proposed mitigation measures (both positive and negative), closure outcomes, residual impacts of the activity and management actions required to avoid or mitigate the negative impacts; or enhance the positive impacts of the project. The assessment of alternatives forms an important part of the assessment process, see Chapter Five of this report.

As per Appendix 3 of the NEMA EIA Regulations, 2014 (as amended), the objectives of the EIA phase of the assessment is to, through a consultative process –

- Determine the policy and legislative context within which the activity is located and document how the proposed activities complies with and responds to the policy and legislative context.
- Describe the need and desirability of the proposed activity, as well as within the context of the development footprint on the approved site as contemplated in the accepted scoping report.
- Identify the location of the development footprint within the approved site based on an impact and risk assessment process, including cumulative impacts, and the ranking of all the identified development footprint alternatives, focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
- Determine the –
    - Nature, significance, consequence, extent, duration and probability of the impacts to inform identified preferred alternatives; and
    - The degree to which these can be reversed; may cause irreplaceable loss of resources; and can be avoided, managed or mitigated.
- Identify the most ideal location for the activity within the development footprint of the approved site based on the lowest level of environmental sensitivity.
- Identify, assess and rank impacts on the development footprint on the approved site as contemplated in the approved scoping report through the life of the activity.
- Identify suitable measures to avoid, manage or mitigate identified impacts.
- Identify residual risks that need to be managed and monitored.

The EIA is required to be undertaken through a consultative process and thus the EIA must, amongst others, satisfy the requirements of Chapter Six (Regulations 39-44) of GN R326 of the NEMA EIA Regulations, 2014 (as amended), which relates to the Public Participation Process and the registration of I&APs, the acknowledgment of their comments, as well as recording and responding to comments on the proposed project. Issues raised during the Scoping Process have been included in a Comments and Responses Trail as part of Chapter Four of the FSR. The Final EIA report will include comments received from I&APs during the review of the Draft EIA. Chapter Four of this report provides detail on the Public Participation Process undertaken for the EIA phase of the assessment. Regulation 43. (1) states the following:

43. (1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations* ***and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application***."

In terms of legal requirements, a crucial objective of the EIA Phase of the assessment is to satisfy the requirements of Appendix 3 of GN R326 of the NEMA EIA Regulations, 2014 (as amended). Appendix 3 regulates and prescribes the scope and content of the EIA Report and specifies the content required in a report for the competent authority to consider and come to a decision on an application. Table 1.2 below indicates how the requirements of Appendix 3 are met by the different sections of this EIA Report. Specialist Studies undertaken as part of the EIA need to comply with either the requirements of Appendix 6 of the NEMA EIA Regulations, 2014 (as amended) or with the respective Assessment Protocols which have been gazetted, applicable in this instance:

- Terrestrial Biodiversity
- Aquatic Biodiversity
- Terrestrial Animal Species
- Terrestrial Plant Species

Table 1.2: Summary of where information requirements in terms of Appendix 3 of the EIA Regulations, 2014, (as amended) are provided for in this report.

Section in Appendix 3	Requirements for an Environmental Impact Assessment process	Where this is provided in this Draft EIA Report
3. (1) (a) (i)	details of the EAP who prepared the report	Chapter 1 and Appendix A
3. (1) (a) (ii)	the expertise of the EAP, including curriculum vitae;	Appendix A
3. (1) (b)	the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including-	Chapter 2 and Chapter 5 for Alternatives.
3. (1) (b) (i)	the 21-digit Surveyor General code of each cadastral land parcel;	Chapter 2
3. (1) (b) (ii)	where available, the physical address and farm name;	Chapter 2
3. (1) (b) (iii)	where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 2
3. (1) (c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Appendix H
3. (1) (c) (i)	a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;	This is not a linear activity.
3. (1) (c) (ii)	on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	The property boundary has been defined.
3. (1) (d)	a description of the scope of the proposed activity, including-	Chapter 2

3. (1) (d) (i)	all listed and specified activities triggered and being applied for; and;	The scope of the activity in Chapter 2 and listed activities in Chapter 4.
3. (1) (d) (ii)	a description of the associated structures and infrastructure related to the development;	Chapter 2
3. (1) (e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislative and policy context;	Chapter 4 and Chapters 6 to 13.
3. (1) (f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 1
3. (1) (g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5
3. (1) (h)	a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	Chapter 5: Assessment of Alternatives.
3. (1) (h) (i)	details of the development footprint alternatives considered;	Chapter 5 for Alternatives and Chapters 6 to 12 for specialist studies.
3. (1) (h) (ii)	details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 4 and Appendix B, D, E and F.
3. (1) (h) (iii)	a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Chapter 4: Comments and Responses Trail.
3. (1) (h) (iv)	the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 5 for Alternatives and Chapters 6 to 12 for specialist studies
3. (1) (h) (v)	the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Alternatives in Chapter 5. Specialist Studies including the assessment of impacts and risks in Chapters 6 to 12.
3. (1) (h) (vi)	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Alternatives in Chapter 5. The methodology used for the rating of impacts in the EIA Phase of the Assessment is provided in Chapter 4.
3. (1) (h) (vii)	positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Alternatives in Chapter 5. Specialist Studies including the assessment of impacts and risks in Chapters 6 to 12.
3. (1) (h) (viii)	the possible mitigation measures that could be applied and level of residual risk;	Specialist Studies including mitigation measures proposed and level of residual risk in Chapters 6 to 12.
3. (1) (h) (ix)	if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Property/ location, as well as layout/ development footprint alternatives have been assessed as part of this assessment, reasoning is provided in Chapter 5.
3. (1) (h) (x)	a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5 for Assessment of Alternatives.
3. (1) (i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including-	Chapter 5 for Assessment of Alternatives. Results of specialist studies in Chapter 6 to 12.

3. (1) (i) (i)	a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Results of specialist studies in Chapter 6 to 12.
3. (1) (i) (ii)	an assessment of significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Results of specialist studies in Chapter 6 to 12.
3. (1) (j)	An assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequence of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	Results of specialist studies in Chapter 6 to 12.
3. (1) (k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapter 13 for a summary of the key findings of the EIA.
3. (1) (l)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment:	Chapter 13 for a summary of the key findings of the EIA.
3. (1) (l) (ii)	a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Appendix H
3. (1) (l) (iii)	a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapter 5 for the Assessment of Alternatives. Chapter 13 for a summary of the key findings of the EIA.
3. (1) (m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for conditions of authorisation;	Chapter 6 to 12 for recommendations from specialist studies for management actions to be included in the EMPr. Chapter 13 for a summary of the key findings of the EIA and conditions of authorisation. Part B of this report for the EMPr.
3. (1) (n)	the final proposed alternatives which respond to the impact management measures, avoidance and mitigation measures identified through the assessment;	Chapter 5 for the Assessment of Alternatives.
3. (1) (o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Chapter 13 for a summary of the key findings of the EIA and recommended conditions of authorisation.
3. (1) (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapters 6 to 12 for specialist studies and any assumptions, uncertainties and gaps in knowledge.
3. (1) (q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 13 for a summary of the key findings of the EIA and conditions of authorisation.
3. (1) (r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	This activity does include operational aspects. Recommendations for the period of the Environmental Authorisation in Chapter 2, Section 2.4.

3. (1) (s)	an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Accompanied the Application Form
3. (1) (t)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable.
3. (1) (u)	an indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	No deviations from the approved Scoping Report.
3. (1) (v)	any specific information that may be required by the competent authority; and	None requested to date.
3. (1) (w)	any other matters required in terms of section 24(4)(a) and (b) of the Act	The Scoping and EIA process takes into consideration IEM principles as contained in NEMA.
3. (2)	Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	Assessment Protocols which have been gazetted and are applicable in this instance: • Terrestrial Biodiversity (Chapter 6) • Aquatic Biodiversity (Chapter 7) • Terrestrial Animal Species (Chapter 6) • Terrestrial Plant Species (Chapter 6)

CHAPTER TWO: PROJECT DESCRIPTION

2.1 INTRODUCTION

The project applicant, Sun Orange Farms (Pty) Ltd, proposes to clear approximately 147ha for the expansion of the existing agricultural development on Remainder of Farm 632, near Sunland in the Sundays River Valley Municipality (SRVM), hereafter referred to as **Sontule**. The proposed expansion will include the establishment of citrus orchards and associated infrastructure (internal roads, internal irrigation pipes) and construction of a new irrigation water balancing dam. The farm, measures ~459ha in extent and is currently zoned Agriculture I.

Environmental authorisation was received from the competent authority for the establishment of approximately 130ha of citrus orchards on Sontule (DEDEAT Ref: EC06/2d/96-01, dated 13 February 2002), as well as the construction of two dams with a capacity of 36 000m³ and 25 000m³ (DEDEAT Ref: EC06/1j/95-01, dated 18 February 2002). Therefore, at the time of this assessment, existing agriculture and associated infrastructure on the farm measures approximately 133ha, which includes ~111ha of orchards, ~11ha of associated infrastructure and a 20 000m³ dam (~1ha footprint). Approximately 9ha were cleared for orchards but were subsequently not planted and have remained transformed. In addition, an area of approximately 4ha has been transformed to accommodate a private airstrip.

The area proposed to be cultivated, including associated infrastructure, that forms part of this current application, has been determined by the outcome of the various specialist assessments forming part of this Scoping and Environmental Impact Assessment (Scoping and EIA) Process.

Irrigation water for the development is proposed to be supplied from the Lower Sundays River Water Users Association (LSRWUA) canal system via an existing dam on the farm, and conveyed into the proposed new balancing dam via a ø 315mm uPVC pipeline of approximately 1.4km in length. The existing dam has a capacity to store 20 000m³ and the new dam is proposed to have a storage capacity of ~49 000m³ (~37 000m² / 3.7ha footprint). Irrigation water will be supplied from the new dam with uPVC pipes varying in internal diameter between 250mm and 315mm. Additionally, irrigation water will be reticulated within the orchards via a network of underground PVC irrigation pipes and valves, with varying internal diameters (between ø60mm and ø160mm). No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support.

The Farm Sontule is located ~11km south-east of Kirkwood and ~12km west of Addo (as the crow flies), in the SRVM. The farm can be directly accessed off the tarred R336 (Kirkwood/ Addo Road) which is adjacent to the northern boundary of the farm. The nearest boundary of the Addo Elephant National Park is located more than 11km east of the farm and therefore, project activities proposed to take place on this property do not trigger listed activities which would require the assessment of impacts on the National Park.

As per the requirements of the NEMA EIA Regulations, 2014 (as amended), GN R326, Appendix 3, Section 3. (1) (b), (c) and (d), this chapter of the report provides the following information, where relevant:

3. (1) (b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including-
(i) the 21-digit Surveyor General code of each cadastral land parcel;
(ii) where available, the physical address and farm name;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

3. (1) (c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

3. (1) (d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered[1];

(ii) a description of the activities to be undertaken, including associated structures and infrastructure;

2.1.1 Proposed Project Location

Map 1.1 in Chapter One of this report, includes a locality map indicating the location of Sontule, in relation to the nearest town and main roads. The cadastral information listed in Table 2.1 below is relevant to Sontule.

Table 2.1: Project cadastral information.

SURVEYOR GENERAL 21 DIGIT CODE																					
C	**0**	**7**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	

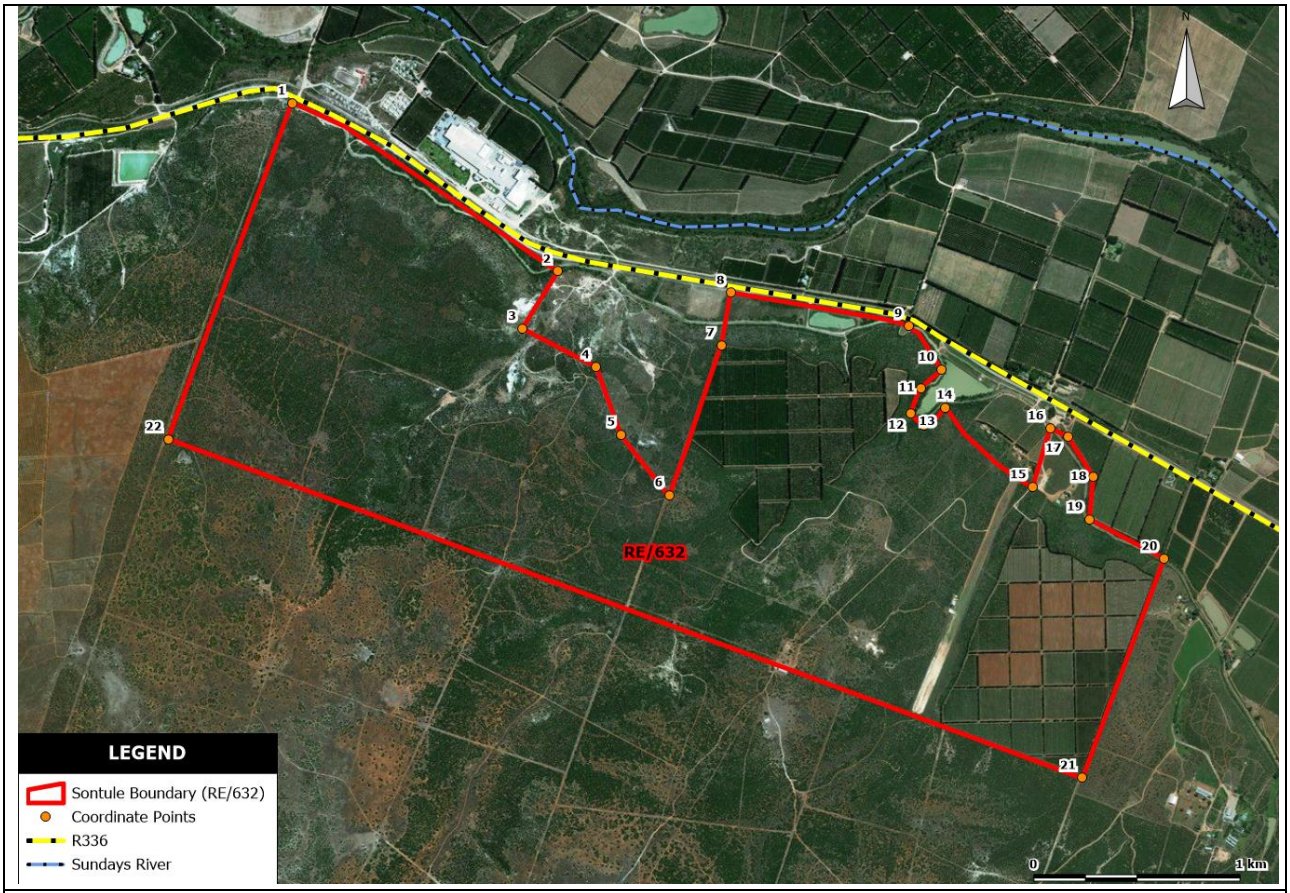
PHYSICAL ADDRESS AND FARM NAME
• Remainder of Farm 632, SRVM, Division of Uitenhage

SITE COORDINATES: REMAINDER OF FARM 632 (SONTULE)						
Point Number	**Latitude (S) (DDMMSS)**			**Longitude (E) (DDMMSS)**		
1	33°	28'	13.23"S	25°	32'	19.39"E
2	33°	28'	35.21"S	25°	33'	0.96"E
3	33°	28'	42.68"S	25°	32'	55.49"E
4	33°	28'	47.75"S	25°	33'	7.04"E
5	33°	28'	56.56"S	25°	33'	11.01"E
6	33°	29'	4.48"S	25°	33'	18.51"E
7	33°	28'	44.86"S	25°	33'	26.68"E
8	33°	28'	38.02"S	25°	33'	28.19"E
9	33°	28'	42.34"S	25°	33'	56.11"E
10	33°	28'	48.05"S	25°	34'	1.20"E
11	33°	28'	50.48"S	25°	33'	58.05"E
12	33°	28'	53.81"S	25°	33'	56.41"E
13	33°	28'	55.37"S	25°	33'	58.43"E
14	33°	28'	53.02"S	25°	34'	1.82"E
15	33°	29'	3.42"S	25°	34'	15.55"E
16	33°	28'	55.74"S	25°	34'	18.32"E
17	33°	28'	56.83"S	25°	34'	21.09"E
18	33°	29'	2.08"S	25°	34'	25.03"E
19	33°	29'	7.64"S	25°	34'	24.45"E

[1] Listed activities requiring Environmental Authorisation in terms of the NEMA EIA Regulations, 2014 (as amended) are contained in Chapter Four of this report.

20	33°	29'	12.81"S	25°	34'	36.13"E
21	33°	29'	41.49"S	25°	34'	23.36"E
22	33°	28'	57.16"S	25°	31'	59.91"E

Map 2.1 below shows the boundary of Sontule upon which the agricultural expansion is proposed to take place.



Map 2.1: A plan indicating the coordinates of the boundary of Remainder of Farm 632, known as Sontule, upon which the agricultural expansion is proposed to take place.

The final preferred development footprint for the proposed project has been determined through the assessment process, which has included a consultation process, specialist assessments and technical input. The listed activities which require Environmental Authorisation are included in Chapter Four of this report. The specialist studies, which have been undertaken for the proposed project are included in Chapters Six to Twelve of this report and the assessment of alternatives is outlined in Chapter Five.

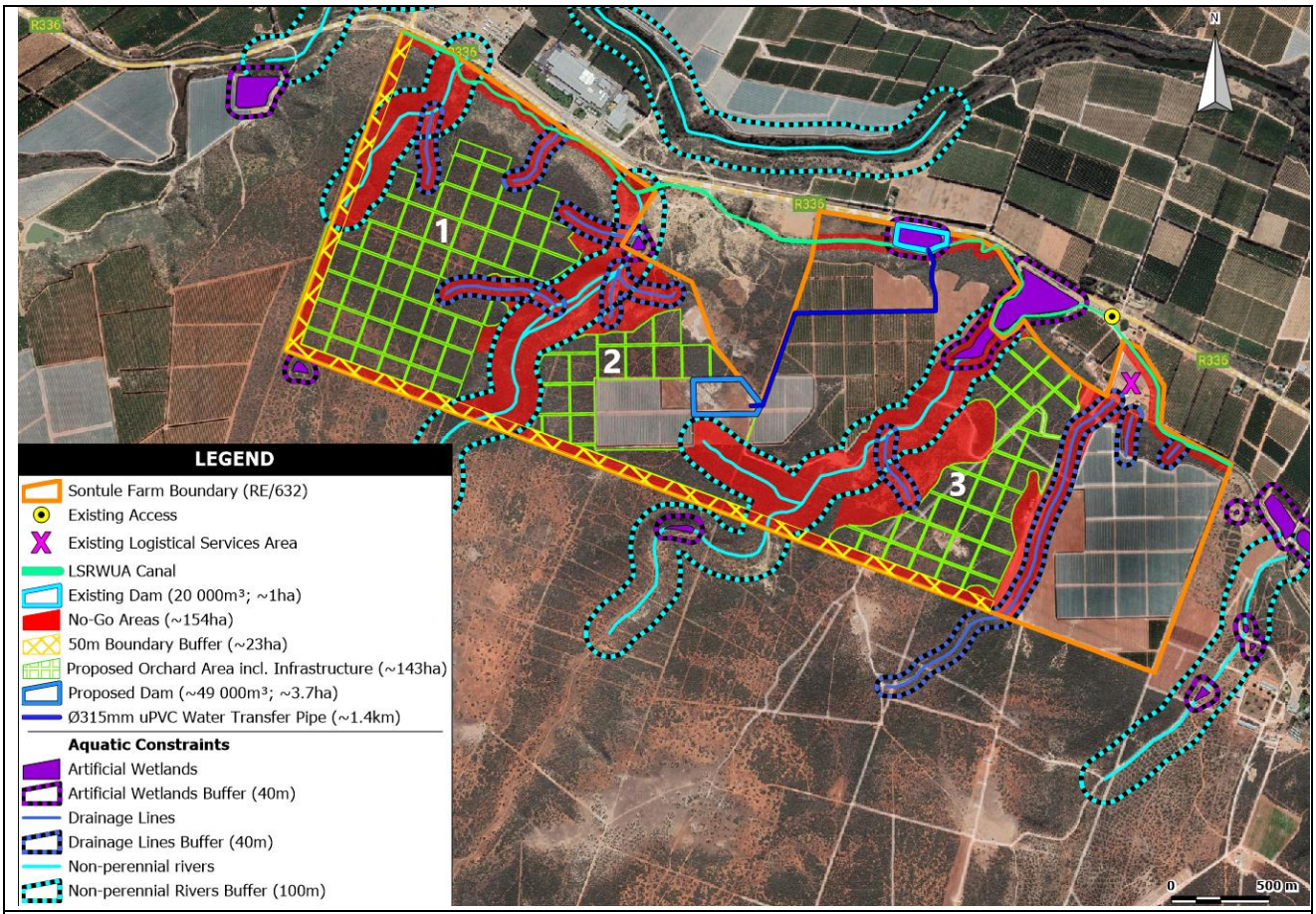
2.2 PROPOSED PROJECT SCOPE AND ACTIVITIES

Based on the outcome of the assessment process, specialist studies, technical input and consultation process, the project applicant, Sun Orange Farms (Pty) Ltd, intends to clear an area of ~147ha for the establishment of citrus orchards and associated infrastructure which will comprise of the following:

- Trees (effective irrigation area ~127ha)
- Shade cloth / nets (if required)
- Laydown areas
- Internal Roads – widths varying between 4m and 9m

- One ø315mm uPVC irrigation water transfer pipe from the existing dam to the proposed new dam over a distance of ~1.4 km
- Proposed new dam with a storage capacity of ~49 000m³ (~3.7ha footprint) and a ~5 metre high wall, including a pump house.
- Internal irrigation water reticulation – varying diameters of between ø60mm and ø160mm
- Electrical infrastructure (transformers and underground powerline).

Map 2.2 below indicated the preferred development footprint, including orchards and associated infrastructure.



Map 2.2: The preferred development footprint, indicating the proposed orchard area on Sontule (RE/632) as well as associated infrastructure, including the irrigation water transfer pipe and the proposed dam. The proposed development phases are also indicated by the white numbers.

Photo 2.1: Farm buildings (sheds) and temporary storage area at the Logistical Services Area.

No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support (Photo 2.1).

During spraying season, chemicals are purchased, delivered and utilised on a needs basis and thus, will be temporarily stored on site. Chemicals required to be utilised on Sontule will be stored in existing infrastructure.

Plastic crates and wooden pallets required during harvesting seasons are proposed to be hired from an independent contractor and transported via truck to delivery and collection areas (laydown areas) at the logistical services area, from where it is transported via tractor-trailer to the orchards. Once full, the crates are transported to loading areas which are established at strategic points within the orchards. At the loading area the fruit is preliminarily sorted according to quality and placed in crates that will either be transported to the packhouse, for sorting and packaging, or the juicing factory (see Photo 2.2). The fruit is not stored in bulk on site and needs to be transported to the packhouses in as short a time as possible to prevent degradation of the product.

Photo 2.2: Example of a loading area where loaded crates are delivered via tractor-trailer and collected by trucks for delivery to the packhouse or the juicing factory.

The now, empty plastic crates and wooden pallets are returned to the designated loading areas within the orchards, to be refilled with fruit. At the end of the harvest season the crates and pallets that have been hired are returned. Thus, no additional storage areas are required for wooden pallets and plastic crates. The applicant utilises their own packhouse for the processing and export of its product. Fruit is transported using their own vehicles which are stored in existing sheds / warehouses on Sontule. Based on market conditions, as well as fruit quality, the fruit produced as a result of the proposed agricultural expansion will be sold as fresh fruit to local and international markets (export) or processed at a local juicing factory.

During harvesting season, portable toilets are placed within the orchards to provide sanitation facilities for workers. The structures / infrastructure described above (i.e., laydown areas, portable toilets, pallets, crates) are required to facilitate the effective function of the farm.

The proposed agricultural development on Sontule can be divided into the following phases, which are outlined in more detail in the sections below:

- Pre-construction;
- Construction; and
- Operational

At this stage of the assessment process decommissioning is not proposed and would be subject to the regulations applicable at the time.

2.2.1 Preconstruction

The fruit proposed to be produced on site is predominantly for international markets, with some of the fruit to be processed (juiced) or sold to local markets. In order to meet the requirements of export stock, seed (the foundation block seed) is required to be booked and purchased from a certified agency, the Citrus Foundation. This is booked approximately two years in advance in order to secure the seed, which includes a financial deposit.

The seed is provided to a certified nursery for a two year grow-out period, during which the seeds are germinated and the seedlings grown to sapling stage. Thereafter, saplings must be planted annually between September and March. Thus, site preparation (outlined in the section below) needs to be complete prior to the planting of the saplings. Meticulous coordination is required between the Citrus Foundation for the purchase of the seed, the nursery for grow-out, and the citrus producer, in order to meet contractual obligations for harvesting and export of the crop. This is an on-going process, which is carefully timed and coordinated to allow the development of the site to take place seamlessly over the development timeframe proposed by the applicant.

The preconstruction phase for securing the foundation block seed and growing of the saplings occurs prior to, and in parallel with, the environmental assessment process and site preparation which is outlined below.

2.2.2 Construction

The project will entail the clearing of vegetation, levelling of the site, construction of laydown areas, and the installation of the drip irrigation system, as well as the establishment of the bulk irrigation infrastructure (i.e., water transfer pipeline, dam), prior to the planting of the saplings. Once the site is prepared, citrus orchards will be established (refer to the operational phase of the development). It is anticipated that vegetation clearing, landscaping, site preparation and planting will be done both by hand and with the aid of suitable earth moving equipment (excavators, bulldozers, TLBs). No workers' accommodation will be provided on site during the construction phase.

Site preparation will entail the following activities on site:

- Clearing of indigenous vegetation;
- Landscaping and levelling the site for citrus orchards, as well as to provide runoff control and stormwater management;
- Establishment of internal unpaved service roads and laydown / loading areas;
- Construction of the new irrigation water storage dam and associated pump house
- Installation of new 500kVA ESKOM transformer as well as two new 75kVA step up / step down transformers (one at each dam)
- Installation of irrigation water transfer pipe (ø315mm) between the existing dam and the new dam;

- Installation of internal water reticulation (ø60mm – ø160mm);
- Planting of orchards;
- Erection of nets (shade cloth).

Site preparation takes approximately a year to complete (dependant on the size of the site) but must be completed to coincide with the planting season, which occurs annually between September and March.

2.2.2.1 Vegetation Clearing and Landscaping

Based on the outcome of the detailed specialist assessments, technical input and consultation process, it is proposed to clear an area of ~147ha in order to facilitate the establishment of ~127ha of citrus orchards and associated infrastructure (~17ha) as well as the proposed new dam (~3.7ha).

Given that an area of ~137ha has been transformed on the farm for orchards and associated infrastructure (~133ha), as well as an airstrip with hangars (~4ha), and an additional area of ~147ha is proposed to be cleared, it is anticipated that an area measuring ~175ha will remain untransformed within the No-Go areas on Sontule. This represents ~38% of the original extent of the natural vegetation (Sundays Thicket) that will be retained on the farm, which exceeds the assigned conservation target for Sundays Thicket, of 19%.

Vegetation clearing will commence with the aid of both mechanised plant/ earth-moving equipment and by hand. Once vegetation has been removed from the development footprint, the area will be landscaped to provide for the establishment of unpaved internal service roads, access roads, irrigation infrastructure and laydown areas, as well as the orchards; and to facilitate stormwater management.

Portions of the area under assessment have been excluded from development due to certain constraints. Chapter Five of this report outlines the assessment of alternatives and provides more detail on the methodology adopted for the identification of the preferred area proposed for development, which has been assessed in full in the EIA phase of the assessment.

2.2.2.2 Internal Roads and Access

Access to the farm is proposed off the R336 (MR00471). An existing access point is proposed to be utilised to access the proposed development.

According to the Traffic Specialist Assessment the access point is positioned such that sight distances are in excess of the prescribed minimum requirements. A total of 604 trips per picking season (302 in and 302 out) equating to 6 per day generated at full development will have minimal impact on the operational capacity of the adjacent road network should regular maintenance be conducted.

Photo 2.3: Example of internal service roads on an existing citrus farm in the Sundays River Valley.

Integral to the internal operations within the proposed orchards are a number of new internal service roads (See Photo 2.2). These internal service roads are anticipated to be between 4 and 9

metres in width. It is anticipated the main internal roads will be provided with a gravel wearing course, while the vehicle tracks amongst the individual orchards will remain unpaved. All internal roads will be designed and constructed to accommodate stormwater runoff, e.g. avoid steep gradients, stormwater cut-off/ diversion berms, and judicious use of erosion protection measures.

2.2.2.3 Dam Construction and Installation of Irrigation Infrastructure

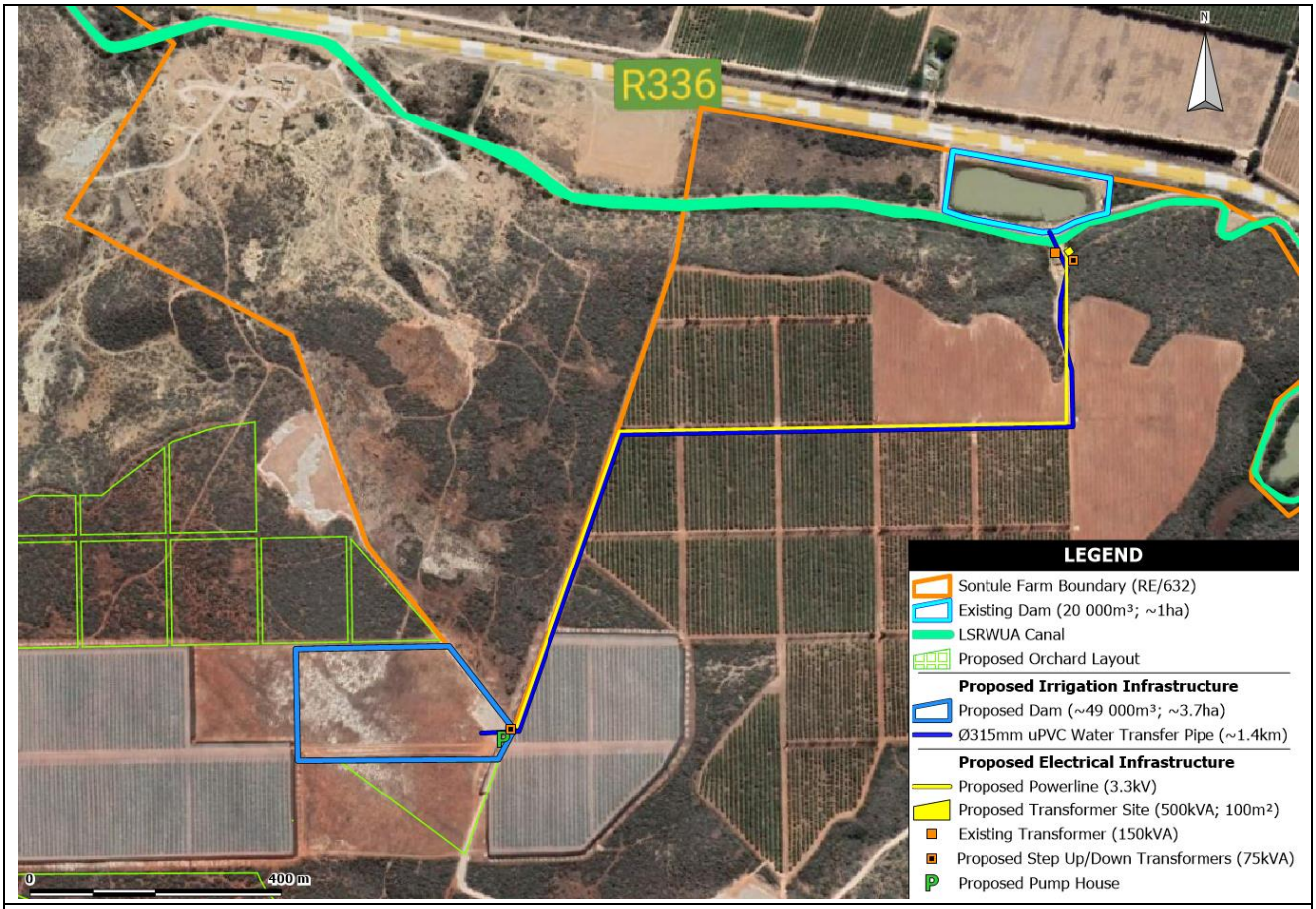
The proposed orchards will be irrigated with water from the LSRWUA supply system. Irrigation water is extracted from the canal, under agreement with the LSRWUA. Individual farmers are permitted to extract water from the canal only at certain allocated pumping/ release times according to a predetermined schedule. Between the allocated pumping/ release times, the holder of water entitlements does not have access to the canal water. Therefore, since water is not continually available from the canal, the orchards cannot be irrigated directly from the canal and irrigation water is required to be stored in farm dams (balancing dams). More detail regarding applicant's water use entitlements is outlined below in the Operational Phase under section 2.2.3.2.

The LSRWUA canal is located along the northern boundary of Sontule. The irrigation water required for the proposed agricultural development is currently pumped from the canal, into an existing balancing dam (20 000m³; ~1ha) located on the northern side of the canal (see map 2.3 and photo 2.4). It is proposed that water will be pumped from this dam, via a Ø315mm uPVC transfer pipe, over a distance of ~1,4 km, up to the proposed new dam which will have a storage capacity of ~49 000m³ (~3.7ha footprint) and a ~5 metre high wall. The dam and associated pumphouse is proposed to be constructed in a portion of the farm that was previously cleared for orchards, in terms of the existing Environmental Authorisation, but that had not been planted (see photo 2.5). The water transfer pipeline is proposed to be installed along existing fencelines and vehicle tracks within, and adjacent to existing orchards. Therefore, no additional intact indigenous vegetation is anticipated to be cleared in order to accommodate the proposed dam and Ø315mm uPVC transfer pipe.

Photo 2.4: Existing dam on Sontule, located between the northern boundary and the LSRWUA canal.

Photo 2.5: Proposed new dam site. (Photo courtesy of Jamie Pote – Terrestrial Biodiversity Specialist)

Refer to map 2.3 below for the proposed location of the new dam, the proposed pipeline route and the associated electrical infrastructure.



Map 2.3: Proposed dam footprint and Ø315mm irrigation water transfer pipe route as well as proposed electrical infrastructure.

Water will be pumped from the proposed new dam to the respective new orchard blocks via Ø315mm and Ø250mm pipes and reticulated within the orchards via a network of underground pvc irrigation pipes and valves, with internal diameters varying between Ø 60mm - Ø 160mm.

The applicant proposes to utilise drip irrigation as the preferred method of water delivery to the trees within the orchards.

2.2.2.4 Windbreaks / Shade Nets

It is the applicant's intention to utilise nets (shade cloth) to perform the function of windbreaks, as part of the proposed agricultural development. The most commonly desired effects from shade netting are reduced light intensity and wind speed, as well as buffering of temperature extremes and increasing relative humidity (Wachsmann *et al*., 2014)[2], thereby maximizing water use and ultimately increased fruit production. Consideration has been given to utilising green shade cloth, which may better blend into the landscape, however the darker colour results in a change to the micro-climate for the growing of citrus (compared to the lighter / white shade cloth). In experiments on 'Orri' mandarin trees, various colours of shade net were tested including red (25%), yellow (24%), white (18%) and transparent (13%) shade nets. Trees under 18% white nets consistently performed better. Trees under dark nets (red and yellow) exhibited increased vegetative growth and reduced yield, while water consumption under dark nets was somewhat higher than under

[2] Wachsmann, Y., N. Zur, Y. Shahak, K. Ratner, Y. Giler, L. Schlizerman, A. Sadka, S. Cohen, V. Garbinshikof, B. Giladi and M. Faintzak. 2014. *Photoselective anti-hail netting for improved citrus productivity and quality*. Acta Hort. 1015: 169-176.

bright ones (white and transparent) (Wachsmann *et al*., 2014).[3] It can be assumed that green nets which are also dark will have a similar effect. The use of darker nets thus defeats the purpose of achieving a production increase at substantial capital cost and is therefore not considered feasible.

If the fruit produced is not proposed for export as whole fruit, but rather, is sent for processing (juicing / oil extraction), the applicant has indicated that it would not be necessary to utilise the shade netting over the proposed orchards.

2.2.2.5 Electrical Infrastructure

The existing ESKOM point at the existing dam (150kVA) is required to be replaced by a 500kVA point. In addition, a step-up transformer (75kVA) will be required to be installed at this point. It is anticipated that a new pump station and a step-down transformer (75kVA) will be required at the new (top) dam (see map 2.3 above). The 500kVA transformer will either be pole-mounted, requiring the erection of 5 creosote poles, or ground-mounted, on a concrete slab. A cable (3.3kV), to be placed in the same trench as the pipeline, is required to be installed between the two transformers. The required electrical infrastructure is predominantly proposed to be installed within areas that have already been transformed (along fencelines and vehicle tracks). However, the new 500kVA transformer is proposed to be located within degraded thicket vegetation and will require the clearance of ~100m². Application has been made to ESKOM for the proposed electrical infrastructure and written confirmation of capacity has been received from Eskom and is included in Appendix G. Eskom representatives in the distribution division will be consulted with regards to any internal distribution lines that may be affected by the project prior to project commencement.

2.2.3 Operational

Once the site is suitably prepared, the area will be utilised for the establishment of citrus orchards for predominantly international markets, with some fruit being sent for processing (juicing) or sold to local markets.

Equipment required for the new operations will be stored in existing sheds / warehouses on Sontule. The following operational phase activities are associated with the project:

- Water for the development will be supplied from the LSRWUA canals which will be reticulated from the existing balancing dam to the new proposed balancing dam and then into the orchards.
- It is anticipated that a number of additional seasonal and permanent employment opportunities will be created by the project.

2.2.3.1 Orchard Establishment

The final size, layout and configuration of the orchards has been determined based on the following:

- Soil Suitability Assessment by a recognised soil specialist;
- Irrigation infrastructure and efficiency requirements to provide drip irrigation;
- Technical requirements (runoff and stormwater management, accessibility, slope); and
- Biophysical constraints (e.g. sensitive areas, Species of Special Concern, maintenance of ecological corridors, biodiversity target areas);

[3] Wachsmann, Y., N. Zur, Y. Shahak, K. Ratner, Y. Giler, L. Schlizerman, A. Sadka, S. Cohen, V. Garbinshikof, B. Giladi And M. Faintzak. 2014. *Photoselective anti-hail netting for improved citrus productivity and quality*. Acta Hort. 1015: 169-176.

2.2.3.2 Water Use Entitlements and Availability

Water for the proposed agricultural expansion will be provided by the LSRWUA supply system from existing water entitlements of 130ha (1 170 000 m³) assigned to the Remainder of Farm 632 (Sontule). Water entitlements from the LSRWUA provide for 900mm/ha/yr (9000m³/ha/yr). The drip irrigation water delivery system which will be used in the orchards will use ~600mm/ha/yr (6000m³/ha/yr). Therefore, in order to irrigate the additional 127ha of orchards, approximately 762 000m³ of water would be required per annum (85ha of water rights). The applicant has approximately 96ha (864 848m³) of spare water rights assigned to the farm, which are not currently in use. Therefore, the applicant has sufficient spare water rights to irrigate the additional proposed orchards on Sontule. See confirmation of water rights attached in Appendix G.

2.3 CAPITAL INVESTMENT AND EMPLOYMENT GENERATION

The anticipated capital investment of the agricultural expansion, upon completion of the construction phase, will be approximately R25 million. It is estimated that the construction phase of the development will create approximately 55 new employment opportunities at a value of R1.2 million.

Upon completion of construction and during the operational phase of the development, it is estimated that 12 new skilled and 85 unskilled employment opportunities will be created at a value of ~R3 million per annum. Labour will be sourced locally from communities predominantly in the SRVM and if required, the Nelson Mandela Bay Municipality (NMBM).

In addition to the direct employment opportunities that are created as part of the farming operations, a number of indirect jobs will also be created by the proposed development particularly within the packaging and logistics industries, amongst others.

2.4 PROJECT SCHEDULE

The following table provides a preliminary overview of the proposed project schedule and an indication of the anticipated approvals process. Should Environmental Authorisation be positive, it is estimated that the project construction phase will take place over a period of 4 years (48 months).

Table 2.2: Proposed project schedule.

PHASES	ACTIVITY	TIMEFRAME
PRE-CONSTRUCTION PERIOD		
Detailed Planning and Design Phase	• Prepare final layouts • Relevant permit & licence applications • Pre-Construction Audit	Completed within 12 months from date of Environmental Authorisation
CONSTRUCTION PERIOD		
PHASES	**ACTIVITY**	**TIMEFRAME**
1	• Clearance of ~73ha of vegetation and site preparation • Construction of new dam • Installation of irrigation pipelines • Planting of ~61ha orchards • Installation of nets	Completed within 12 months of Pre-Construction Period

2	• Clearance of ~30ha of vegetation and site preparation • Installation of irrigation pipelines • Planting of ~26ha orchards • Installation of nets	Completed within 12 months of Phase 1
3	• Clearance of ~45ha of vegetation and site preparation • Installation of irrigation pipelines • Planting of ~40ha orchards • Installation of nets	Completed within 12 months of Phase 2
OPERATIONAL PERIOD		
PHASES	**ACTIVITY**	**TIMEFRAME**
Farming Phase	• Commence with Farming Activities (orchard operation and harvesting)	Commence upon completion of orchard establishment

2.5 CONCLUDING REMARKS

Alternatives and the assessment thereof are outlined in Chapter Five of this report. The specialist reports forming part of the EIA phase of the assessment, which have informed the preferred development footprint within the site are included in Chapters Six to Twelve of this report. Potential impacts associated with the proposed agricultural development and associated infrastructure are included in the respective specialist studies and the proposed mitigation measures have been incorporated in the draft EMPr.

CHAPTER THREE: DESCRIPTION OF THE AFFECTED ENVIRONMENT AND SITE SENSITIVITY VERIFICATION

3.1 INTRODUCTION

This section of the report provides baseline information regarding the affected environment, as well as an overview of the surrounding land use activities. An overview of the associated environmental attributes of the site has been included to aid in the process of identifying project activities that may have potential impacts on the environment, and which may require further assessment in the Environmental Impact Assessment (EIA) phase. Additionally, this information highlights potential constraints which the affected environment may place on the proposed development. In compliance with the requirements for a Scoping Report in terms of the NEMA EIA Regulations, 2014 (as amended), as contained in GN R326 Appendix 2.2 (1)(g)(iv), the following environmental attributes have been considered in line with the accepted Scoping Report:

- Geographical Context: Site Locality and Surrounding Land-use
- Biological
- Physical
- Heritage and Cultural
- Socio-economic: Social and Economic

The respective environmental attributes have, amongst others, informed the identification of alternatives for the proposed development. The assessment of alternatives is contained in Chapter Five of this report.

Regulation 16 (3) (a) of GN R326 indicates that any report submitted as part of an application must "*comply with any protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice*". As such, several assessment protocols and minimum report content requirement guidelines have been gazetted by the Minister which inform the information that is to be contained in the specialists' assessments that form part of the EIA Report.

Regulation 16 (3) (c) requires that a report submitted as part of an application must "*take into account any applicable government policies and plans, guidelines, environmental management instruments and other decision-making instruments that have been adopted by the competent authority…*". The National Web-based Environmental Screening Tool (screening tool) is one of the environmental management instruments that are utilized in determining the environmental sensitivity of the site as well as which potential specialist studies should be included in the assessment process.

In terms of the aforementioned assessment protocols, prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the screening tool must be confirmed by undertaking a **site sensitivity verification.**

In order to verify the site sensitivities identified by the screening tool, on Sontule, the following minimum content requirements have been included in this Chapter:

1. A desktop analysis utilising the following resources:
    - Plans
    - Guidelines
    - Spatial Tools and Mapping Resources

- Municipal Development Planning Frameworks and Instruments
- Relevant literature and Web-based Information
- DFFE's National Web-based Environmental Screening Tool and Assessment Protocols

2. A preliminary on-site inspection took place on the 22 August 2019 and photographic evidence of the current land use and environmental sensitivities was collected.
3. The information gathered from site observations was also supplemented by preliminary specialist input.
4. A compliance audit was undertaken over the farm RE/632 to determine compliance with the existing Environmental Authorisations (EC06/2d/96-01 and EC06/1j/95-01) which also informed the determination of the respective site sensitivities.
5. In addition, the description of the affected environment has been informed by the Environmental Assessment Practitioner's (EAPs) knowledge of the local area, based on several previous environmental assessments of a similar nature which have been undertaken in the Nelson Mandela Bay Municipality (NMBM) and Sundays River Valley Municipality (SRVM), namely:

    - Agricultural Development of the Remainder of Portion 7 of the Farm Scheepers Vlakte No. 98, SRVM.
    - Ikamva Lethu Agricultural Development on the Remainder of Farm 653, Sunland, SRVM
    - Umgcambo Citrus & Associated Pipeline, Portion 525 & 523 of farm Strathsomers Estate No. 42, SRVM
    - New agricultural developments for Habata Boerdery on the following farms:
        - Landdrost Veeplaats, SRVM
        - Oliphantskop, NMBM
        - Portion 18 and 19 Logan Braes, NMBM
        - Portion 16 and 17 Logan Braes, NMBM
        - Portion 15 Logan Braes, NMBM
        - Falcon Ridge, SRVM
    - New agricultural developments for San Miguel Fruits SA (Pty) Ltd:
        - Riverbend Citrus, SRVM
        - Intsomi Citrus, SRVM
        - Sylvania Citrus, SRVM
    - Agricultural developments/expansion for Venter Boerdery on the following farms:
        - Tango Citrus, Portion 11 of Farm Kremlin No 100, SRVM
        - Middledrift Poultry Breeder Facility, Portion 6, 10 & 40 of Farm T'Zoetgeneugd No. 192, SRVM
        - Dam expansion on Farm 682, Kuduskloof, SRVM
        - Hopefield Citrus Farm 713, SRVM
        - Disco Chicks 1 Poultry Broiler Facility on Farm 690, SRVM
        - Disco Chicks 2 Poultry Broiler Facility on Farm 719 Hopefield, SRVM
    - Agricultural expansion for Unifrutti South Africa (Pty) Ltd on Portion 14 of Farm 89, SRVM
    - Agricultural development for Kududu Trust on Portion 5 of Nooitdgedacht, SRVM
    - Agricultural development for Hermanus Potgieter Familie Trust on Swanepoels Kraal, SRVM
    - Agricultural development for Luthando Farm on Portion 320 of Strathsomers Estate No. 42, SRVM

The outcome of the Site Sensitivity Verification informed the content of the specialists' assessments that form part of this EIA Report and was contained in the Final Scoping Report, which has been approved by DEDEAT.

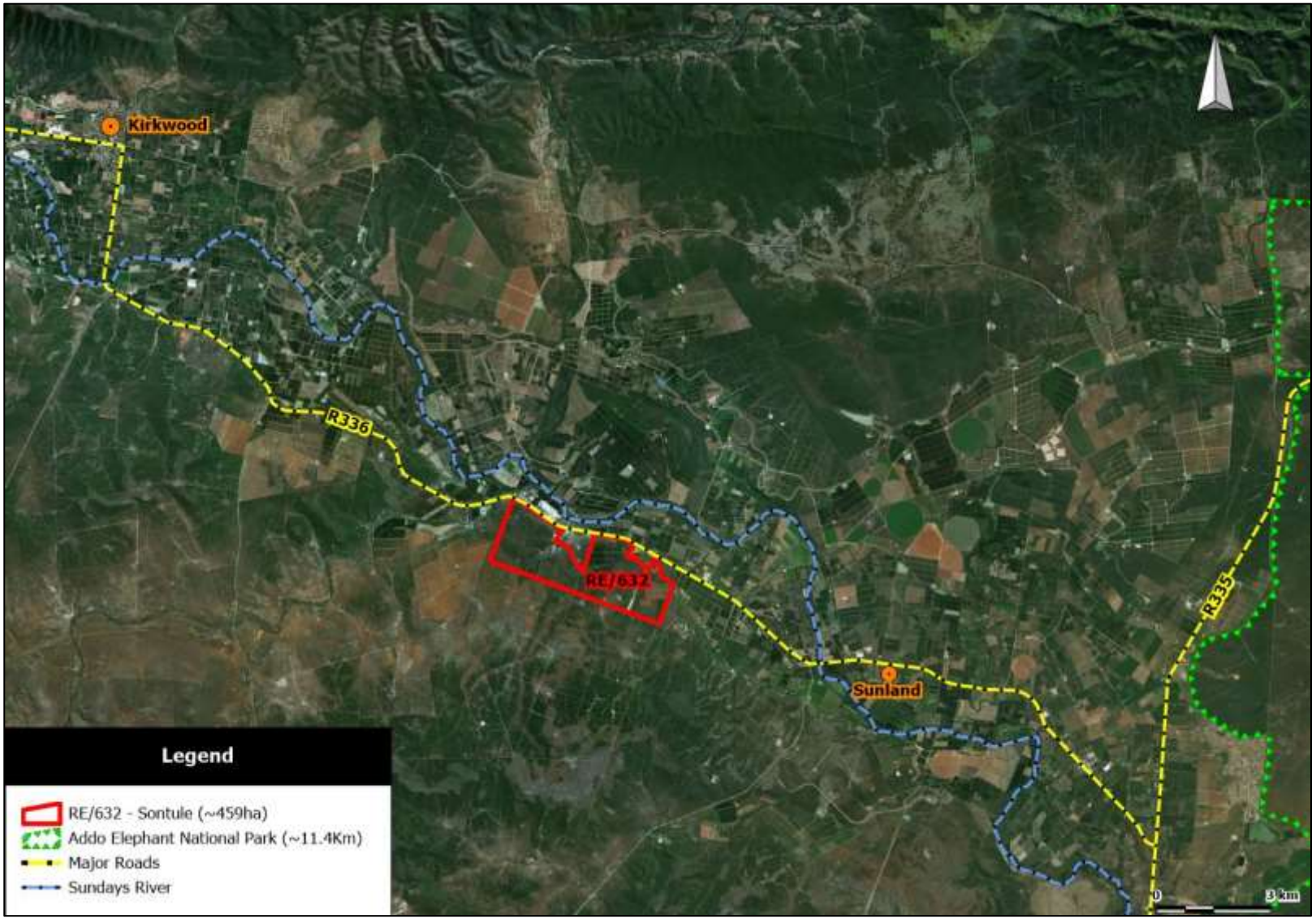
Based on the outcome of the assessment process, specialist studies, technical input and consultation process, the applicant, Sun Orange Farms (Pty) Ltd, proposes to expand their existing agricultural operations, by clearing ~147ha of vegetation on the Remainder of Farm 632, hereafter referred to as Sontule for the establishment of citrus orchards and associated infrastructure (irrigation infrastructure and internal roads). In order to provide the necessary irrigation water for the proposed expansion, it is proposed that a new off-stream dam, with a storage capacity of ~49 000m³, will be constructed on the farm. Water will be conveyed from an existing dam (~20 000m³) to the proposed dam via a uPVC with an internal diameter of 315mm. The size of the proposed dam is estimated to be ~37 000m² (3.7ha) and will have a dam wall height of 5 metres. Irrigation water will be relayed to the trees via internal irrigation pipelines of various diameters.

The area to be cultivated, including associated infrastructure, has been determined by the outcome of the various specialist assessments and public participation forming part of this Scoping and EIA process. A detailed project description is provided in Chapter Two of this report.

3.2 GEOGRAPHICAL CONTEXT

3.2.1 Site Locality and Overview

The farm Sontule is located ~5 km north-west of Sunland and ~11 km south-east of Kirkwood (as the crow flies), in the SRVM. The farm can be directly accessed via an entrance off the R336. The nearest boundary of the Addo Elephant National Park is located ~11.4 km east of the farm. The locality map attached provides an overview of the location of the proposed agricultural development (See Map 3.1).



Map 3.1: Locality Map of Remainder of Farm No. 632 (Sontule)

3.2.2 Surrounding Land-use

Sontule is adjacent to eleven properties (See Map 3.2). These properties, with their associated activities, are listed in Table 3.1 below. The R336 abuts much of the northern boundary of Sontule. The Unifrutti Packhouse is located on the northern side of the road, along with citrus orchards, formal and informal housing and temporary housing (workers' hostel). The Dunbrody Farm School is also located on this farm portion. The Sundays River flows ~250m north of the road, at its nearest point, with some natural vegetation remnants present along its banks. The LSRWUA canal runs adjacent to the R336, on the southern side of the road. The vegetation of the farm portion located adjacent to the northern boundary of Sontule, south of the R336, is predominantly degraded, with a portion having been modified for workers' housing. The properties located to the north-east, east, north-west and west have been transformed for agriculture. A portion of the farm located immediately west of Sontule seems to be in a near natural state, however the majority of the farm is under cultivation. The vegetation on the properties to the south of Sontule appears to be largely intact near-natural, although some modification such as cut lines, shooting range and vehicle tracks is evident. The vegetation on the property to the south-east appears severely degraded, possibly as a result of overgrazing. The farm located east of Sontule is primarily used for agriculture including orchards, and several enclosures for various animals (e.g., Horses, birds, grysbok).

The focus of this EIA is on the potential of the site for the planting of citrus orchards, as well as areas for conservation, guided by technical and biophysical constraints determined through relevant specialist studies.

Table 3.1: Activities on the properties surrounding and adjacent to the area under assessment.

Farm Number	Activities	Boundary
RE/658	Citrus Orchards; Untransformed Riparian Vegetation, Dunbrody Farm School; Hostel and Formal Housing	North
1/658	Unifrutti Packhouse	North
3/89	Informal Settlement and Railway line	North-west
4/89	Informal Settlement and Railway line	North-west
2/658	Settlement, Graveyards, Transformed Vegetation, Intact vegetation and LSRWUA canal.	North
710	Balancing Dams, Intact Riparian Vegetation, Worker Housing and Citrus Orchards	North-West
2/683	Citrus Orchards, Balancing Farm Dams, Intact Vegetation and Quarry	West
4/632	Intact vegetation, Game grazing, Shooting Range and Orchards	South
83/558	Intact vegetation, Transformed Vegetation Citrus Orchards, Animal enclosures and Farm Dams	South-East
59/588	Citrus Orchards, degraded vegetation and LSRWUA Canal	East
60/558	Citrus Orchards and LSRWUA Canal	North-east

Map 3.2: Properties (orange outline) surrounding and adjacent to Sontule (red).

3.3 ENVIRONMENTAL ATTRIBUTES

3.3.1 Biological

The vegetation expected to occur at the site as well as the anticipated aquatic resources are noted in a number of conservation planning frameworks relevant to the area. The resolution of the planning framework mapping is limited to a landscape level and the terrestrial and aquatic characteristics on individual farms is subject to confirmation by a terrestrial and aquatic biodiversity specialist. The section below outlines the findings of the desktop review of the relevant National and Regional conservation planning frameworks and mapping resources applicable to the area, as well as the site sensitivities identified by the screening tool, which are subject to confirmation by the relevant specialists.

3.3.1.1 Aquatic Environment

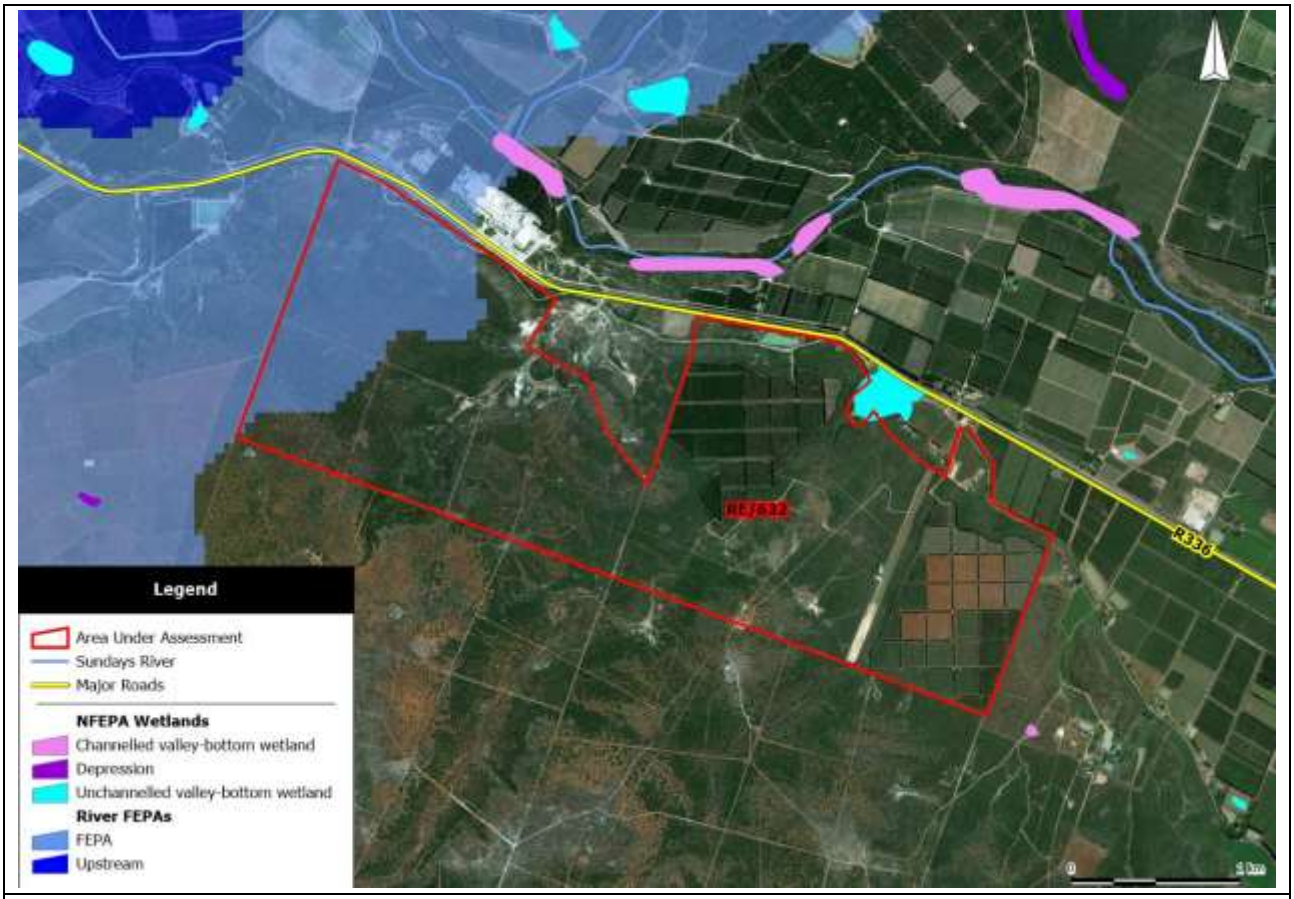
National Context

- National Freshwater Ecosystem Priority Areas (NFEPA; Net *et al*. 2011):

The NFEPA project is a systematic biodiversity planning framework which aims to identify FEPAs to meet national biodiversity goals for freshwater ecosystems, within the context of equitable socio-economic development. Additionally, the project aims to enable the effective implementation measures to ensure the protection of FEPAs, which includes free-flowing rivers.

In terms of the NFEPA mapping resources, the farm predominantly falls within a sub-quaternary catchment associated with a reach of the Sundays River that has not been classified according to NFEPA. A small section of the north-western portion of the site falls within a sub-quaternary catchment of a **FEPA** River (Map 3.3). No land use recommendation is provided in terms of NFEPA for the sub-quaternary catchments falling within the reaches that have not been classified according to NFEPA.

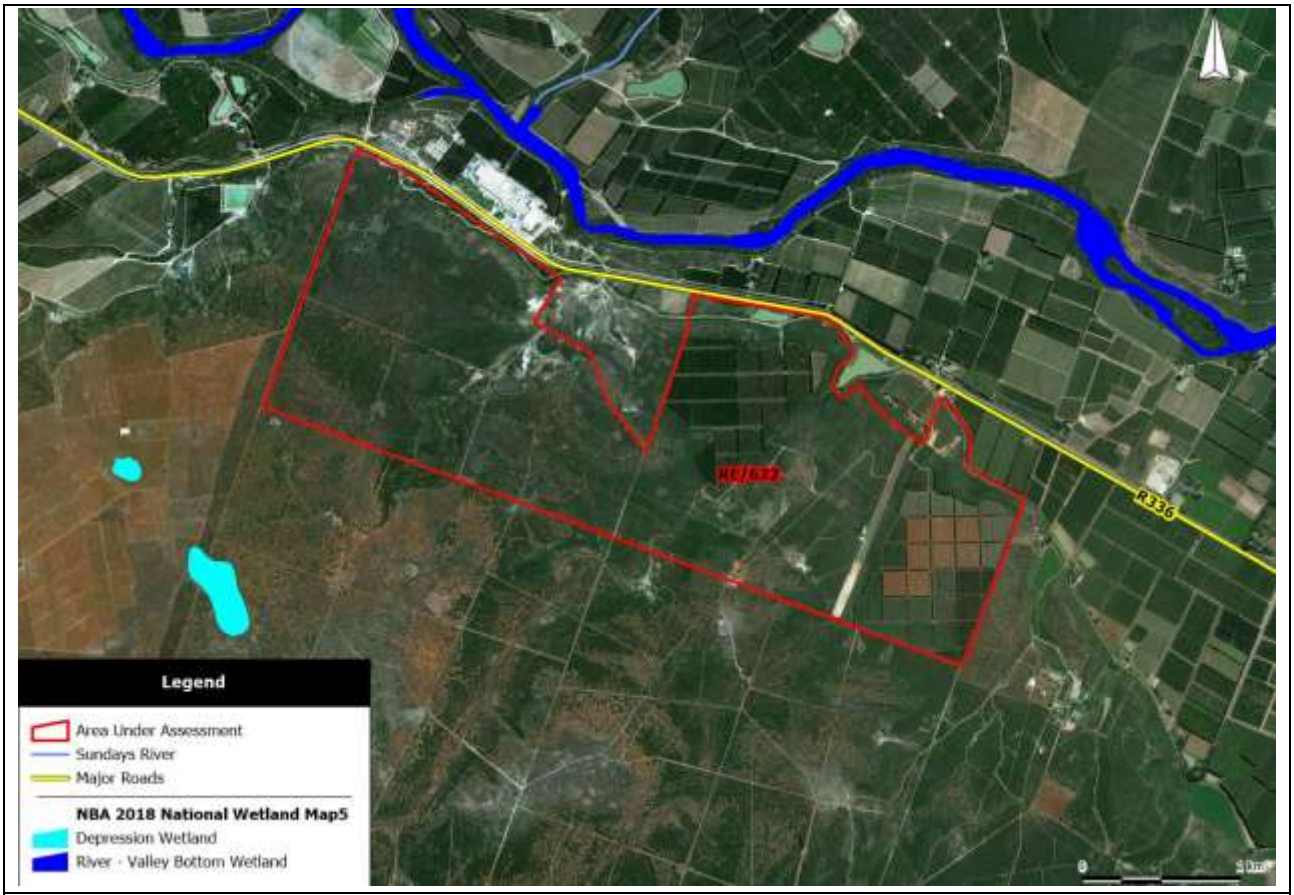
In terms of NFEPA wetlands, three Channelled Valley-bottom wetlands have been identified within 500m of the northern boundary as well as one near the south-eastern boundary of the farm. An Unchanneled Valley-bottom wetland has been identified adjacent to the north-eastern boundary of the property (see Map 3.3).



Map 3.3: Sontule, as described by the National Freshwater Ecosystem Priority Areas (NFEPA) mapping resources.

- National Wetland Map 5 (National Biodiversity Assessment, 2018):

No natural wetlands occur within and immediately surrounding the majority of the site. According to the NBA (2018) one natural riverine wetland associated with the Sundays River occurs within 500m of the 315mm water transfer pipeline (which follows already transformed and existing development footprints). It is worth noting that this riverine wetland is in fact riparian in nature (see Map 3.4).



Map 3.4: Sontule, as described by the National Biodiversity Wetland (2018) mapping resources.

The presence of potential and existing wetlands, rivers and drainage lines within the area under assessment, and within 500m of the area under assessment as well as the impact of the proposed expansion has been confirmed and assessed by an aquatic specialist during the EIA phase of this assessment. Refer to Chapter Seven.

- Screening Tool Aquatic Biodiversity Theme:

The DFFE National Web-based Environmental Screening Tool has identified the site sensitivity, in terms of the aquatic biodiversity theme, as Very High. In Map 3.5 below (screening tool report extract) the north-western corner of the site is mapped as Very High sensitivity, while the remainder of the site is indicated as Low sensitivity. The high sensitivity rating is based on the sub-quaternary catchment associated with a FEPA River (as indicated in Map 3.3 above).

Map 3.5: Aquatic biodiversity theme sensitivity mapping according to the screening tool.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Freshwater ecosystem priority area quinary catchments

The aquatic biodiversity specialist has confirmed the sensitivity of the site and the preferred development footprint has been located within areas that have been confirmed to be of Low sensitivity (see Chapter Seven).

Regional Context

- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019; Hawley *et al*):

The ECBCP is a broad scale biodiversity plan, utilized to map particularly Terrestrial or Aquatic Critical Biodiversity Areas (CBAs) for conservation in the Eastern Cape, as well as to assign appropriate land use categories and guidelines to the existing land. The ECBCP 2019 has been updated to include updated land cover data, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the Province that require integration.

It is important to note that, although the *Sundays River Valley Municipality Biodiversity Sector Plan* has been mapped at a finer scale, when determining the listed activities applicable to the proposed development, the ECBCP (2019), rather than the SRVM BSP is consulted, as stipulated by the competent authority.

In terms of the ECBCP 2019 mapping resources, a number of drainage lines have been identified across Sontule, which, with their associated buffers, have been identified as ESA1 (see Map 3.6). According to the ECBCP Handbook (2019), areas identified as ESA 1 should be in a functional state (semi-natural) such that ecological function and ecosystem services are maintained. Ecosystems that are in a natural/semi natural state should be maintained and those that are moderately degraded/ disturbed should be restored. Cultivation in ESA 1 areas are indicated as “not recommended”.

The importance of the aquatic resources on Sontule in maintaining CBAs and Ecological Processes, has been assessed by an aquatic biodiversity specialist during the EIA phase of this assessment (see Chapter Seven)

Map 3.6: Sontule, in terms of the ECBCP (2019) Aquatic CBA mapping resources.

3.3.1.2 Terrestrial Environment

National Context

- National Vegetation Map of South Africa, Lesotho and Swaziland (Mucina *et al*, 2018; VegMap) and National Biodiversity Assessment (NBA 2018):

The NBA aims to identify the threat status and protection levels for ecosystems, in order to map and classify various ecosystem types in South Africa. The most recent update to the NBA (2018) is based on the 2018 version of the VegMap Mapping resources.

The VegMap mapping resources show the predominant vegetation type on Sontule as Sundays Valley Thicket while a few small sections, adjacent to the northern boundary of the site, is mapped as Albany Alluvial Vegetation. Sundays Valley Thicket has an Ecosystem Status of *Least Concern* and Albany Alluvial Vegetation has an Ecosystem Status of *Endangered*. The former is listed as *Moderately Protected,* while the latter is listed as *Poorly Protected.* Sundays Valley Thicket has been assigned a conservation target of 19% of the historical extent and Albany Alluvial Vegetation has been assigned a conservation target of 31% of the historical extent (NBA, 2018) (see Map 3.7).

The presence and extent of the vegetation types on Sontule has been determined by a Terrestrial biodiversity specialist (see Chapter Six).

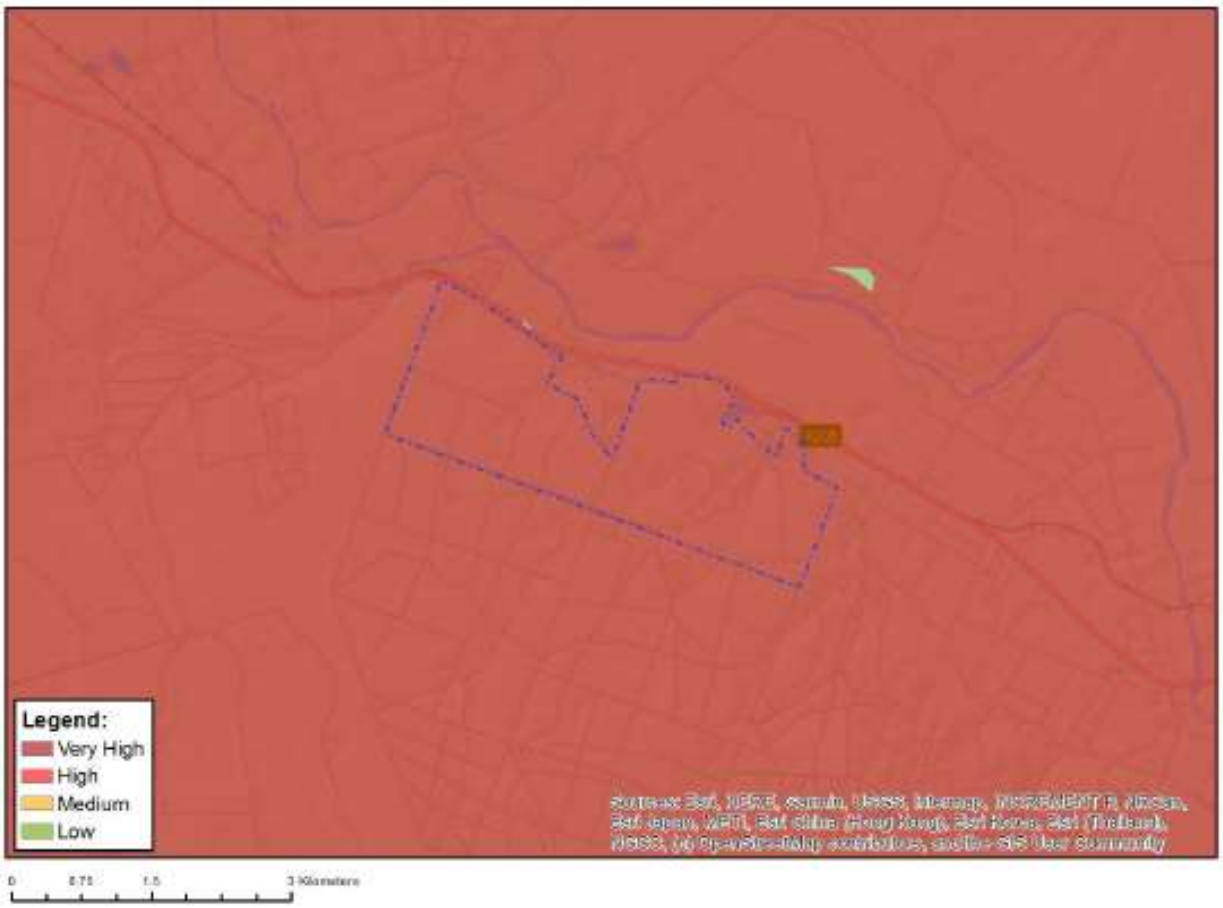
Map 3.7: Sontule, as mapped in the VegMap & NBA 2018 mapping resources, showing the vegetation types on site.

- Screening Tool Terrestrial Biodiversity Theme:

The DFFE National Web-based Environmental Screening Tool has identified the site sensitivity, in terms of the terrestrial biodiversity theme, as Very High. The entire site is indicated as Very High sensitivity (see map 3.8 below; screening tool report extract), due to the following characteristics having been identified by the screening tool:

  - Ecological Support Area 1
  - Ecological Support Area 2

- FEPA Sub-catchments
- Endangered Ecosystem



Map 3.8: Terrestrial biodiversity theme sensitivity mapping according to the screening tool.

The Terrestrial biodiversity specialist has confirmed the sensitivity of the site, and this has informed the preferred development footprint (see Chapter Six).

Regional Context

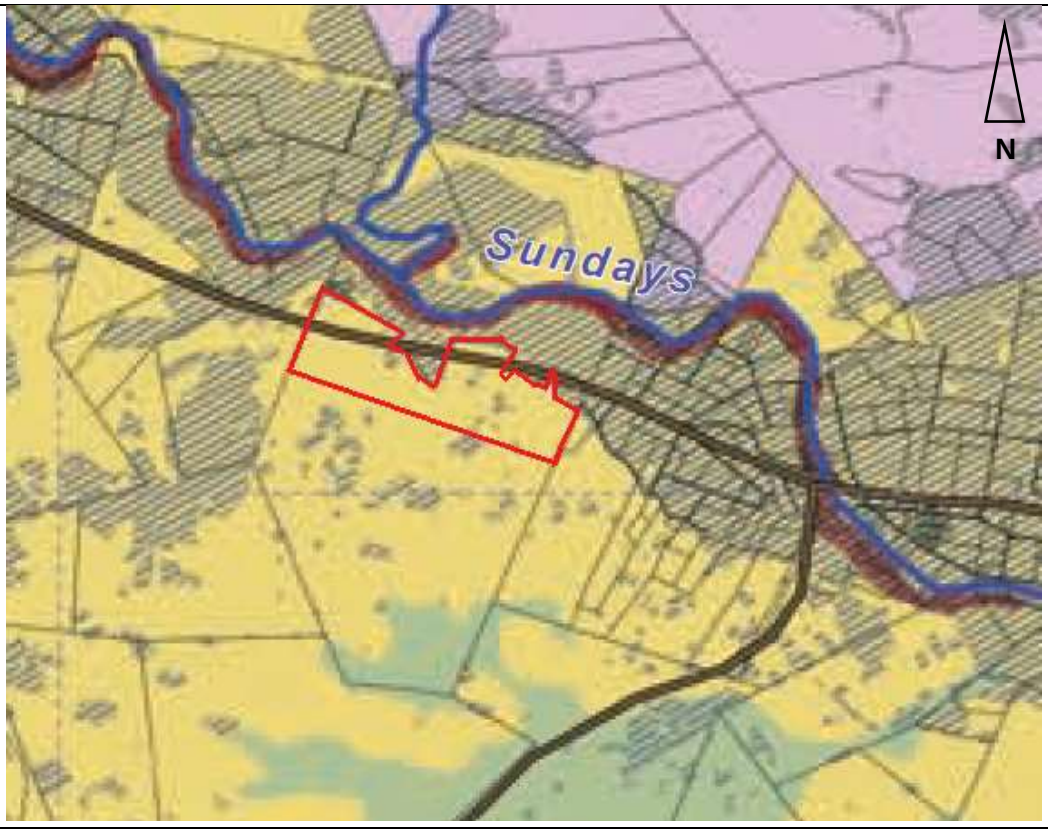
- Subtropical Thicket Ecosystem Programme (STEP; Pierce & Mader 2006):

The STEP mapping resources indicate that the vegetation on Sontule is predominantly Sundays Spekboom Thicket with a few small sections, adjacent to the northern boundary of the site, mapped as Sundays Doringveld (See Map 3.9). Sundays Spekboom Thicket and Sundays Doringveld are both currently listed as *Vulnerable* and the conservation targets are 18% and 17% respectively.

According to the STEP mapping resources, Sontule falls within a Vulnerable Ecosystem area (Yellow). The STEP Mapbook (2006), notes that vulnerable land can only withstand minimal loss of natural areas through disturbance and developments (see Map 3.10). Developments should preferably take place on areas that are disturbed and on land that is considered as least threatened rather than vulnerable land. It is worth noting that the STEP is superseded by the SRVM Biodiversity Sector Plan and the ECBCP, in terms of the identification of Critical Biodiversity Areas as these are more recent and at a finer scale.

The presence of the vegetation types on Sontule has been confirmed by a Terrestrial biodiversity specialist (see Chapter Six).

Map 3.9: Sontule, as mapped in the STEP mapping resources, showing the vegetation types on site.



Map 3.10: Sontule (red outline) is situated within a Vulnerable Ecosystem (yellow), as identified in the STEP mapping resources (Map is not to scale)

- Eastern Cape Biodiversity Conservation Plan (ECBCP 2019; Hawley *et al*)):

The ECBCP is a broad scale biodiversity plan, utilized to map particular Terrestrial or Aquatic Critical Biodiversity Areas (CBAs) for conservation in the Eastern Cape, as well as to assign appropriate land use categories and guidelines to the existing land. The ECBCP 2019 has been updated to include updated land cover data, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the Province that require integration.

It is important to note that, although the *Sundays River Valley Municipality Biodiversity Sector Plan* has been mapped at a finer scale, when determining the listed activities applicable to the proposed development, the ECBCP (2019), rather than the SRVM BSP is consulted, as stipulated by the competent authority.

The ECBCP (2019) mapping resources identify the majority of the farm as an ESA 1. A section toward the middle of the farm as well as a section to the east, which appear to correlate to the existing orchards on the farm, have been mapped as ESA 2. According to the ECBCP Handbook (2019), sites identified as Terrestrial ESA 1 should be maintained in a functional state, i.e. semi-natural state such that ecological function and ecosystem services are maintained. Ecosystems that are natural/ near natural should be maintained and those that are moderately degraded / disturbed should be restored. For areas identified as ESA 2, the land management objective is to maintain current land use with no intensification of activities. These areas have already been subjected to severe and/or irreversible modification. Both ESA 1 and ESA 2 are not required to meet biodiversity targets, although cultivation is indicated as “an appropriate land use activity” for ESA 2 and “restricted” for ESA 1.

The importance of the vegetation on Sontule in maintaining CBAs and Ecological Processes has been assessed by terrestrial and aquatic biodiversity specialists (see Chapters Six and Seven).

Map 3.11: Sontule, in terms of the ECBCP (2019) Terrestrial CBA mapping resources.

- Sundays River Valley Municipality Biodiversity Sector Plan (SRVM BSP; Vromans et al. 2012):

Of the nine local municipalities in the Sarah Baartman District Municipality, the Sundays River Valley Local Municipality is one of the four local municipalities for which Biodiversity Sector Plans have been developed. From a biodiversity perspective, these municipalities comprise 44.7% of South Africa's Albany Thicket Biome. Furthermore, approximately half of the Sundays River Valley Local Municipality occurs in the southwestern Albany-Pondoland-Maputoland Hotspot, a globally recognized hotspot (Mittermeier et al., 2004).

It is important to note that, although the *Sundays River Valley Municipality Biodiversity Sector Plan* has been mapped at a finer scale, when determining the listed activities applicable to the proposed development, the ECBCP, rather than the SRVM BSP is consulted, as stipulated by the competent authority.

In terms of the SRVM BSP CBA mapping resources, the majority of Sontule is mapped as an *Other Natural Area* (ONA). A north-western section as well as a section along the northern boundary of the farm is mapped as ESA. A small section in the north-western corner of the farm is mapped as a CBA, as well as several sections along the northern boundary. Two sections near the middle and eastern parts of the farm, which correlate with the existing orchards on the farm, have been identified as *No Natural Remaining (NNR).* (See Map 3.12. According to the SRVM BSP Handbook (2012), low impact agriculture, such as extensive agriculture, is "Restricted" in CBAs, and extensive agriculture in ESA should be managed to maintain ecological processes. Extensive agriculture is a favourable land management objective for ONA and NNR with sustainable management within rural land-use principles.

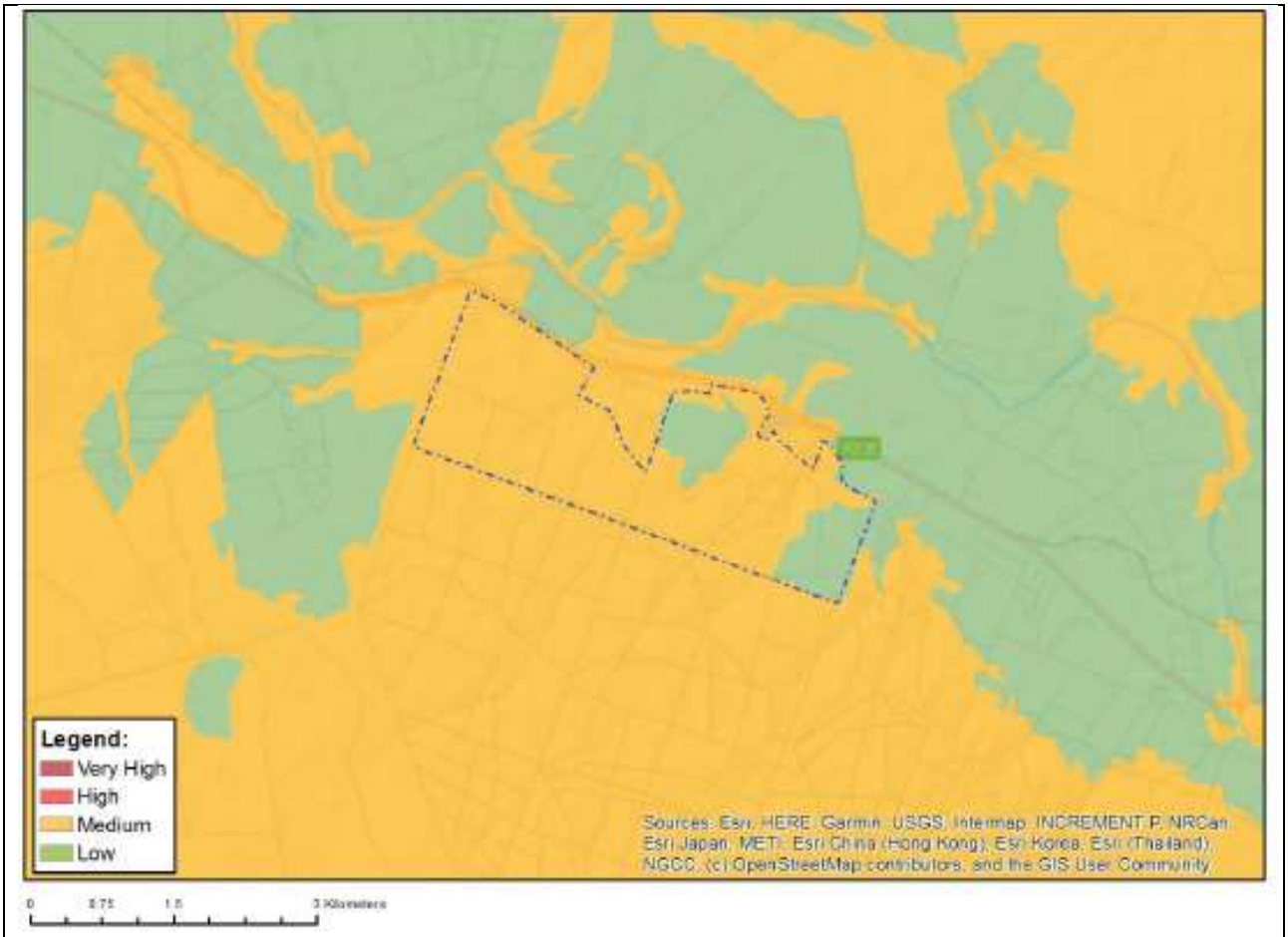
The importance of the vegetation on Sontule in maintaining CBAs has been assessed by a terrestrial biodiversity, as well as an aquatic biodiversity specialist (see Chapters Six and Seven).

Map 3.12: Sontule, as mapped in the SRVM Biodiversity Sector Plan CBA mapping resources.

3.3.1.3 Plant Species of Conservation Concern

Sundays Valley Thicket tends to have a relatively high flora diversity and is also quite uniform in terms of species composition relating to dominant and common species, with occasional individuals or clumps of less common species, including those listed as being of conservation concern.

The screening tool identified the site as being of Medium sensitivity. As indicated in map 3.13 below, the majority of the site is Medium sensitivity apart from the portions of the site which have been transformed for orchards, which are indicated as Low sensitivity.



Map 3.13: Plant species theme sensitivity mapping according to the screening tool.

Several Species of Conservation Concern are indicated as potentially being present within the site and broader area using several online databases[1] (Maputaland-Pondoland-Albany Hotspot study, SANParks metadata, 2010; National Environmental Screening Tool, 2021 and Plants of Southern Africa, 2021), as indicated in Table3.2 below.

Table 3.2: Potential Plant Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS[2, 3]
Asparagus spinescens	Asparagaceae	NEST (M), LC
Drimia elata	Hyacinthaceae	DDT
Duvalia pillansii	Apocynaceae	NEST (M), Rare
Justicia orchioides subsp. orchioides	Acanthaceae	NEST (M), VU [B1ab(i,ii,iii,iv,v)]
Ledebouria coriacea	Hyacinthaceae	CR [B1ab(i,ii,iii,iv,v) +2ab (i,ii,iii,iv,v)]
Selago zeyheri	Scrophulariaceae	NEST (M), VU

[1] Includes threatened species mapped by the Maputaland-Pondoland-Albany Hotspot study in 3325AD/BC (SANParks metadata, 2010), the National Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/#/pages/welcome) and the SANBI New Plants of South Africa website (http://newposa.sanbi.org/sanbi/Explore).

[2] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).

[3] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.

SCIENTIFIC NAME	FAMILY	STATUS[2, 3]
Sensitive species 1248[4]		NEST (M), VU
Sensitive species 1252		NEST (M), VU
Sensitive species 1268		NEST (M), EN
Sensitive species 19		NEST (M), VU

The terrestrial biodiversity specialist has confirmed that none of the sensitive species listed as per the National Screening Tool were found to be present within the affected area. Therefore, the Terrestrial Biodiversity Specialist Assessment Report forming part of this report (see Chapter Six) has included the minimum information requirements of a Terrestrial Plant Species Compliance Statement.

3.3.1.4 Site Observations

The site observations discussed below were informed by the following:

- A site visit undertaken by the EAP on the 22 August 2019
- Preliminary input from specialists

Vegetation on Site and Levels of Modification and Degradation

The farm is approximately 459ha in extent. A central and eastern section of the farm has been transformed for existing citrus orchards (~133ha). The terrestrial biodiversity specialist has confirmed that the vegetation within the proposed expansion footprint is predominantly Sundays Valley Thicket (Photo 3.1). No Albany Alluvial Vegetation was found to occur on site. The Sundays Valley Thicket appears to be relatively intact. Although there are some cutlines, vehicle tracks, and encroachment by *Opuntia ficus indica, O. aurantiaca* and *Cynodon dactylon*.

Sundays Valley Thicket comprises of dense shrubs, short trees and many succulents. Euphorbia species and Spekboom are common and a notable feature in the landscape. In areas surrounding drainage lines the vegetation becomes shorter than the surrounding uplands with smaller shrubs and grasses and a lower density. A higher proportion of Spekboom and a smaller proportion of woody species is indicative of increasing aridity. Sundays Valley Thicket has dominant succulent tree species including *Aloe Africana, Pappea capensis, Schotia afra,* tall shrubs including *Euclea undulata* and *Olea europaea* and succulent shrubs including *Portulacaria afra*.

[4] Some of these Species of Conservation Concern (SCCs) are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number.

Photo 3.1: An example of Sundays Valley Thicket vegetation in relatively good condition on the eastern section of the farm.

A new irrigation storage dam with a storage capacity of 49 000m³ is proposed to be constructed on a portion in a central section of the farm, in an area that was previously cleared, in terms of a previous Environmental Authorisation. The area that is proposed for the dam is irreversibly modified and encroachment by *Opuntia ficus indica* is evident in the area (see Photo 3.2).

Photo 3.2: The historically cleared area proposed for the construction of a New off-stream dam. An example of encroachment by Opuntia ficus-indica is visible in the foreground.

The Terrestrial Biodiversity specialist has confirmed that none of the sensitive plant species listed as per the National Screening Tool were found to be present on the site (see Chapter Six).

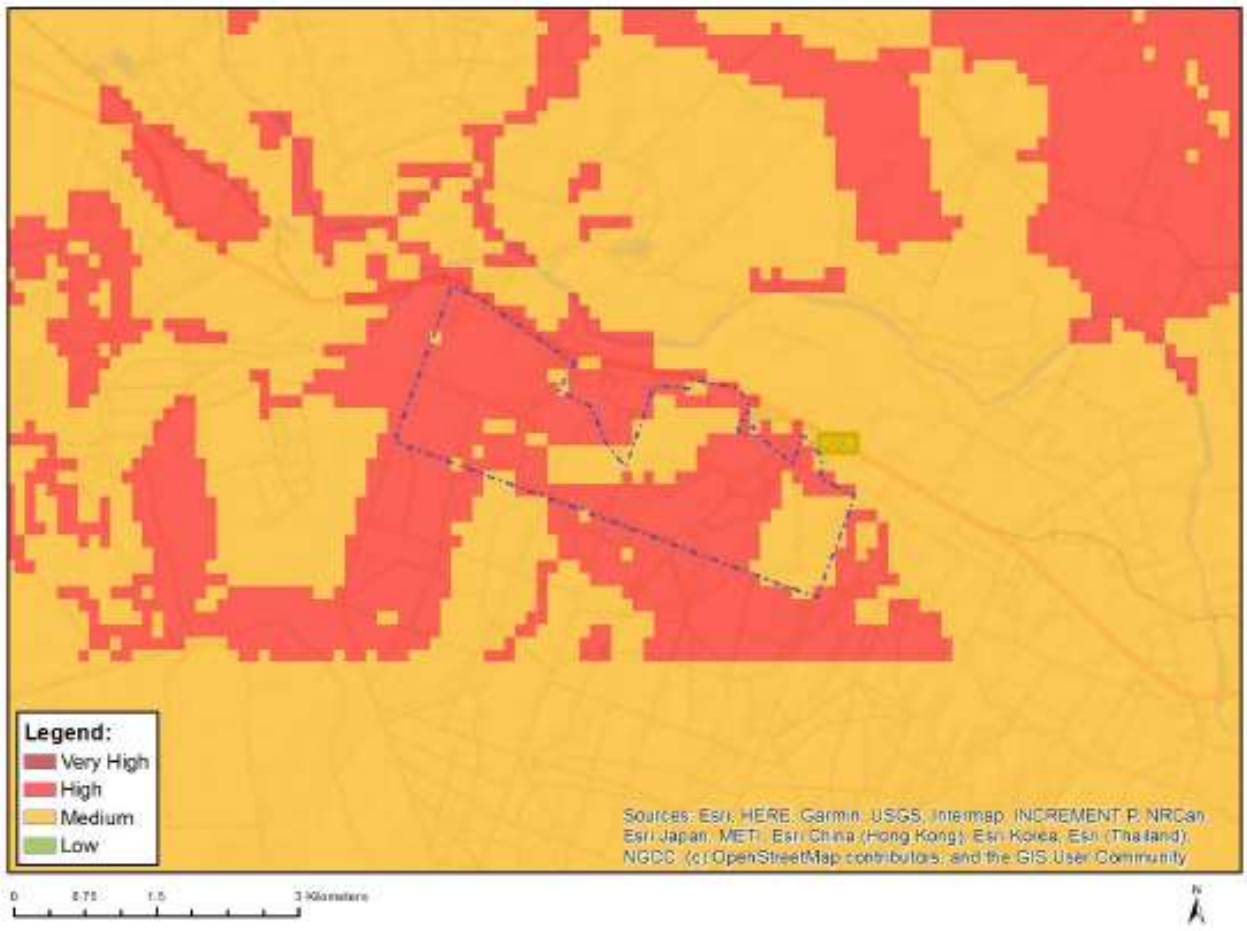
Concluding Remarks

These on-site findings supplement the information obtained from the various conservation and planning frameworks, as well as the screening tool, consulted above. These findings have been verified by a terrestrial biodiversity, as well as an aquatic biodiversity specialist. Suitable recommendations (e.g. aquatic buffers, ecological corridors and biodiversity target areas) have been made for the incorporation of the requirements of the relevant conservation planning frameworks in the proposed development (see Chapters Six and Seven and the EMPr attached as Part 2 of this report).

3.3.1.5 Faunal Species of Conservation Concern

A formal faunal investigation has not been undertaken on the site. It is anticipated that the vegetation on site provides habitat for several small to medium mammal, reptilian and amphibian species. The site is likely also frequented by a variety of avifaunal species.

The screening tool identified the site as being of High sensitivity. As indicated in map 3.14 below, the majority of the site is High sensitivity apart from the portions of the site which have been transformed for orchards, which are indicated as Medium sensitivity.



Map 3.14: Animal species theme sensitivity mapping according to the screening tool.

Several Faunal Species of Conservation Concern are indicated as potentially being present within the site and broader area using several online databases[5] (Maputaland-Pondoland-Albany Hotspot study, SANParks metadata, 2010; National Environmental Screening Tool, 2021 and Plants of Southern Africa, 2021), as indicated in Table 3.3 below.

Table 3.3: Potential Faunal Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]
Acinonyx jubatus	Felidae (Cheetah)	NEST (M), VU
Aneuryphymus montanus (Yellow-winged Agile Grasshopper)	Acrididae	NEST (M)
Circellium bacchus (Cape Flightless or Addo Dung Beetle)	Scarabidae	Endemic
Circus ranivorus (African marsh harrier)	Accipitridae	LC (Intl), EN (SA), NEST (M)
*Neotis denhami (*Denham's bustard)	Otididae	NEST (H), NT (Intl), Protected (SA)
Sensitive species 7		NEST (M), LC (Intl), VU (SA)

[5] Includes threatened species mapped by the Maputaland-Pondoland-Albany Hotspot study in 3325AD/BC (SANParks metadata, 2010), the National Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/#/pages/welcome) and the SANBI New Plants of South Africa website (http://newposa.sanbi.org/sanbi/Explore).

[6] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).

[7] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.

No sensitive species, as identified by the screening tool, were found on the site and the likelihood of presence is likely also low. The Terrestrial Biodiversity specialist has thus confirmed that the proposed activity is not anticipated to pose any significant risk to these faunal species.

Although the Screening Tool has indicated that an Animal Species Assessment be undertaken, such has not been undertaken as part of this assessment. Reasons for exclusion of the identified specialist studies were included in the Plan of Study for EIA as part of the Final Scoping Report which has been approved by the competent authority. However, the minimum information requirements required for a Terrestrial Animal Species Compliance Statement have been included as part of the Terrestrial Biodiversity Assessment Report (see Chapter Six).

3.3.2 Physical

3.3.2.1 Climate

The Sundays River Valley is characterised by harsh climate conditions, with summer temperatures rising in excess of 40°C. The monthly distribution of average daily maximum temperatures ranges from 21.9°C (July) to 29.2°C during summer (February). The region is the coldest during July, with average night-time temperatures of 5.2°C.

Rainfall for the area is overall low, between 250-500mm annually, and spread throughout the year. Sunland, the closest town to Sontule, receives ~315mm of rain per year. Lowest rainfall occurs during the winter, specifically in July (13mm), and the highest rainfall during autumn, particularly in March (44mm).

3.3.2.2 Geohydrology and Surface Water

A site visit on the 22 August 2019 and review of the relevant aerial imagery, as well as input from the aquatic biodiversity specialist, have assisted in the identification of aquatic features in the vicinity of the site. There are a number of non-perennial tributaries falling with the project area. These non-perennial tributaries likely historically drained into the perennial Sundays River system, however, there has been complete alteration/disconnection of the non-perennial tributaries falling within the project footprint and the Sundays River. These rivers would be termed non-perennial with intermittent flow in terms of SANBI Classification guidelines (2013).

The non-perennial streams have no clear or well-defined active channel but rather vegetated channels with more pronounced drainage pathways compared to the drainage lines. These non-perennial rivers would likely rarely see any flows, only during rainfall or flood events. A large majority of these non-perennial rivers are in a modified state from existing activities on the farm portions (gravel roads, tracks, animal pathways, historical and current cultivation). Since these non-perennial rivers appear completely disconnected from the Sundays River system they are considered to be of relatively low ecological importance.

The drainage lines are mostly inconsistent, with no exact flow path and location. No well-developed channels or riparian zone is evident. These drainage lines typically act as flow paths for water and would only likely see surface flows during heavy rainfall or flooding events. The large majority of drainage lines identified appear to have formed as a result of erosion due to historical gravel roads, pathways, small-scale excavation and borrowing activities.

No natural wetlands were identified on the property under assessment, based on desktop analysis and site investigation. NWM5 (NBA, 2018) identified one natural riverine wetland associated with the Sundays River within 500m of the development footprint. This river was noted to have prominent

reed beds. It is worth noting, that this river will not be affected by the project development, given its distance from the site and existing road, canal and cultivated/developed areas acting as a buffer between the property and the Sundays River. A number of water storage dams occur within and surrounding the project footprint. One off-channel water storage dam occurs within the property and two instream water storage dams occur adjacent to the border of the property.

The remaining water storage dams occur on neighbouring properties within 500m of the development footprint and will not be affected by the development proposal.

The presence and extent of aquatic features on Sontule have been assessed by an aquatic biodiversity specialist during the EIA phase of the assessment (see Chapter Seven).

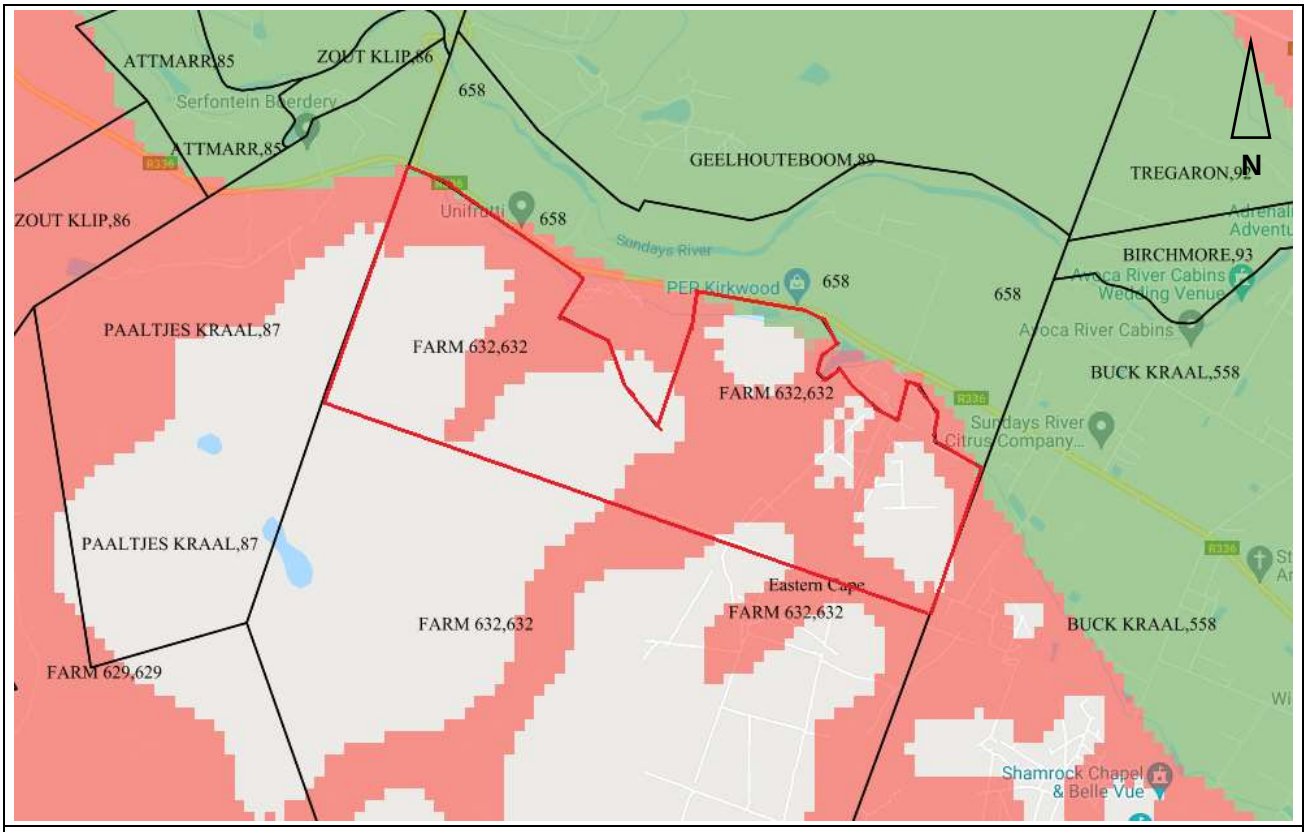
3.3.2.3 Geology and Topography

Geology

In terms of the Fossil Sensitivity Map compiled by the South African Heritage Resources Agency (http://www.sahris.sahra.org.za/map/palaeo Accessed November 2021), the fossil sensitivity on Sontule, is Very High (red/ pink on Map 3.15) and Unknown (white/ clear on Map 3.15). The study area is underlain by marine and estuarine sediments of the Early Cretaceous Sundays River Formation. The Sundays River Formation contains rich fossil faunas of marine invertebrates such as ammonites, belemnites, bivalves and gastropod shells. Plant remains, vertebrate fragments (including the almost complete marine plesiosaur discovered near Redhouse) and microfossils (forams, ostracods) are also common (Shone 2006). The formation is linked to a shallow marine depositional environment that may have included lagoonal, estuarine and shallow shelf settings (McClachlan and Mcmillan 1976). Good exposures of the Sundays River Formation sediments, comprising grey-green sandstones siltstones and mudstones with thin shell-rich limestone beds, are seen in the cliffs bounding the Sundays River, 6 km north of the study area (Rossouw, 2017).

Damage to or destruction of any fossils during construction activities would be highly negative, permanent impact of international significance. However, the nature of the proposed agricultural development is unlikely to result in deep excavations into bedrock.

A paleontological specialist has determined the likelihood of the occurrence of substantial fossil deposits on Sontule, as well as the potential impacts of the proposed agricultural development on such deposits (see Chapter Ten). The palaeontological heritage impact significance of all components of the proposed agricultural expansion (i.e. new blocks of citrus plantation, new dam, internal roads, irrigation pipeline etc) is assessed as low (negative) without mitigation.

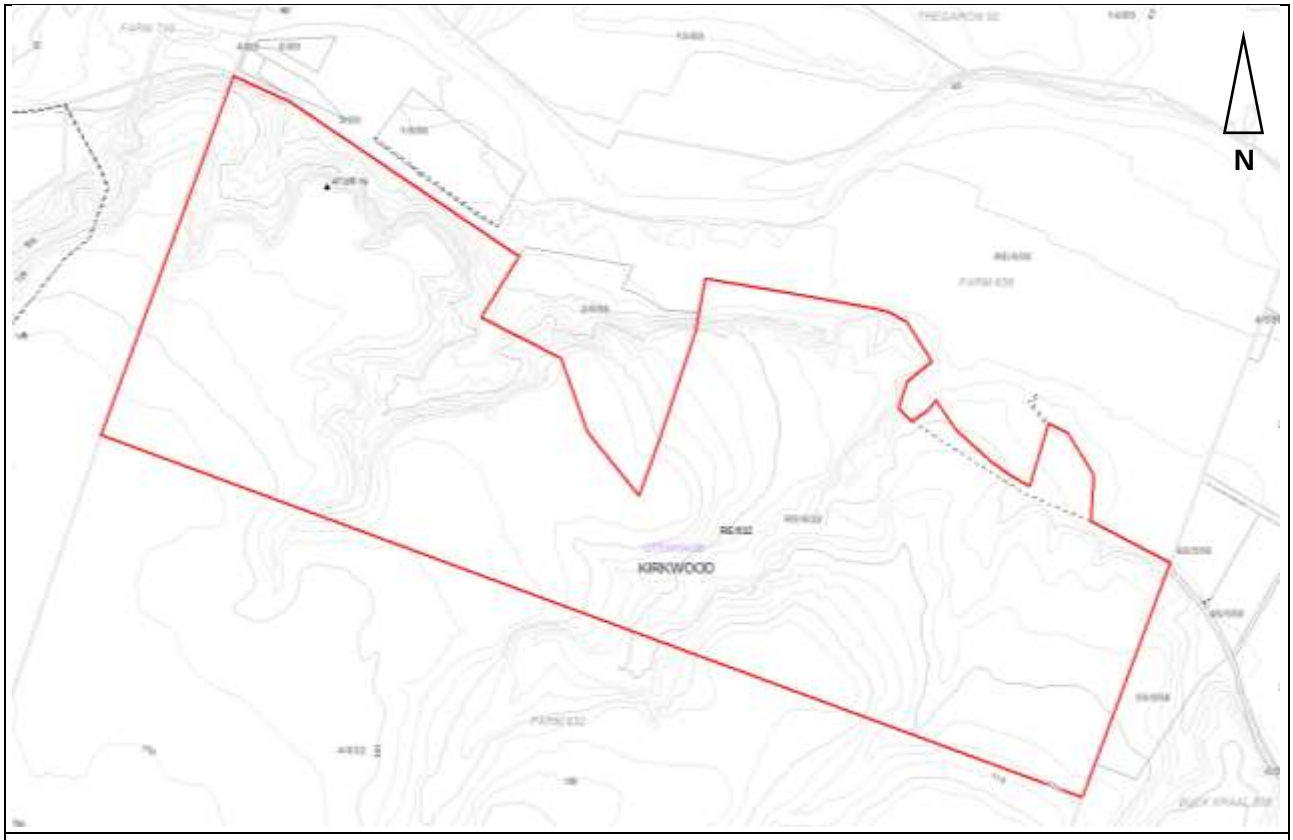


Map 3.15: Fossil Sensitivity on Sontule, as given by the SAHRA mapping resource.

Colour	Sensitivity	Required Action
RED/PINK	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Topography

The topography of Sontule is varied, with steep cliff faces along the northern boundary of the farm forming a gentle increasing sloping plateau on the western portion of the farm (from 125m to 145m). Several steeply sloping incised valleys run in a general north-east to south-west direction throughout the farm (with lowest elevation points 70m and 85m). These steep slopes and associated valleys have been excluded from the proposed development footprint. The eastern portion of the farm slopes from a height of 75m to a heigh of 110m. The highest point on the south-western corner of the farm measures 145m.



Map 3.16: Contour map (5m contour intervals) showing topography of Sontule (red outline).

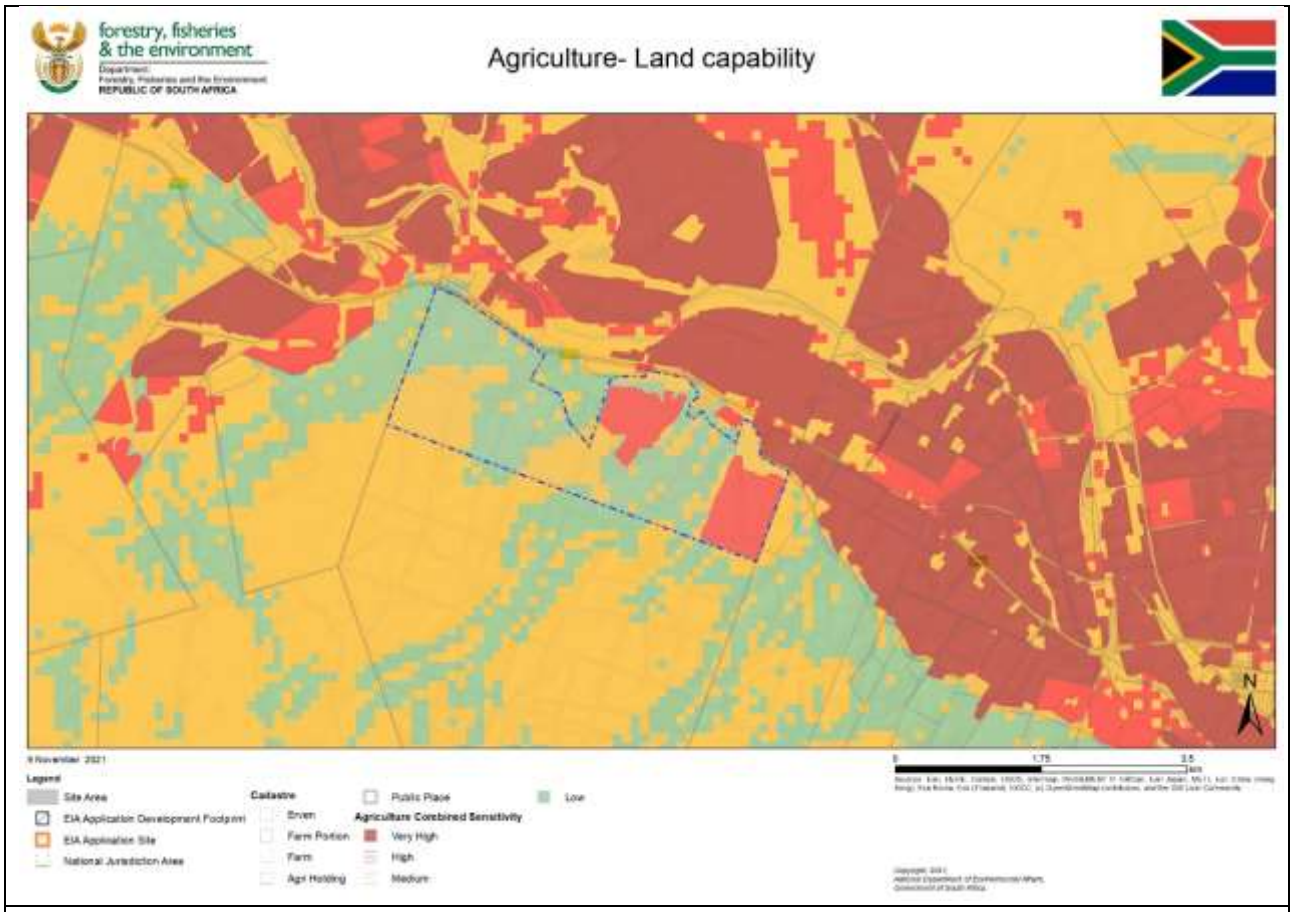
3.3.2.4 Agricultural Potential

The National Web Based Environmental Screening Tool mapping resources (Dept. of Environment, Forestry and Fisheries, Accessed November 2021), indicates that the Land Capability rating on Sontule ranges from High to Low sensitivity (Map 3.17). The lower sensitivity appears to align loosely with steeper slopes, while the higher capability areas align with flatter gradients and existing orchards.

According to Land Capability/Agricultural potential assessment protocols Low-sensitivity areas are defined as non-arable land onto which most development should be steered. Medium-sensitivity areas are rated as marginal arable land, and High-sensitivity areas as those with highest agricultural potential.

In terms of the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (Published in Government Gazette 43110, GN R320 on 20 March 2020), sites that have been identified as High Sensitivity for agricultural resources must submit an Agricultural Agro-Ecosystem Specialist Assessment. Reasons for exclusion of the identified specialist studies were included in the Plan of Study for EIA as part of the Final Scoping Report which has been approved by the competent authority.

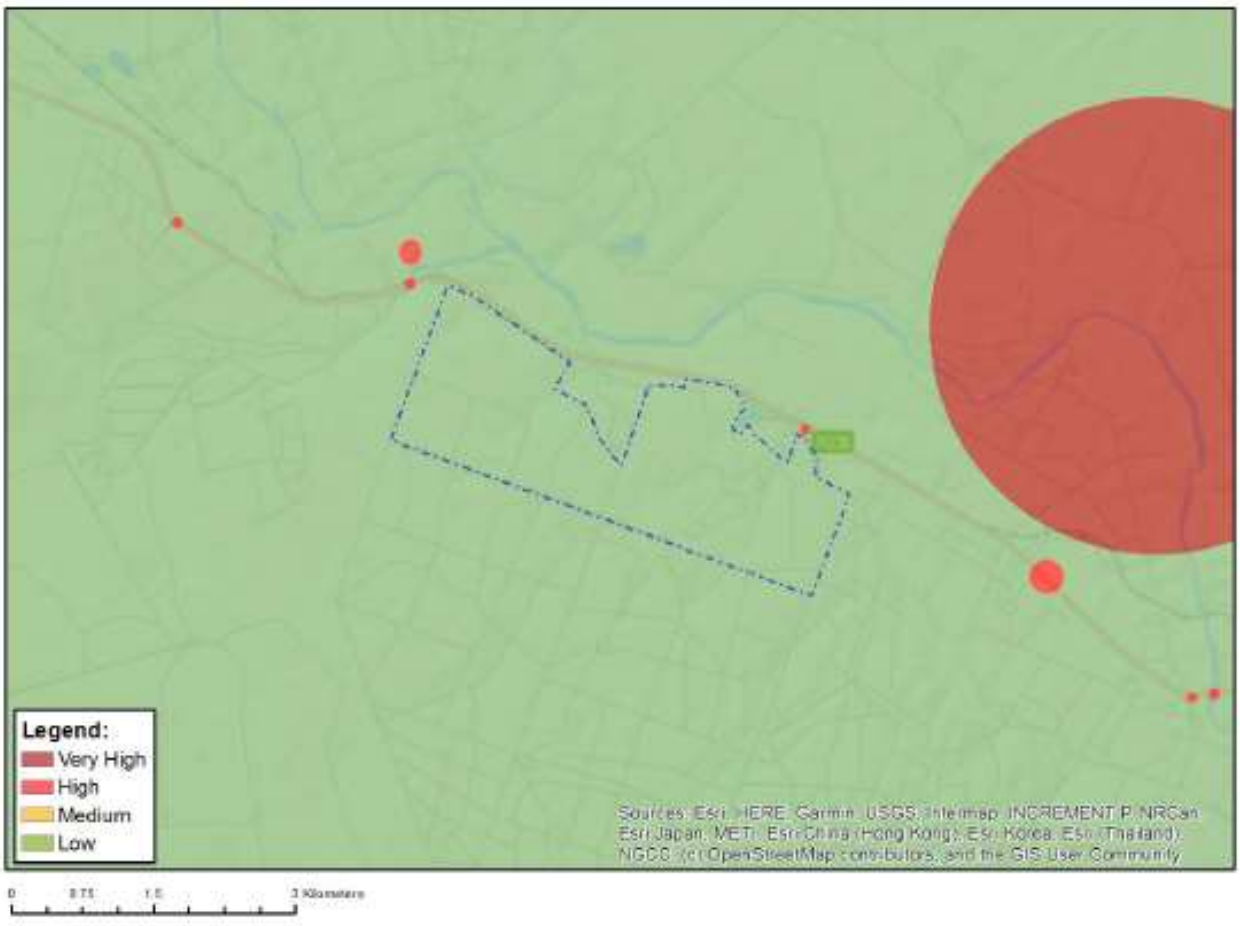
Agricultural potential of the site for the commercial production of citrus has been included as part of a Land Capability Study undertaken by a soil specialist (see Chapter Eight).



Map 3.17: Land Capability Mapping indicating agricultural potential of the farm Sontule (National Web Based Environmental Screening Tool (https://screening.environment.gov.za/).

3.3.3 Heritage and Cultural

Certain cultural and heritage resources are protected under the National Heritage Resources Act, No 25 of 1999. These may include structures older than 60 years; archaeological and palaeontological sites and materials, and meteorites; certain burial grounds and graves; declared heritage objects; and declared heritage sites. The screening tool identified the site as being of Low archaeological and cultural heritage sensitivity, as depicted in map 3.18 below (screening tool report extract).



Map 3.18: Archaeological and cultural heritage theme sensitivity mapping according to the screening tool.

No graves, burial sites or structures older than 60 years were noted during the site visit. The site has been surveyed by an archaeological specialist, for the presence of graves or burial grounds, as well as other material which might be of archaeological importance, or which may have potential impacts on the proposed development. The archaeological specialist has determined that the proposed areas for development appear to be of low archaeological sensitivity.

Given the palaeontological sensitivity of the rock formations that are anticipated to occur on site, as previously discussed under section 3.3.2.3, a palaeontological specialist has determined that the palaeontological heritage impact significance of the proposed agricultural expansion is assessed as low (negative) without mitigation.

3.3.4 Socio-economic (Social and Economic)

The nearest town to Sontule is Sunland (~5km), in the Sundays River Valley Local Municipality (SRVM). However, local labour is sourced from both the SRVM, as well as the Nelson Mandela Bay Municipality (NMBM), therefore, socio-economic data for both municipalities has been considered here.

The Final Integrated Development Plan (IDP 2016/2017) for the SRVM indicates that the current unemployment rate in the municipal area is as high as 38.54%. The Agricultural Sector, being one of the top five employment sectors in the SRVM, provides room for growth in terms of employment opportunities, as it currently represents approximately 11% of the employment for the SRVM area. (Final SRVM IDP 2015/2016; See Figure 3.1).

The NMBM Integrated Development Plan 2017/2018 – 2021/2022 (3rd Edition, Adopted 19 June 2019) highlights some of the key socio-economic challenges in the NMBM and lists unemployment and poverty among them. Some of the reasons cited in the NMBM IDP (2017-2021) for the low economic growth experienced in the NMBM (1.36% per annum) are the high unemployment and dependency ratios (unemployment rate 36.8%). The NMBM is experiencing a devastating drought, one of the worst recorded, and it has strained all main economy sectors of NMBM including Agro-processing, one of the four main economic sectors in the NMBM (NMBM IDP 2017-2021).

The nearby communities associated with the towns Kirkwood and Addo in the SRVM, as well as the greater NMBM area, represent an important labour force in close proximity to the proposed development. It is anticipated that the proposed development will result in a number of temporary (construction) and permanent seasonal (operation) employment opportunities for the local community.

Based on information provided by the project applicant, a number of permanent and temporary employment opportunities (i.e., seasonal pickers) will be created by the proposed development, which will contribute to the growth and stability of the local economy. As far as possible preference will be given to local labour for the construction of the proposed development. The employment opportunities provided during the operational phase will also provide skills development and career growth, thus leading to an improved standard of living and livelihood improvement for employees. In addition, the proposed agricultural development is an empowerment project, which will include additional benefits for beneficiaries associated with the project.

No significant negative impacts on the local socio-economic environment are anticipated. Conversely, the proposed development is anticipated to have a positive socio-economic impact by way of job creation, local economic growth and food security.

The Screening Tool did not identify the Socio-economic Theme, nor assign a sensitivity rating. No concerns have been raised by I&APs regarding Socio-economic impacts of the proposed development, which would require a specialist assessment. Therefore, no specialist socio-economic assessment has been undertaken during this EIA.

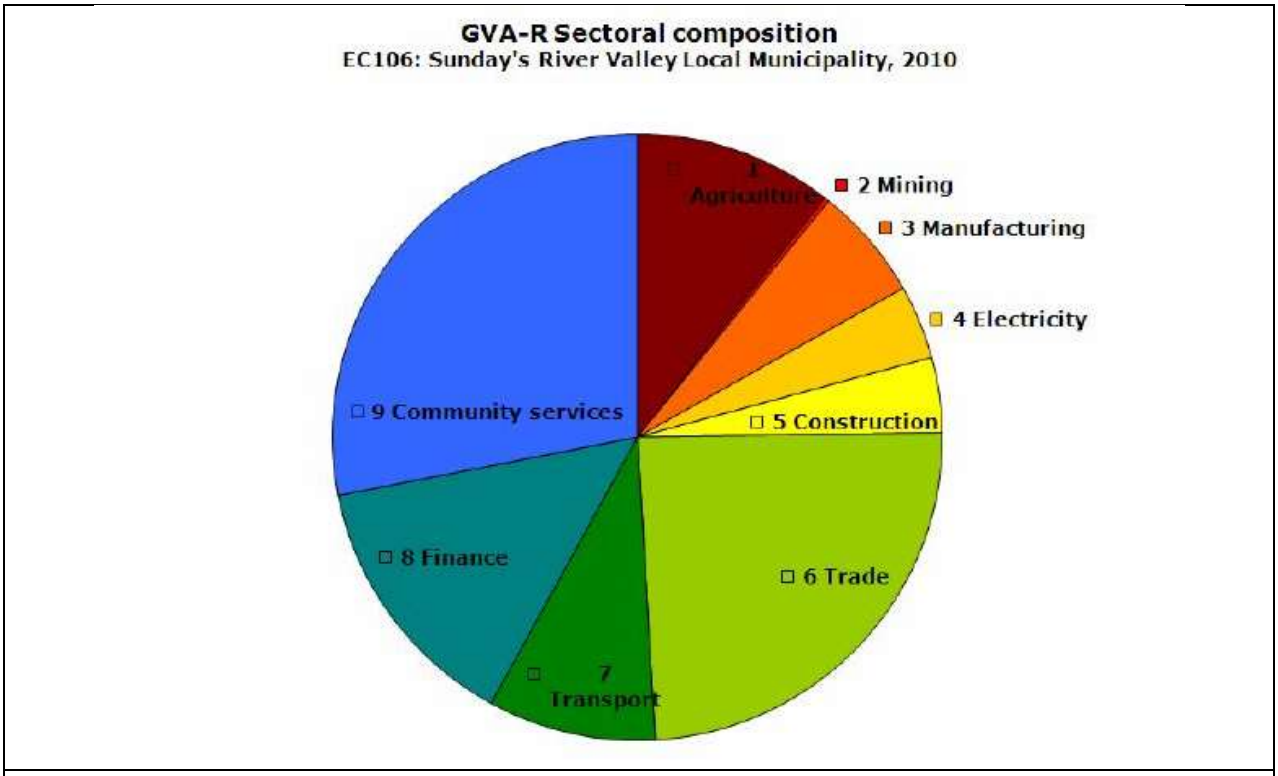


Figure 3.1: Breakdown of the Employment Sector for the Sundays River Valley Municipality (Final SRVM IDP 2016/2017).

3.3.5 Civil Aviation Installations

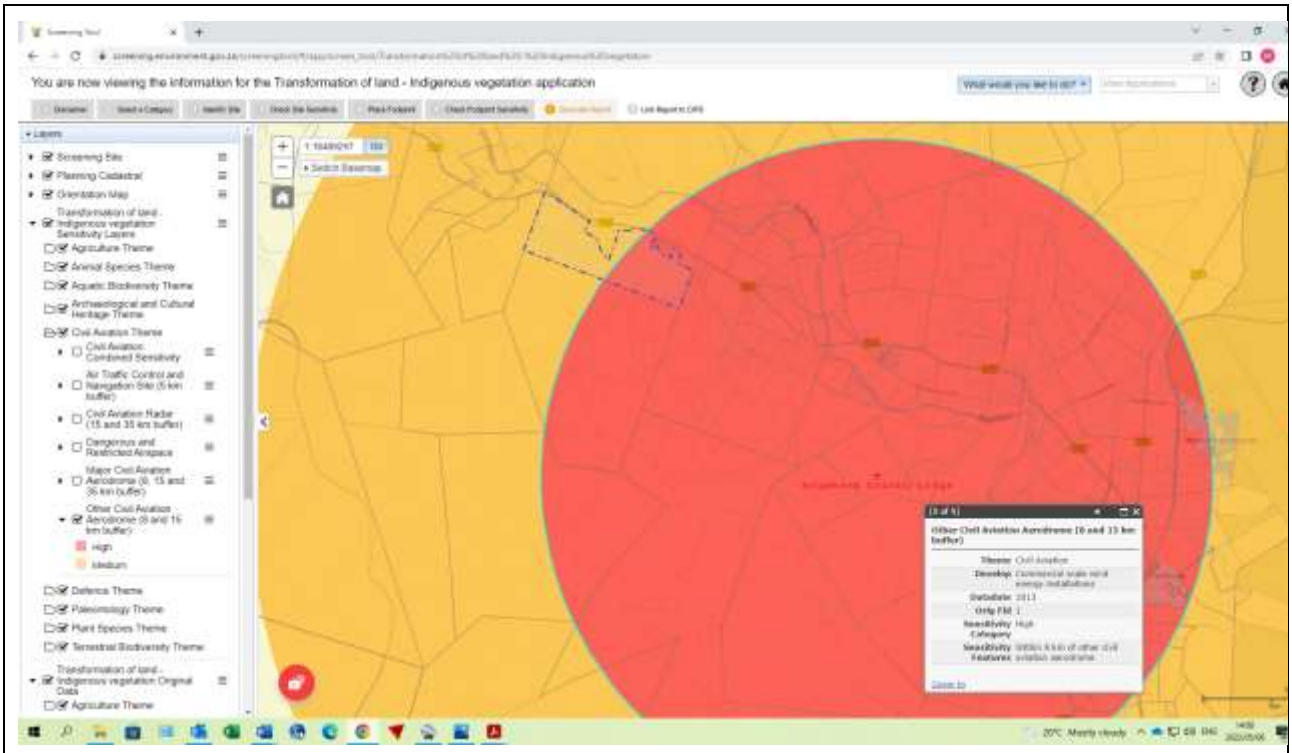
The Civil Aviation Theme was listed in the Screening Tool Report as having a Medium and High Sensitivity. In terms of the Protocol for the Assessment and Reporting of Environmental Impacts on Civil Aviation Installations (Published in Government Gazette 43110, GN R320 on 20 March 2020), sites that have been identified as High or Medium Sensitivity require the preparation of a Civil Aviation Compliance Statement.

The site has been classified as Medium to High Sensitivity as it falls within an 8km (High) and 15km (Medium) radius of "other civil aviation aerodrome". This is likely because the Hitgeheim Country Lodge Airstrip is located approximately 5km south-east of Sontule. The site sensitivity has been verified by the EAP, by means of desktop analysis using satellite imagery as well as a preliminary on-site inspection as follows:

1. The Identify Feature Box (Screening Tool) includes the criteria "Develop" which indicates "Commercial scale wind energy installations" (see map 3.19 below). This may indicate that the Civil Aviation Theme, and thus the High Sensitivity ranking, would be applicable if the proposed development were a wind energy installation. This is not currently proposed on this site.
2. Taking into consideration, the type of development (establishment of crops, citrus orchards and water infrastructure) and the distance from any civil aviation installations, the proposed development is not expected to have negative impacts on civil aviation installations (i.e., Hitgeheim Country Lodge Airstrip).
3. Based on the above reasons, the sensitivity rating of "High" and "Medium" for the proposed site, as identified by the screening tool, is therefore disputed and is found to be of a "**Low**" sensitivity.

In terms of the Protocol for the Assessment and Reporting of Environmental Impacts on Civil Aviation Installations (Published in Government Gazette 43110, GN R320 on 20 March 2020), sites that have been rated as having a Low Sensitivity are not expected to have negative impacts on civil aviation installations and thus further assessment and mitigation measures are not required.

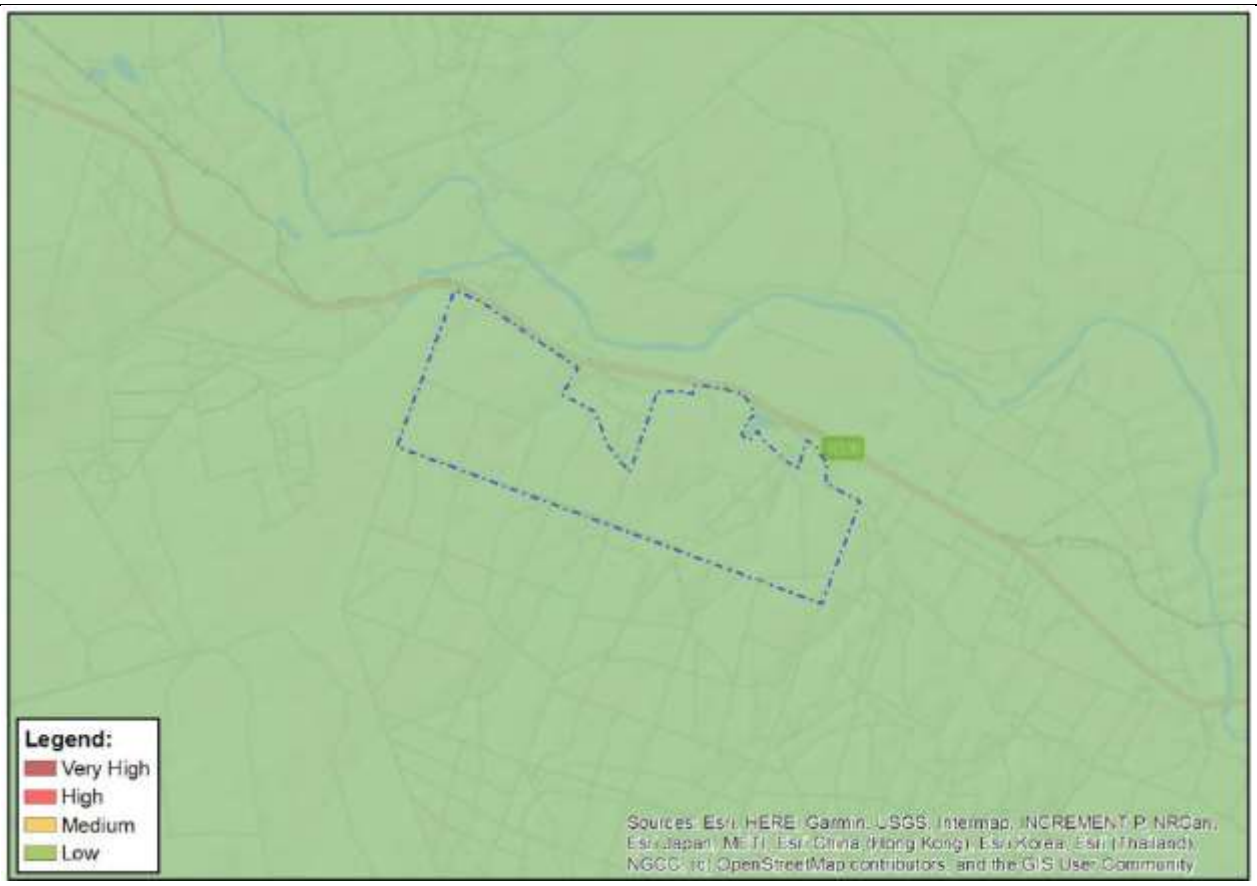
The Civil Aviation Theme is thus not deemed applicable to the proposed agricultural development and a Civil Aviation Compliance Statement is thus not included with this assessment.



Map 3.19: Screengrab of the Screening Tool Identify Feature Box indicating the criteria "Develop" which indicates "Commercial scale wind energy installations".

3.3.6 Defence Installations

The screening tool has identified the site as Low sensitivity in terms of the defence theme (see map 3.20 below; screening tool report extract). The site sensitivity has been verified and confirmed by the EAP as Low. In terms of the Protocol for the Assessment and Reporting of Environmental Impacts on Defence Installations (Published in Government Gazette 43110, GN R320 on 20 March 2020), sites that have been rated as having a Low sensitivity are not expected to have negative impacts on defence installations and thus further assessment and mitigation measures are not required.



Map 3.20: Defence theme sensitivity mapping according to the screening tool

3.4 CONCLUDING REMARKS

The specialist studies forming part of the EIA Phase of this assessment, including potential impacts associated with the proposed agricultural development and associated infrastructure, which have informed the preferred development footprint on Sontule, are included in Chapters Six to Twelve of this report. Alternatives and the assessment thereof, are outlined in Chapter Five of this Report.

CHAPTER FOUR: ENVIRONMENTAL IMPACT ASSESSMENT PROCESS AND PUBLIC PARTICIPATION

4.1 INTRODUCTION

This Chapter of the report provides the legal context for this Environmental Impact Assessment (EIA), an overview of the approach to the EIA process, with focus on the Public Participation process, as well as the objectives of the NEMA Regulations, 2014 (as amended), GN326, Appendix 3, as follows:

2.(a) *determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;*

3.(1)(h)(ii) *details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs;*

3.(1)(h)(iii) *a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;*

3.(1)(h)(vi) *the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;"*

The generic Terms of Reference for the assessment of impacts by specialist, as contained in the approved Plan of Study for EIA, is included as Appendix 4.1 of this chapter. As required by GN R326 sections 39 to 44 and Appendix 3, the steps for the EIA Phase of the Assessment are outlined in detail below. The approved Final Scoping Report (FSR) contains the details for the Scoping Phase of the Assessment Process.

Spatial planning tools, municipal development planning frameworks and instruments which have been considered in the EIA Phase of this assessment are listed below and are discussed in more detail in the various chapters of this report (Chapters One to Thirteen). Chapter One of this report includes a table, which indicates where the requirements for EIA as contained in GNR326, Appendix 3, are provided for in this report.

4.2 LEGAL CONTEXT FOR THIS EIA

Section 24(1) of NEMA (as amended) provides as follows:

"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact of the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by this Act with granting the relevant environmental authorization."

The reference to "listed activities" in section 24 of NEMAA relates to the NEMA EIA Regulations 2014 (as amended), which came into effect on the 8 December 2014 and were amended on the 7 April 2017 by Government Notice R326, 327, 325 and 324 published in Government Gazette 40772. The Government Notices published are collectively referred to as the NEMA EIA Regulations 2014 (as amended) and amongst others, comprise listed activities that require either Basic Assessment (BA), or a Scoping and EIA, which is to be undertaken prior to the commencement of any activities on site. This proposed agricultural expansion on Farm 632 requires full Scoping and EIA in order to obtain Environmental Authorisation for activities listed in GN R327, 325 and 324, for which the

decision-making authority is the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), Sarah Baartman Region. Based on specialist assessments and refinements to the project description, Table 4.1 below indicates the listed activities as contained in GN R326,327, 325, and 324, which require Environmental Authorisation

As noted in Chapter One of this report, and in correspondence dated the 21 August 2019, DEDEAT was notified in writing of the intention to commence with a Scoping and EIA Process for the proposed project. Included with this correspondence was a Background Information Document (BID) on the project which, amongst others, outlined the approach to this Scoping and EIA Process, potential listed activities and included a locality map for the development. Due to the delay that occurred as a result of being requested to undertake a compliance audit of the existing Environmental Authorisation, as well as to accommodate certain legislative changes that occurred in the interim, an additional Project Announcement and Registration comment period was provided. Therefore, the assessment process was reinitiated and the competent authority as well as all I&APs and Organs of State on the project database were again notified of the intention to commence the assessment process on 23 September 2021.

On the 1 June 2022, an Application Form for Environmental Authorisation, inclusive of listed activities, was submitted to DEDEAT and reference number **EC06/C/LN2/M/23-2022** was assigned to the application. Acknowledgement of receipt of the submission of the Final Scoping Report (FSR) was received from DEDEAT on 8 July 2022, and acceptance of the FSR and Plan of Study for EIA, was received from DEDEAT on 22 August 2022. As per GN R326, Regulation 23:

(1) *The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority - (a) an environmental impact assessment report inclusive of any specialist reports, and an EMPr, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority;"*

The EIA Process is a planning, design and decision-making tool which needs to show the competent authority, DEDEAT, and the project applicant, what the consequences of their choices will be in biophysical, social and economic terms. As such, it identifies potential impacts that the project may have on the environment, as well as identifying potential constraints the environment may place on the development. The EIA Report makes recommendations to mitigate potentially negative impacts and maximize potentially positive impacts associated with the project.

Table 4.1: Listed activities according to GN R327, 325 and 324 requiring Environmental Authorisation in terms of the NEMA EIA Regulations 2014 (as amended).

GN R327 – Listing Notice 1 requiring Basic Assessment	
Listed Activity	**Description of Project Activity**
12. The development of— *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —*	A number of drainage lines occur on site. The proposed agricultural expansion will require the installation of irrigation pipelines of varying widths as well as the construction of access roads and vehicle tracks across these drainage lines. The combined footprint of this infrastructure may exceed 100 square metres within a watercourse and within 32 metres of a watercourse. **This listed activity will require Environmental Authorisation**.

19. The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	A number of drainage lines occur on site. The proposed agricultural development will require the installation of irrigation pipelines of varying widths as well as the construction of access roads and vehicle tracks across these drainage lines. The installation of this infrastructure will require the excavation, removal or moving of soil, sand, pebbles or rock of more than 10 cubic metres from a watercourse. **This listed activity will require Environmental Authorisation**.
24. The development of a road— *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	A number of unpaved, internal access roads and vehicle tracks will be required to provide access within the orchards. The width of these roads will vary between 4 metres and 9 metres. **This listed activity will require Environmental Authorisation**.
GN R325 – Listing Notice 2 requiring Full Scoping and EIA	
Listed Activity	**Listed Activity**
15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for —	A total of ~147ha are proposed to be cleared as part of this application, the majority of which will be indigenous vegetation. **This listed activity will require Environmental Authorisation.**
GN R324 – Listing Notice 3 requiring Basic Assessment	
Listed Activity	**Listed Activity**
12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. *a. Eastern Cape* *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;*	The area under assessment is ~321ha most of which is anticipated to be indigenous. The total number of hectares to be cleared will be determined through the assessment process. A portion of the vegetation which is proposed for transformation has been identified as Albany Alluvial Vegetation in terms of the NBA mapping resources. This vegetation type has been listed as an Endangered ecosystem in terms of section 52 of the NEMBA. The terrestrial biodiversity specialist has confirmed that this vegetation type does not occur on site. **Therefore, this listed activity will *not* require Environmental Authorisation.**

4.3 LEGISLATION AND GUIDELINES APPLICABLE TO THIS EIA

As per Appendix 3 of GN R326 (Regulation 3 (1) (e)) the scope and content of this report has been informed by the following legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, instruments, and information series documents, which are potentially applicable to this project and considered in the assessment process:

4.3.1 International Policy

4.3.1.1. Sustainable Development Goals

In 2015, the 2030 Agenda for Sustainable Development was adopted by South Africa and 192 other countries at the Sustainable Development Summit. The new agenda, entitled “Transforming Our World: The 2030 Agenda for Sustainable Development”, was agreed upon by the 193 member states of the United Nations, and includes 17 Sustainable Development Goals (SDGs) and 169 targets. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted as a

universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

All 17 SDGs interconnect, meaning success in one affects success for others. For example, eradicating hunger through achieving food security and promoting sustainable agriculture will contribute to ensuring healthy lives and promote well-being; promoting sustained, inclusive and sustainable economic growth and productive employment for all will end poverty for all.

Although the NDP pre-dates the adoption of the 2030 Sustainable Development Agenda, there is much alignment between the development priorities highlighted in the NDP and the SDGs. As such, the NDP provides a roadmap for South Africa's efforts to achieve the SDGs, as well as the development priorities identified in the NDP itself.

Applicability to this proposed project: South Africa has made progress in addressing SDG 2, which aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture by 2030. A 2017 study conducted by StatsSA indicates that there was a decline in the number of households that were vulnerable to hunger from 24.2% in 2002 to 10.4% in 2017.[1] The proposed agricultural project is in line with SDG 1 (No Poverty), 2 (Zero Hunger) and 8 (Decent Work and Economic Growth). In addition, the proposed development must take into account SDG 12 (Responsible Consumption and Production) and 15 (Life on Land).

4.3.2 National Legislation

4.3.2.1. The Constitution of the Republic of South Africa (Act 108 of 1996):

The Constitution is the supreme law of South Africa and provides the legal framework for legislation regulating environmental management in general, against the backdrop of the Bill of Rights contained in Chapter Two of the constitution and enshrining fundamental human rights. Section 24 of the Constitution states that everyone has the right:

"a) to an environment that is not harmful to their health or well-being; and
b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that:
(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

Applicability to this proposed project: The proposed development must be implemented in a manner to 1) prevent pollution and ecological degradation; 2) promote conservation; and 3) secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development. The State has a duty to promulgate legislation and take other steps that ensure that these rights are upheld and that, among other things, ecological degradation and pollution are prevented.

[1] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, pg. 47.

4.3.2.2. National Environmental Management Act (as amended) and the Environmental Impact Assessment Regulations 2014 (as amended), published under Chapter Five of NEMA (GN R326, GN R327, GN R325 and GN R324):

The NEMA sets out a number of principles (Chapter One, Section 2) to give guidance to developers, private landowners, members of public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA.

NEMA, as the primary environmental legislation, is complemented by a number of sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, inter alia i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimized and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimized and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimized and remedied.

Regulation 16 (1) (b) (v) of the NEMA EIA Regulations, 2014 (as amended) requires that a report, generated by the national web based environmental screening tool, accompanies the application for environmental authorization which is submitted to the competent authority. Further Regulation 16 (3) (a) indicates that any report submitted as part of an application must comply with any protocol or minimum information requirements relevant to the application. As such, several assessment protocols and minimum report content requirement guidelines have been gazetted which inform the information that is to be contained in the specialists' assessments that form part of the EIA Report.

Regulation 16 (3) (c) requires that a report submitted as part of an application must "*take into account any applicable government policies and plans, guidelines, environmental management instruments and other decision-making instruments that have been adopted by the competent authority…*". The Screening Tool is one of the environmental management instruments that are utilized in determining the environmental sensitivity of the site as well as which potential specialist studies should be included in the assessment process. Other instruments utilized would include, amongst others, biodiversity planning frameworks, for example the ECBCP, NBA, VegMap and SRVM Biodiversity Sector Plan.

Applicability to this proposed project: The activity requires full Scoping and EIA in order to obtain Environmental Authorisation for activities listed in GN R327, 325 and 324, for which the competent authority is the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), Sarah Baartman Region. This report serves to inform the process and governing principles of NEMAA and the requirements of the NEMA EIA Regulations 2014 (as amended).

In terms of the requirements for good governance prescribed by the Act, there is an obligation to use all available information when making decisions, and to ensure that decisions are informed by the most up to date and relevant information available.

The Screening Tool Report for the proposed site was generated and submitted to the competent authority along with the application form. The Screening Tool Report identified several Assessment Protocols which could be applicable to this assessment process. Therefore, where these protocols are relevant, these were included in the Terms of Reference and have been addressed by the respective specialist studies.

4.3.2.3 National Environmental Management Biodiversity Act (Act 10 of 2004):

The NEMBA provides for the protection of listed endangered ecosystems and restricts activities according to the categorization of the area (not just by listed activity as specified in the NEMA EIA Regulations 2014 (as amended)). It promotes the application of appropriate environmental management tools to protect biodiversity. Chapter Three allows for the publication of bioregional plans. Chapter Five of the Act refers to the introduction and control of alien invasive species. The Threatened or Protected Species (TOPS) Regulations, in terms of Section 97 (Chapter Eight), requires an authorization/ permitting process to be followed.

Applicability to this proposed project: The site falls within the Sundays River Valley Municipality (SRVM) and no bioregional plans have been gazetted for this region. However, environmental management tools that are available for this region include, the Eastern Cape Biodiversity Conservation Plan (ECBCP), as well as the Sundays River Valley Municipality Biodiversity Sector Plan (SRVM BSP). These biodiversity planning frameworks must be consulted to inform decision making. Amongst others, these documents identify Aquatic and Terrestrial Critical Biodiversity Areas and Ecologically Sensitive Areas, which are coupled with relevant land use guidelines. However, these planning frameworks only serve as an identification tool and thus, require site verification, the results of which need to be considered by the development proposal.

Any threatened or protected species in terms of the NEMBA Threatened or Protected Species (TOPS) list cannot be removed without a permit. Alien species listed in terms of NEMBA identified on a site are required to be controlled and/ or eradicated. This assessment process includes a Terrestrial Biodiversity and Aquatic Specialist Assessment which include a consideration of the abovementioned planning frameworks and applicable legislation.

4.3.2.4 National Forests Act (Act 84 of 1998):

The National Forests Act (NFA) (Act 84 of 1998) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the National Forest Act (Act 84 of 1998), a license is required to remove, cut, disturb, damage or destroy any of the listed protected trees. A list of protected tree species is published annually, with the most recent list having been published in March 2022. The Department of Forestry, Fisheries and Environment (DFFE) is authorised to issue licenses for any removal, cutting, disturbance, damage to or destruction of any protected trees.

Applicability to this proposed project: The protected trees that commonly occur in this region are *Sideroxylon inerme* (Milkwood) and *Pittosporum viridiflorum* (Cheesewood). The Terrestrial Biodiversity Specialist Assessment has confirmed the presence of *Sideroxylon inerme* within the area proposed for development.

4.3.2.5 National Heritage Resources Act (Act 25 of 1999):

The National Heritage Resources Act (NHRA) (Act 25 of 1999) introduces an integrated and interactive system for the managements of national heritage resources (which include landscapes and natural features of cultural significance). The protection of archaeological and paleontological

resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State.

Archaeology, palaeontology and meteorites:

"Section 35 (4) No person may, without a permit issued by the responsible heritage resources authority:

a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites."

Heritage resources management:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:

a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
b) the construction of a bridge or similar structure exceeding 50 m in length;
c) any development or other activity which will change the character of the site –

(i) exceeding 5000 m^2 in extent, or"

Applicability to this proposed project: A Phase 1 Archaeological and Paleontological Impact Assessment has been undertaken for the proposed development, as part of the EIA Phase of the assessment. The East Cape Provincial Heritage Resources Agency (ECPHRA) is required to provide comment on these reports to assist DEDEAT in their decision making. In order to facilitate their input, the respective reports will be loaded onto the SAHRIS website and the ECPHRA will be provided with copies of reports during the various stages of the assessment process.

4.3.2.6 National Water Act (Act 36 of 1998):

The National Water Act (NWA) is concerned with the overall management, equitable allocation and conservation of water resources in South Africa. It controls and manages water use in terms of water abstraction, water storage, wastewater discharge, impact on watercourses, altering watercourse flow and the determination of the Reserve. The General Authorizations in terms of Section 39 of the Act identify certain activities that require registration or licensing via the Department of Water Affairs that impact aquatic resources (watercourses and wetlands).

Section 144 states the Departments view on development surrounding water resources: 144) For the purposes of ensuring that all persons who might be affected have access to information regarding potential flood hazards, no person may establish a township unless the layout plan shows, in a form acceptable to the local authority concerned, lines indicating the maximum level likely to be reached by floodwaters on average once in every 100 years. In other words, the township developer must delineate the 1:100-year flood line on a map when developing a township. Measures must be implemented that prevent pollution and ecological degradation of aquatic resources i.e. rivers and wetlands.

A water use licensing application or registration is generally processed in the event that a proposed development lies within 500m of wetland habitat, in close proximity to aquatic features (wetlands, dams, rivers) or where a development crosses a watercourse; in terms of Section 21(c): impeding

or diverting flow in a watercourse and 21(i): altering the beds and banks etc. of a watercourse. Application is made in terms of the Dam Safety Regulations for dams exceeding 50 000 m^3 and with a berm wall height exceeding 5 m in height.

Applicability to this proposed project: Due to the potential occurrence of water resources (wetlands, irrigation/ storage dams and watercourses) in close proximity to the proposed development, an Aquatic Specialist Assessment has been undertaken. The results of the full Aquatic Specialist Assessment are included in the EIA Report.

The irrigation water required for the proposed agricultural expansion is proposed to be supplied from an existing dam on Farm 632, located adjacent to the R335, north of the proposed expansion area under assessment. Additionally, the proposed expansion will require the construction of a new off-stream farm dam, with a storage capacity of 49 000m^3, to act as a balancing dam, and installation of internal irrigation pipelines of various diameters (Ø60mm – Ø315mm).

Confirmation is required from the Department of Water and Sanitation (DWS) whether the undertaking of activities within 500m of wetlands that has been preliminarily identified within a 500m radius of the farm, will require a General Authorisation (GA) or the submission of a Water Use Licence Application (WULA) in terms of Section 21 (c) and (i) of the Water Act. The DWS has been included on the database for this project and will be provided with copies of reports during the various stages of the assessment process.

4.3.2.7 National Environmental Management: Protected Areas Act (Act 57 of 2003):

The National Environmental Management Protected Areas Act (NEMPAA) provides for the declaration of Protected Areas (PAs) in three forms (Chapter Three), namely Special Nature Reserves (Part 2), Nature Reserves (Part 3) and Protected Environments (Part 4). National Parks are the equivalent of National Protected Areas. Section 10 states that a Protected Area, declared in terms of provincial legislation, is either a nature reserve or protected environment.

Applicability to this proposed project: The nearest boundary of the Addo Elephant National Park is located ~11.5km east of Farm 632 (Sontule) and therefore, project activities proposed to take place on this property do not trigger listed activities which would require the assessment of impacts on the National Park.

4.3.2.8 Conservation of Agricultural Resources Act (Act 43 of 1983):

The objectives of the CARA (Act 43 of 1983) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- Maintenance of the production potential of land;
- Combating and prevention of erosion and weakening or destruction of the water sources; and
- Protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,

- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or land owner to control invasive alien plants occurring on the land under their control.

The provisions of Regulation 2 of CARA relate to the cultivation of virgin or new land. The landowner or applicant must obtain permission or authorisation in terms of Regulation 2 of the CARA Act, before virgin soil may be disturbed mechanically.

Applicability to this proposed project: The Terrestrial Biodiversity Specialist Assessment has identified CARA listed species on site. Alien plant species occurring within the study area will be managed in line with the EMPr. The Land Use and Soil Management Directorate of the Department of Agriculture, Land Reform and Rural Development as well as the Provincial Department of Rural Development and Agrarian Reform, Resource Planning Section, have been included on the project database and notified in writing of the various stages to comment on the assessment process. A Soil Reconnaissance Survey has been undertaken by a soil specialist during the EIA phase of the assessment. The applicant will need to apply for a permit for the Cultivation of Virgin Soil in terms of Regulation 2 of CARA prior to the commencement of any activities on site.

4.3.2.9. Protection of Personal Information Act 4 of 2013 (POPIA)

The Protection of Personal Information Act 4 of 2013 (POPIA) was enacted to give effect to the constitutional right to privacy by safeguarding personal information processed by a responsible party. The right to privacy includes a right to protection against the unlawful collection, retention, dissemination and use of personal information. Section 11 (1) of the Protection of POPIA states the following:

"*Personal information may only be processed if – …*
(c) processing complies with an obligation imposed by law on the responsible party;"

Section 18 (1) requires the following in terms of collection and processing of personal information:

If personal information is collected, the responsible party must take reasonably practicable steps to ensure that the data subject is aware of-

(a) the information being collected and where the information is not collected from the data subject, the source from which it is collected;

(b) the name and address of the responsible party;

(c) the purpose for which the information is being collected;

(d) whether or not the supply of the information by that data subject is voluntary or mandatory;

(e) the consequences of failure to provide the information;

(f) any particular law authorising or requiring the collection of the information;

(g) the fact that, where applicable, the responsible party intends to transfer the information to a third country or international organisation and the level of protection afforded to the information by that third country or international organisation;

(h) any further information such as the-

(i) recipient or category of recipients of the information;

(ii) nature or category of the information;

(iii) existence of the right of access to and the right to rectify the information collected;

(iv) existence of the right to object to the processing of personal information as referred to in section 11 (3); and

(v) right to lodge a complaint to the Information Regulator and the contact details of the Information Regulator, which is necessary, having regard to the specific circumstances in which the information is or is not to be processed, to enable processing in respect of the data subject to be reasonable.

Applicability to this proposed project: The POPIA came into full effect on 1 July 2021. In terms of the NEMA EIA Regulations, 2014 (as amended), an Environmental Assessment Practitioner (EAP) is required to obtain and process certain personal information of individuals who have been identified as Interested and Affected Parties (I&APs), including affected / juristic organs of state and state departments. This includes, amongst others, opening an I&AP register which contains the names, contact details and addresses of I&APs, and which register must be submitted to the competent authority. In addition, all comments submitted by I&APs during the assessment process must be recorded in a Comments and Responses report, which is included in the reports submitted to the competent authority. Copies of all comments received by the EAP during an assessment process are also attached as an appendix to the reports, which are submitted to DEDEAT. Since this is a legal obligation imposed on the EAP by law (i.e. EIA Regulations), the EAP is not required to obtain consent from I&APs to collect and process the aforementioned personal information. However, the EAP is still required to make I&APs aware of the information contained in Section 18 (1) above.

4.3.2.10 Other Applicable National Legislation:

- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993);
- Hazardous Substances Act (Act 15 of 1973)

4.3.3 Provincial and Local Legislation

4.3.3.1 Cape Nature and Environmental Conservation Ordinance (Act 19 of 1974):

The Ordinance allows for conservation of the natural environment; and the protection of wildlife. Certain biota are scheduled and, therefore, protected. A permit must be obtained from the Provincial DEDEAT, Biodiversity Section, to remove or destroy any plants listed in the Ordinance.

Applicability to this proposed project: A Terrestrial Biodiversity Specialist Assessment has been undertaken during the EIA Phase of the assessment. DEDEAT's Biodiversity Division have been included on the project database and notified in writing of the various stages to comment on the assessment process.

4.3.3.2 Eastern Cape Provincial Heritage Resources Act (Act 9 of 2003):

This Act provides for the establishment of a statutory body to identify, manage, conserve and promote heritage resources in the Province and matter related thereto.

Applicability to this proposed project: As noted under 4.3.1.5, a Phase 1 Archaeological and Paleontological Impact Assessment have been undertaken for this project. The ECPHRA is registered on the project database and all reports as a result of this assessment process will be uploaded onto the SAHRIS website to facilitate their input. In addition, the ECPHRA is emailed an

electronic copy of reports during the comment period for the various stages of this assessment process.

4.3.3.3 Other Applicable Provincial and Local Legislation:

- SRVM Integrated Development Plan (IDP), 2016/ 2017
- SRVM Spatial Development Plan (SDP), 2013
- Section 8 Zoning Scheme Regulations

4.3.4 Policies and Guidelines

The policies and plans listed below have been considered in the compilation of this report. The applicability of the relevant conservation and other planning frameworks is discussed in more detail in Chapter Three of this report and will be considered by the relevant specialists in their respective assessments as part of the EIA Phase of the assessment.

- South African National Development Plan 2030, 2011.
- Integrated Environmental Management Information Series (Booklets 0 to 23, DEA, 2002-2005)
- Integrated Environmental Management Series Guidelines:
  - Guideline 7: Public Participation in the EIA Process, (DEA, 10 October 2012, No 35769).
  - Guideline on Need and Desirability (DEA 2017).
- Conservation and Other Planning Frameworks:
  - National Biodiversity Assessment (NBA 2018).
  - National Freshwater Ecosystem Priority Areas (NFEPA).
  - National Protected Areas Expansion Strategy (NPAES).
  - South African Heritage Resources Agency (SAHRA).
  - Eastern Cape Biodiversity Conservation Plan (ECBCP 2019).
  - Subtropical Thicket Ecosystem Programme (STEP).
  - Sundays River Valley Municipality Biodiversity Sector Plan (SRVM BSP).

4.4 OVERVIEW OF THE SCOPING AND EIA PROCESS

The Scoping and EIA Process for this assessment has been divided into the following phases and is discussed in more detail below:

Pre-Application Scoping Phase (See Chapter 4 of the FSR)

- Project Announcement and Registration of I&APs (30 days)
- Additional Project Announcement and Registration of I&APs (30 days)
- Draft Consultation Scoping Report Review (30 days)
- Draft Consultation Scoping Report Additional Information - Supplementary Comment Period (30 days) – partly in parallel to the review of the Draft Consultation Scoping Report

Application and Scoping Phase (See Chapter 4 of the FSR)

- Submit Application form for Environmental Authorisation to DEDEAT
- Consultation Scoping Report Review (30 days)
- Submit Final Scoping Report to DEDEAT

Environmental Impact Assessment Phase (see Section 4.5)

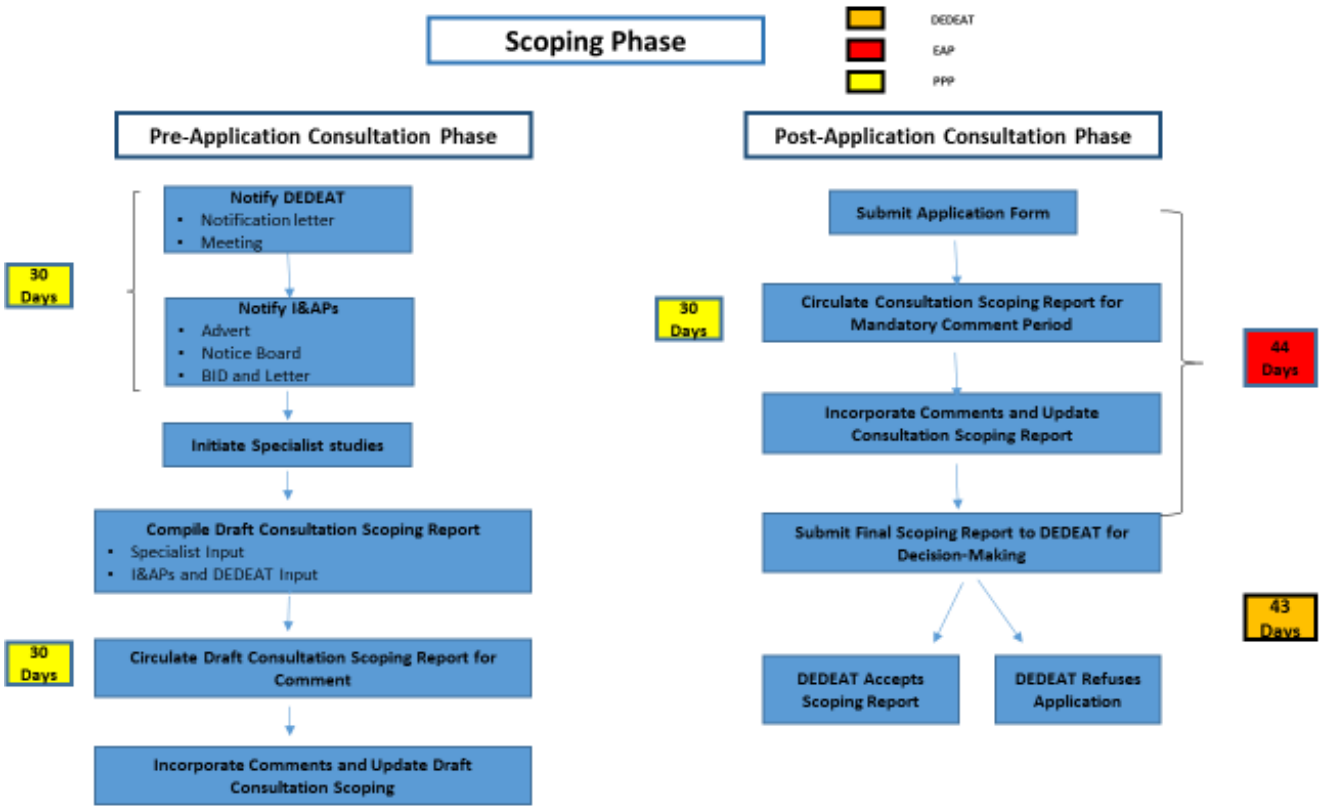
- Draft Environmental Impact Assessment Report (30 days)
- Submit Final Environmental Impact Assessment Report to DEDEAT **(WE ARE HERE NOW)**

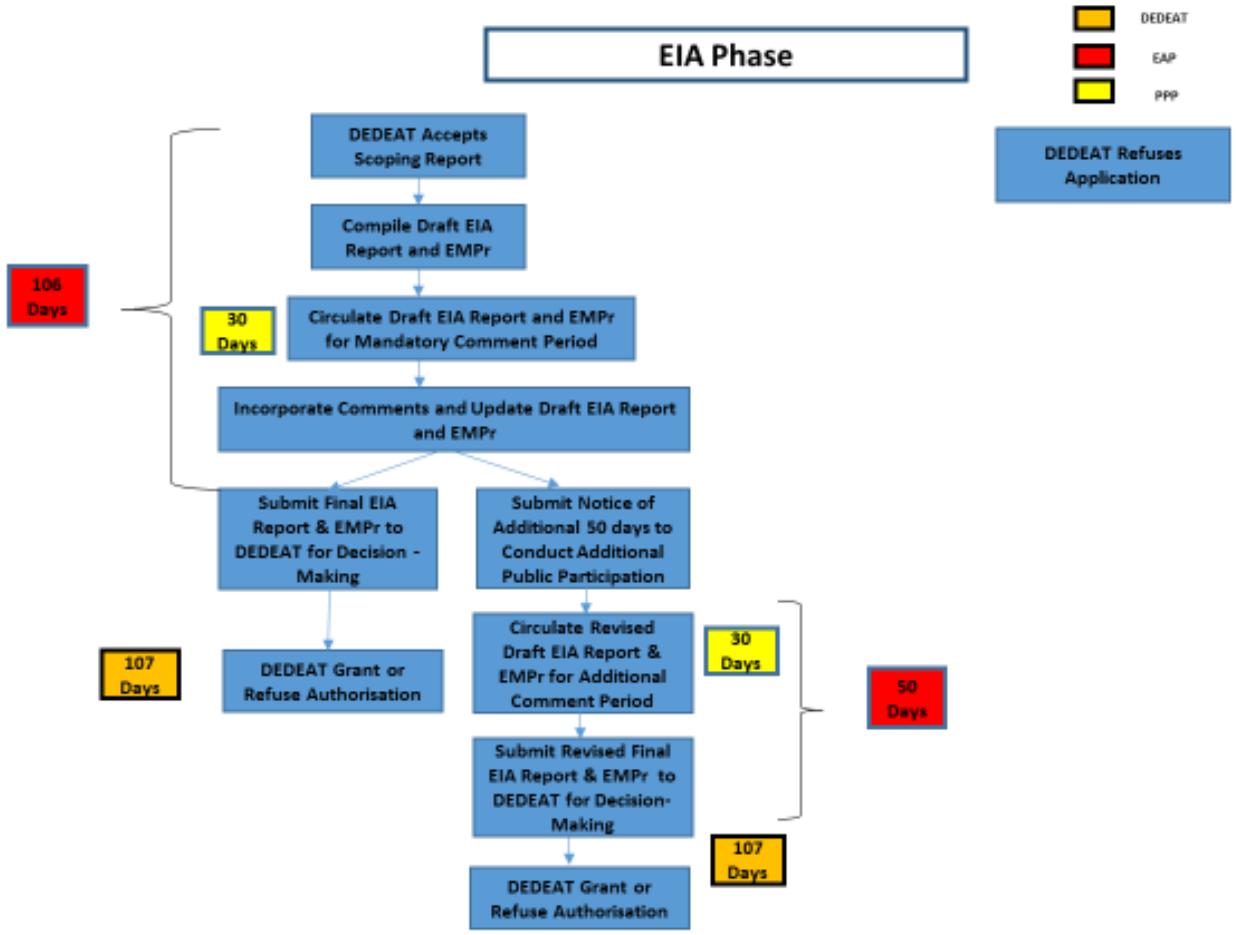
Decision Making and Appeal Period (see Section 4.5)

- Notice to I&APs of Decision and Appeal Period

The project is currently at the stage where the Final EIA and EMPr is being prepared and will be submitted to DEDEAT for their decision-making. The competent authority has 107 days to make a decision to either grant, partially grant or deny Environmental Authorisation.

The diagram below depicts the Scoping and EIA Process, which has been implemented for the proposed project. It, however, does not depict the Additional Project Announcement and Registration Period (30 days) nor the Draft Consultation Scoping Report Supplementary Comment Period, which were held during the Pre-Application Consultation Phase.





4.4.1 Principles for Public Participation

The Scoping and EIA Process is being driven by a stakeholder engagement process that will include inputs from the competent authority, affected/ Juristic Organs of State and State Departments, Interested and Affected Parties (I&APs), specialists and the project applicant.

Guideline 7 on "Public Participation in the EIA Process", published by DEA in October 2012, states that Public Participation is one of the most important aspects of the Environmental Authorisation process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective Public Participation also improves the ability of the competent authority to make informed decisions and results in improved decision-making as the view of all parties are considered (DEA, 2012: pg. 5). An effective Public Participation Process could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The Guideline (DEA, 2012) further notes that the benefits of Public Participation include the following:

- "*it provides an opportunity for I&APs, EAPs and the competent authority (CA) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;*
- *it provides I&APs with an opportunity to voice their support, concerns and questions regarding the project, application or decision;*
- *it provides I&APs with the opportunity of suggesting ways for reducing or mitigating any negative impacts of the project and for enhancing its positive impacts;*

- *it enables an applicant to incorporate the needs, preferences and values of affected parties into its application;*
- *it provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;*
- *it is an important aspect of securing transparency and accountability in decision-making; and*
- *it contributes toward maintaining a healthy, vibrant democracy."*

The EIA Process is designed to, amongst others, satisfy the requirements of Chapter 6 (Regulations 39-44) of GN R326 of the NEMA EIA Regulations 2014 (as amended), which relates to the Public Participation Process and the registration of I&APs and the acknowledgment of their comments on the proposed project. Issues raised during the Scoping Process were included in a Comments and Responses Trail as part of the Final Scoping Report. The comments raised after the submission of the FSR and prior to the release of the Draft EIA have been included as part of the Comments and Responses Trail of this Chapter of the report. Copies of comments received from I&APs are included in Appendix F of this report.

Regulation 43 (1) states the following:

43. (1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations* ***and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application***."

4.4.2 Authority Consultation

All Public Participation documentation (Draft and Final Reports) will be sent to the competent authority (DEDEAT), as well as other affected/ Juristic Organs of State and State Departments, which may have jurisdiction over an aspect of the project and are included on the I&AP database. Authorities are required to provide their input into the assessment process, within the timeframes stipulated. Input from authorities has been included in the Comments and Responses Trail for the Scoping and EIA Process.

In order to initiate the Scoping and EIA Process, notification of the intention to commence with a Scoping and EIA Process, was initially submitted to the competent authority (DEDEAT) on 21 August 2019 and sent to all identified Interested and Affected Parties (I&APs) and Organs of State on 22 August 2019.

Subsequent to the initiation of the assessment process, it was determined that an existing Environmental Authorisation had been issued for agricultural development on RE/632, dated 13 February 2002 (Reference: EC06/2d/96-01). Therefore, DEDEAT requested that a compliance audit be undertaken for the site to determine any instances of non-compliance.

Due to the delay that occurred as a result of undertaking the compliance audit, as well as to accommodate certain legislative changes that occurred in the interim, an additional Project Announcement and Registration comment period was provided. Therefore, the assessment process was reinitiated and the competent authority as well as all I&APs and Organs of State on the project database were again notified of the intention to commence the assessment process on 23 September 2021. Included with the notice of intention to commence was a Background Information Document (BID), locality map and a comment form.

On 1 June 2022, an Application Form for Environmental Authorisation, inclusive of listed activities, was submitted to DEDEAT. Correspondence was received from DEDEAT on 2 June 2022 confirming that the application is deemed to be complete and confirming that Reference Number **EC06/C/LN2/M/23-2022** had been assigned to the application. The Consultation Scoping Report was released for I&AP and Authority review from the 3 June to 4 July 2022.

The Final Scoping Report, including the Plan of Study for the EIA, was submitted to the competent authority on 8 July 2022 and acknowledgement of receipt was received later that same day. No comment period was provided for the FSR. An official acceptance for the Final Scoping Report and the Plan of Study for EIA, was received from DEDEAT on the **22 August 2022**.

Notification of the 32-day Authority and I&AP review period for the Draft EIA and EMPr, which extended from **8 September 2022 to the 10 October 2022**, was submitted to DEDEAT on 8 September 2022. Acknowledgement of receipt of the Draft EIA Report was received from DEDEAT on the 15 September 2022. The EIA is currently at a stage where the Final EIA is being prepared for submission to DEDEAT for their decision-making. Copies of correspondence to and from DEDEAT, have been attached to this report as Appendix B and correspondence to and from I&APs, affected/ Juristic Organs of State and State Departments, are attached as Appendix E and F of this report, respectively. In line with NEMA Regulations, 2014 (as amended), the Final EIA which has been subjected to a minimum, legislated 30-day I&AP review period, must be submitted to DEDEAT within 106 days of the acceptance of the FSR and approval of the Plan of Study for the EIA by DEDEAT, **by 07 December 2022**.

Affected/ Juristic Organs of State and/ or State Departments, which may be required to issue a licence or permit prior to commencement of the project, have been consulted and are included on the project database. Appendix D.2 includes the database of affected/ Juristic Organs of State and/ or State Departments, which may have jurisdiction over an aspect of the project, with their contact details. The following National, Provincial and Local Government Departments, as well as other Organs of State, were proactively identified and included on the database for this project prior to advertising the Scoping Process (Pre-Application Phase) and have been notified of the various stages to comment:

- National and Provincial Government Departments
  - Provincial Department of Economic Development, Environmental Affairs and Tourism (Competent Authority)
  - Provincial Department of Economic Development, Environmental Affairs and Tourism (Biodiversity Section)
  - National Department of Agriculture, Land Reform and Rural Development (DALRRD)
  - Provincial Department of Rural Development and Agrarian Reform
  - Provincial Department of Water and Sanitation
  - Eastern Cape Department of Transport
  - Department of Forestry, Fisheries and Environment (DFFE: Forestry)
  - Eastern Cape Provincial Heritage Resources Agency
- Other Organs of State and Government Departments
  - Sundays River Valley Municipality: Local Authority
  - Lower Sundays River Water Users Association
  - Sundays River Valley Municipal Ward Councillor, Ward 8

These affected/ Juristic Organs of State and State Departments will remain on the database for the duration of the Scoping and EIA Process and will receive information in the format as agreed to with the respective departments. Information available for I&AP review is placed on the project website www.publicprocess.co.za for the duration of the Scoping and EIA Process.

4.4.3 Database Development, Maintenance and Ongoing Information Sharing

The following provides an outline of the approach to the development of the database for the Project Announcement Phase of the Scoping Process, as well as the maintenance of the database and ongoing information sharing throughout the Scoping and EIA Process.

Prior to advertising the Scoping and EIA Process, the EAP, drawing on experience in the local Sundays River Valley municipal area and by means of a deed search, developed an initial database of potential I&APs for the initiation of the Scoping Process. Adjacent landowners/ tenants were identified through a deeds search (Windeed) and, where required, contact information was confirmed by telephonic communication. This database included, amongst others, adjacent landowners/ tenants, affected/ Juristic Organs of State and State Departments, the competent authority (as outlined in Section 4.4.2 above), the Councillor for Ward 8 and other potential I&APs.

The Scoping and EIA process for this assessment initially commenced in August 2019. However, the process was delayed due to a request from the competent authority (DEDEAT) to undertake a compliance audit of the site. To take into account the duration of the delay as well as recent legislative changes, and so as to ensure good practice, the assessment was re-initiated and an additional “Project Announcement and Registration” comment period was provided, which comment period commenced on 23 September 2021.

All potential I&APs were notified, via Letter 1, sent with normal mail, as well as email, where available, of the initiation of the Scoping and EIA process. At the time of advertising the Scoping and EIA Process, the database included 27 registered IA&Ps.

At the time of the submission of the FSR, the I&AP database included 52 registered IA&Ps.

For more details regarding Database Development, Maintenance and Ongoing Information Sharing, during the Scoping Phase of this assessment process, please refer to the Final Scoping Report.

The identification and registration of I&APs will be ongoing for the duration of the Scoping and EIA Process. While not required by the regulations, those I&APs identified at the outset of the Scoping Process will remain on the project database and will be kept informed of all opportunities to comment and will only be removed from the database by request.

I&AP details on the database will be regularly captured and automatically updated as and when information is distributed to or received from I&APs, throughout the assessment process. This ongoing and up-to-date record of communication will be an important Public Participation component which accurately reflects the interaction with I&APs throughout the assessment process. The I&AP database is attached as Appendix D of the report which is submitted to DEDEAT. Due to the POPI Act, this database is not released into the public domain.

All I&APs were notified, via email, of the release of the Draft EIA report and EMPr for a legislated 32-day comment and review period, which extended from **8 September 2022 to the 10 October 2022**. This notification included an executive summary, comment form and an electronic link to the project website where available information can be downloaded. Prior to the release of the Draft EIA & EMPr for comment it was confirmed that Mr. Sello Mokhanya has been replaced by Ms. Ayanda Mncwabe-Mama as the representative of the Eastern Cape Provincial Heritage Resources Authority. Comments were received from Mr Howard Blane (Eskom Distribution Division: Cape Coastal Cluster - Land and Right Manager) and Mr John Vosloo (Legal representative for Mr Dawie van der

Westhuizen, *et al*.) Copies of correspondence to and from I&APs are included in Appendix E and F, respectively. At the time of the submission of the Final EIA to DEDEAT, the project database included **52 registered I&APs.**

The sections below provide an overview of the tasks that have been undertaken and which are to be undertaken in the EIA Phase of the assessment, with an emphasis on providing a clear record of the Public Participation Process followed, to ensure that the objectives for Public Participation and the Scoping Process for this EIA are achieved.

4.5 PUBLIC PARTICIPATION PROCESS FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND EMPr

The following section outlines the various steps to be followed in the public participation process for the EIA phase of the assessment. The participation process for the Scoping process is outlined in detail in the FSR. While not required by the regulations, all I&APs on the project database were notified in writing of the submission of the FSR to DEDEAT for their decision making. See copy of correspondence attached in Appendix E.

4.5.1 Compile Draft EIA Report and EMPr

After acceptance of the FSR and approval of the Plan of Study (PoS) for EIA, the assessment moves into the EIA phase. This entails the compilation of the Draft EIA and EMPr for a 30-day legislated I&AP and authority review period. The Draft EIA and EMPr has been compiled based on the specialist studies conducted for the project as outlined in the accepted FSR and approval of the Plan of Study (PoS) for EIA, received from the competent authority, DEDEAT.

4.5.2 Review of the Draft EIA (and EMPr) and Ongoing Communication

The Draft EIA Report and EMPr were made available for a legislated 32-day I&AP and authority review period, which extended from 8 September to 10 October 2022. The following indicates the Public Participation Process that were implemented for the review of the Draft EIA Report and EMPr, in order to allow I&APs, affected/ Juristic Organs of State and State Departments to submit comments on the Draft EIA Report and to facilitate access to information:

- Advertisement was placed in one local newspaper:
  - The Herald, 08 September 2022 (Provincial Distribution)
- Letter 7 to I&APs - Notification of comment period on the Draft EIA and EMPr.
- Report Distribution:
  - All I&APs, affected/ Juristic Organs of State and State Departments on the project database were notified of the Draft EIA Report and EMPr for a legislated minimum 32-day comment and review period, via email. Included with this notification was an executive summary of the Draft EIA Report and a comment form.
  - Key I&APs (Competent Authority, Councilor, Affected/ Juristic Organs of State and State Departments) were provided with a copy of the Draft EIA, in the format agreed to with the respective Departments namely, emailed link to the report on the website or electronic version of the report via email, or via WeTransfer.
  - A copy of the Draft EIA Report and appendices, including an executive summary, as well as a copy of the Draft EMPr were placed on the project website www.publicprocess.co.za.
- Focus Group Meetings:
  - No Focus Group Meetings were requested by any I&APs

- Authority Consultation – Affected/ Juristic Organs of State and State Departments were provided with copies of the report, and, where provided their input was included in the Final EIA Report, as agreed to with the respective Departments.
- Submission of Draft EIA to DEDEAT:
  - The project case officer, Ms Nicole Gerber were emailed notification regarding the 30-day comment period to be provided for the review of the Draft EIA Report and EMPR and this email included a link to the project website where the report could be downloaded. A link to a Dropbox folder containing the report were also be included in the email. Dayalan Govender, Andries Struwig and Charmaine Struwig were copied in on the email notification.

A copy of the I&AP database was submitted to DEDEAT, and at the time of release of the Draft EIA included **52 registered I&APs**. Due to the POPI Act, this database is not released into the public domain.

4.5.3 Compilation of the Final EIA Report and EMPr, as well as Submission to Authorities

In line with Regulation 23 (1) of the NEMA EIA Regulations 2014 (as amended), the Final EIA Report, including the Comments and Responses Trail and EMPr, will be compiled for submission to the DEDEAT for their decision-making, within 106 days from the acceptance of the Scoping Report. The following process will be followed regarding the notification to I&APs, affected/ Juristic Organs of State and State Departments of the submission of the Final EIA Report.

- Letter 8 to I&APs: Notification of submission of the Final EIA Report and EMPr via email.
- Report Distribution:
  - Key I&APs (Competent Authority, Councilor, Affected/ Juristic Organs of State and State Departments) will be provided with a copy of the Final EIA, in the format agreed to with the respective Departments namely, emailed link to the report on the website or electronic version of the report via email or WeTransfer.
  - Project information available for the Final EIA Report and appendices, as well as a copy of the EMPr will be placed on the project website www.publicprocess.co.za.
- Submission of Final EIA to DEDEAT:
  - The project case officer, Ms Nicole Gerber, will be emailed notification regarding the submission of the Final EIA and this email will include a link to the project website where the report can be downloaded. A link to a Dropbox folder containing the report will also be included in the email. Dayalan Govender, Andries Struwig and Charmaine Struwig will be copied in on the email notification.

The Final EIA Report will also include proof of the Public Participation Process that was undertaken to inform all registered I&APs, affected/ Juristic Organs of State and State Departments, of the availability of the Draft EIA Report and EMPr for the legislated minimum 30-day comment and review period.

4.5.4 Decision on Application and Appeal Period

The competent authority must, within 107 days of receipt of the Final EIA and EMPr, reach a decision with regards to the application (Environmental Authorisation Granted or Refused), in line with Regulation 24 (1) of the NEMA EIA Regulations 2014 (as amended). All I&APs, affected/ Juristic Organs of State and State Departments on the project database will be notified once the competent authority has reached a decision on the application. In terms of Regulation 4 (2) the applicant must, within 14 days of the date of the decision, notify all registered I&APs of the decision and provide them with access to the decision and reasons for the decision, as well as draw their attention to the

fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. The following process will be followed for the notification of the decision:

- Letter 9 to I&APs: Notification of the Decision and Appeal Period.
  - All I&APs, including affected/ Juristic Organs of State and State departments will be notified of the decision reached by the competent authority, via email.
  - A copy of the Environmental Authorisation, granted, partially granted or refused, will be placed on the website www.publicprocess.co.za.

All I&APs, affected/ Juristic Organs of State and State Departments on the project database will be notified of the outcome of the appeal period if an appeal is lodged, this notification will be included in Letter 9 to I&APs.

4.6 IDENTIFICATION OF ISSUES

An important element of the EIA Process is that it should be undertaken in a consultative manner. To, inter alia, capture and respond to comments made by I&APs and authorities in order to respond to comments made and indicate where this has been addressed in the assessment process, as well as where comments fall beyond the assessment process to provide reasoning for such.

In accordance with the philosophy of Integrated Environmental Management, it is necessary to focus the EIA on the key issues raised. Comments received during the Scoping Phase of this assessment were captured and included in the Comments and Responses trail in the Final Scoping Report. A comment was received from one commentator, Mr Zinzile Mtotywa, after the submission of the FSR to DEDEAT. This comment, as well as comments received from DEDEAT since the submission of the FSR to DEDEAT and prior to the release of the Draft EIA and EMPr for I&AP review, have been captured in the Comments and Responses Trail below (Table 4.3). Copies of comments received from DEDEAT and from I&APs / Organs of State are included in Appendix B and F, respectively.

Comments received during the 32-day Draft EIA and EMPr comment period have been included in the Final EIA Report. The Comments and Responses trail will indicate the nature of the comment, as well as when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses will be provided by the relevant member of the team and/or specialist. The response provided indicates how the comment received has been considered in the Final EIA, in the design, or in the EMPr for the project. Where the comment received falls outside of the scope of the EIA this has, as far as possible, been clearly indicated and reasons provided. Copies of the correspondence to and from I&APs has been included in Appendices E & F respectively.

Comments on the Draft EIA and EMPr were received and documented as follows:

- Written and email comments (emails and electronic comment forms).
- As far as practically possible, telephonic consultations was held with I&APs, upon request, and such discussions was confirmed by email.
- One on one meetings with key authorities and/ or I&APs (as requested).

A copy of the I&AP database will be submitted to DEDEAT, and at the time of release of the Final EIA included **52 registered I&APs**. Due to the POPI Act, this database is not released into the public domain.

The table below provides a summary of the issues raised by I&APs and Organs of State / State Departments during the EIA phase of this assessment process. The issues raised have been divided into categories. The left-hand column indicates the issue raised in the form of a category. The number of issues raised per category is given in the middle column. The right-hand column indicates

the commentators and in brackets the number of times a commentator has raised an issue per category.

Table 4.2: *Summary of Issues Raised during the EIA Process*

ISSUE	NO.	COMMENTATORS AND NUMBER OF ISSUES RAISED PER COMMENTATOR[2]
COMMENTS RECEIVED PRIOR TO THE RELEASE OF THE DRAFT EIA & EMPR FOR COMMENTS AND REVIEW		
1. EIA and Public Participation	1	**Prior to Draft EIA** • Zinzile Mtotywa, Dept. Forestry, Fisheries and Environment: Forestry (1 Comments)
COMMENTS RECEIVED DURING THE DRAFT EIA & EMPr COMMENTS AND REVIEW PERIOD		
2. EIA and Public Participation	3	**Draft EIA & EMPr** • Howard Blane, Eskom: East London - Land Rights Manager (1 Comment) • John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen, *et al* (1 Comment)
3. Visual Impacts of Existing and Proposed Shade cloth	22	• John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen *et al* (22 Comments)

[2] **Note:** This summary table does not include the comments made by DEDEAT

Table 4.3: Comments and Responses Trail.

- ***Comments received from I&APs***

1. EIA Process and Public Participation

ISSUES RAISED BY I&APS *PRIOR TO* THE REVIEW OF THE DRAFT EIA REPORT				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
1.1	This serves to acknowledge receipt of the report.	Zinzile Mtotywa, Dept. Forestry, Fisheries and Environment: Forestry	*8 July 2022, Email*	As a representative of a potentially Juristic State Department, the commentator was provided with a copy of the Final Scoping Report, by means of an emailed link to the report on the project website. This comment was made in response to receipt of the report.
ISSUES RAISED BY I&APS DURING THE REVIEW OF THE DRAFT EIA & EMPr REPORT				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
1.2	Please find attached. Eskom Distribution in East London remain an interested party.	Howard Blane, ESKOM: East London - Land Rights Manager	*8 September 2022, Email*	This commentator was proactively registered on the project database as a representative of Eskom, prior to the project announcement and registration phase of this assessment and will remain on the project database for the duration of this Scoping & EIA process. The commentator will be provided with copies of the available information and will be notified of the various opportunities to comment throughout this assessment Process.
1.3	Eskom DX = East london remain a interested party. There could be Eskom powerlines that could be impacted by this expansion	Howard Blane, ESKOM: East London - Land Rights Manager	*8 September 2022, Comment Form*	This comment is noted. The applicant, Sun Orange farms (Pty) Ltd, has met with Eskom representatives on site to discuss the upgrading of existing distribution infrastructure and new distribution infrastructure on site. The details of this infrastructure are outlined Chapter 2 of the Draft and Final EIA in section 2.2.2.5 and on Map 2.3. Should any additional Eskom infrastructure be affected by the proposed expansion, Eskom must be consulted by the project applicant.
1.4	Yourselves are aware of which I&AP (clients) we act for (see our letter dated 23 September 2021) and for whom we continue to act. The comments below relate to the existing older orchard being farm 632 with ROD dated 13 / 2 / 2002 (old orchard) as well as	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.*	*10 October 2022, Email*	The clients Mr Vosloo represents were included in his correspondence during the first *initial* project announcement period (August 2019) and the *second* project announcement period (September 2021) and therefore were included, in the Draft Consultation Scoping Report (DCSR), Consultation Scoping Report

	the current proposed expansion and should be read as being applicable to both portions of property as may be applicable. 1. Client's previous correspondence as set out as appendixes to the consultation and final scoping report herein still stand and are deemed and to be read as if incorporated herein.	(Adjacent Landowner)		(CSR) and Final Scoping Report which was submitted to DEDEAT for their decision making. The Final Scoping Report and Plan of Study for EIA (POSEIA) was accepted by DEDEAT on the 22 August 2022. With regards to the old orchards, and as contained in the Draft Consultation Scoping Report, "*The erection of shade cloth is not a listed activity in terms of the NEMA EIA Listed Activities, 2014 (as amended) therefore an environmental assessment process is not required to be undertaken prior to the erection of shade cloth over existing orchards*." It is further noted, as contained in the Final Scoping Report which was accepted by DEDEAT, that shade cloth over existing orchards on Sontule and elsewhere in the area falls beyond the scope of the current assessment and DEDEAT's jurisdiction in this impact assessment process. However, it is acknowledged that although the installation of shade cloth itself is not a listed activity, it is a potential impact that arises from other listed activities. For that reason, and based on the comments received from I&APs (in particular, this I&AP) a Visual Impact Assessment was recommended in the POSEIA in the Scoping Report which included an assessment of cumulative impacts. The Final Scoping Report and POSEIA, including the comments that were raised during the Scoping Process, through 4 separate 30 day comment periods, and their responses was accepted by DEDEAT on the 22 August 2022. As indicated in the Final Scoping Report, "*The Scoping phase of the EIA refers to the process of determining the spatial and temporal (extent) boundaries for the EIA, as well as the key issues to be addressed in the EIA phase. This is done through a parallel process of consultation with I&APs, the competent authority, affected/ Juristic Organs of State and State Departments and specialist input."* As per Appendix 2 of the NEMA EIA Regulations, 2014 (as amended), the objectives of the Scoping Process are to, amongst others, "*identify the key issues to be addressed in the assessment phase*".

				As contained in the Scoping Report, "*During the Scoping Process, it is important to evaluate and prioritise the issues raised through the interactions with authorities, I&APs, specialists on the EIA team, and the project applicant. In accordance with the philosophy of Integrated Environmental Management, it is necessary to focus the EIA on the key issues raised. To assist in the identification of key issues, a decision-making process is applied to the issues raised, based on the following criteria:* *• Whether the issue falls within the scope and responsibility of this EIA.* *• Whether sufficient information is available to respond to the issue raised without further specialist investigation.* *Where an issue is considered to fall beyond the scope of this assessment process, sufficient reasoning needs to be provided*." The EAP has applied this reasoning to the issues raised by these I&APs and their attorney during the Scoping Process. During this Draft EIA comment period, the attorney states "*1. Client's previous correspondence as set out as appendixes to the consultation and final scoping report herein still stand and are deemed to be read as if incorporated herein*." The issues raised by the attorney as well as his client were included in the Scoping Phase of the Assessment. It is noted that the commentators do not confirm or dispute any of the responses provided by the EAP to the issues that were raised during the Scoping Process.

2. Visual Impacts of Existing and Proposed Shade Cloth

ISSUES RAISED BY I&APS DURING THE REVIEW OF THE DRAFT EIA & EMPr REPORT				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
2.1	2. With reference to the comments in the executive summary *viz a viz* the Visual Impact Assessment in respect of the proposed shade cloth (old and proposed new) we are instructed as follows:-	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.*	*10 October 2022, email*	The commentator makes reference to an "executive summary", however the commentator does not indicate which executive summary he is referring to, the one for the Draft EIA or the executive summary for the Visual Impact Assessment in Chapter 12 of the Draft EIA.

	2.1 Yes, it may be so that certain views already contain features associated with citrus production. This is a very broad and non specific and non descriptive statement and relates to certain views only, not all views. The shade cloth referred to however goes much further than a citrus association to the extent that same visually dominates the landscape and holds very significant negative visual impacts. It is thus not as "gentle" as something simply being associated with citrus production as such.	(Adjacent Landowner)		The commentator makes reference to "*certain views*" and then goes on to state "*This is a very broad and non specific and non descriptive statement and relates to certain views only, not all views*". (underlining provided). The visual impact specialist does not make reference to all views. However, as noted in the VIA when referring to this adjacent landowner's property *"views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project*." As contained in the Final Scoping Report, *"The erection of the shade cloth around the existing orchards on Sontule falls beyond the scope of this assessment process."*, and DEDEAT's jurisdiction in this impact assessment process. Existing and proposed shade cloth over orchards, which do not belong to the project applicant and on land which does not belong to the project applicant, falls beyond the scope of this assessment. However, the Visual Impact Assessment (VIA) has assessed the cumulative impacts of the proposed and existing shade cloth and rated this impact as medium negative. Shade cloth has historically not been associated with citrus production in the Sundays River Valley, however this is no longer the situation, and based on the issues raised by this I&AP a Visual Impact Assessment has been undertaken for this EIA as shade cloth may be utilised within the proposed new orchards.
2.2	2.2 The very same shade cloth in fact materially and significantly changes and alters the visual perception of the prevailing landscape and its natural state (even when planted with orchards only)	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	As indicated in the Final Scoping Report and in the response above, the existing shade cloth on Sontule as well as shade cloth on other orchards and property which do not belong to the project applicant fall beyond the scope of this assessment and DEDEAT's jurisdiction in this impact assessment process. However, the impact thereof has been assessed and rated by the VIA under cumulative impacts, with a rating of medium negative. The Sundays River Valley is not in a natural state as claimed by the commentator, amongst others, natural vegetation has been removed for various forms of agriculture, namely, orchards, various fruit and

				vegetable varieties (e.g., cabbages, broccoli, pumpkins, butternuts and melons of various varieties). It is further characterised by two towns (Addo and Kirkwood), the settlement of Sunlands, Provincial and District Roads (tarred and gravel) as well as other activities associated with agriculture, packhouses, farm dams and irrigation canal systems.
2.3	2.3 Most importantly the Visual Impact Assessment study goes to an assessment through the eyes and perception of the beholder, the landowners and receptors as opposed to the impacts same may or may not have on the natural vegetation as the high water mark or test thereof. The test is predominantly subjective.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	As noted in the VIA: "*The assessment of likely effects on a landscape resource and on visual amenity is complex since it is determined through a combination of quantitative and qualitative evaluations*." "*A qualitative evaluation of the landscape is essentially a subjective matter. In this study, the aesthetic evaluation of the study area is determined by the professional opinion of the author based on on-site observations and the results of contemporary research in perceptual psychology*." (VIA, Chapter 12, Draft EIA) The commentator states the assessment is predominantly subjective, as indicated above the assessment is "*a combination of quantitative and qualitative evaluations."* An independent Visual Impact Assessment has been undertaken for this project by a qualified individual and their professional opinion has been provided. The VIA notes "*In determining the quality of the visual resource for the Sontule Project site, both the objective and the subjective or aesthetic factors associated with the landscape are considered*." (underlining provided)
2.4	2.4 Whether the environment continues to function in a modified manner or not does not change the highly negative visual impact of shade cloth scarring of the landscape in the eyes of the beholder, especially when the beholder lives in its immediate vicinity, is faced with same every single day and it results in a very negative impact on its own tourism and hunting business adjacent thereto.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule and within the local area, as well as on properties which do not belong to the project applicant, fall beyond the scope of this assessment and DEDEAT's jurisdiction in this impact assessment process. However, the cumulative impact has been assessed as medium negative. Further, as indicated above, the landscape is not in a natural state and has been altered by various forms of agriculture, and associated infrastructure. The VIA notes "*The Project's visual impact will cause changes in the landscape that are noticeable to receptors living in and visiting residences, tourist areas, and public roads to the south, north and east of the project site. It has been established that the most*

				sensitive receptors are residents as well as visitors of the property immediately to the south of the site." (underlining provided) This is the commentators client's property. The VIA goes on to note "*However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project*." *(Draft EIA Sontule Citrus, Executive Summary.*
2.5	2.5 Mitigating factors such as a row of buffer trees is with all due respect simply not a mitigating factor against a visual assault such as hectares upon hectares of shade cloth. A mere elevation of a few feet some distance away naturally exposes the vast majority of the sea of shade cloth to the viewer. Our clients residence and business is primarily situated above and elevated from the existing and proposed development / shade cloth resulting in an almost 100% constant view thereof. A buffer of trees will not alleviate the problem and is not a mitigating factor.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment as well as DEDEAT's jurisdiction in this assessment, however they have been assessed as a medium negative cumulative impact. The VIA notes that even with mitigation the cumulative rating of the impact remains medium negative. As indicated above the VIA notes "*It has been established that the most sensitive receptors are residents as well as visitors of the property immediately to the south of the site*." (underlining provided) and "*However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project."* As indicated by the commentator a row of trees alone is not the only mitigatory measure proposed, the following mitigatory measures are proposed: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.* • *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* o *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours,*

				appropriate lighting (of appropriate lumen and downward angles) should be ensured." (Draft EIA Sontule Citrus, Executive Summary)
2.6	2.6 It is denied that the impact of the shade cloth can be categorized as medium negative.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	This comment is noted.
2.7	2.7 The alteration to the visual landscape is not moderate but extremely negative and highly obvious to the extent that it significantly and dramatically changes the visual impact of the landscape in a massive way. It amounts to an assault on the natural senses when one is accustomed to seeing green veldt or green orchards which are suddenly replaced by an undulating sea of shade cloth over hectares upon hectares or landscape.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment, however they have been assessed as a medium negative cumulative impact. As indicated above the Sundays River Valley is not in a predominantly natural state, amongst others, this is an actively farmed area, natural vegetation has been removed for various forms of agriculture, namely, orchards, various fruit and vegetable varieties (e.g., cabbages, broccoli, pumpkins, butternuts and melons of various varieties). It is further characterised by two towns (Addo and Kirkwood), the settlement of Sunlands, Provincial and District Roads (tarred and gravel) as well as other activities associated with agriculture, packhouses, farm dams and an irrigation canal system.
2.8	2.8 A Visual Impact Assessment does not assess the landscape but rather the viewer's assessment, evaluation and appraisal of the landscape and how it may be changed or altered by a specific event or construction. The viewer includes those who live in the immediate area, travel through the area as well as tourists. Special regard is to be had where people reside and do business on the doorstep of such proposed shade cloth installation with absolutely no possibility of not having to look at the entirety thereof every single time one goes outside or looks in its direction.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment, however they have been assessed in the VIA as a medium negative cumulative impact. The installation of shade cloth itself is not a listed activity, it is a potential impact that arises from other listed activities. For that reason and based on the comments received from I&APs (in particular, this I&AP) a Visual Impact Assessment was recommended in the Plan of Study for EIA (POSEIA) in the Scoping Report which included an assessment of cumulative impacts. The following mitigatory measures are proposed for in the VIA for the current area under assessment on Sontule: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.*

				• *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary)
2.9	2.9 One must also have regard to not only the viewer's perception and assessment of the visual assault caused by the shade cloth but also evaluate its impact on any business which may be near or adjacent thereto and which relies on natural views of "Africa" such as eco-tourism and hunting as its draw card, primary marketing element and use element by way of example. This being exactly the situation our clients find themselves in. After spending years or expensive developing and promoting of an African eco-hunting experience, their clients (overseas and local hunters and eco-tourists) are now faced with swathes of commercial shade cloth in almost every direction they look. Gone is the inherent value of the natural green fauna and flora. Even orchards in their natural state would not detract from the African experience in the manner which artificial shade cloth does. In this manner the visual impact is not only negative and offensive to the viewer but also devastating to certain business enterprises resulting in a significant devaluation and loss of capital investment. These are factors that can never ever be mitigated	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment as well as the jurisdiction of DEDEAT on this assessment. However, the VIA rates the impact as a medium negative cumulative impact. The commentator refers to an "African eco-hunting" experience. However, the property under assessment is located adjacent to an historically commercial agricultural area, which is characterised by various forms of extensive and intensive agriculture, provincial as well as district roads (gravel and tarred), packhouses, farm dams and irrigation canals associated with agricultural activities. It is therefore, highly unlikely that any clients of these I&APs would be seeking an African eco-hunting experience in the area. To the extent that it is argued that the shade cloth will result in socio-economic impacts (as a result of an impaired sense of place) it is necessary for the I&AP to substantiate the claim about adverse impacts on his African eco-hunting business in considerably more detail before any weight can be given to it.
2.10	2.10 The existence of shade cloth in the sub-region is no ground of justification as the EP may want one to believe. Each and every situation is to be evaluated on its own merits and its own unique characteristics, demands and obligations. There is no general standard that can be applied "across the board" as such.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	It is the opinion of the VIA professional that the following mitigatory measures should be applied, however the impact will remain medium negative: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.* • *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.*

				• *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary) A general standard has not been applied to the VIA but is site specific with regards to the proposed shade cloth which may erected over the orchards which form part of this assessment
2.11	2.11 Just because a certain state of affairs is not uncharacteristic to a sub-region at large does not make it acceptable.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The property under assessment is located adjacent to an historically commercial agricultural area, which is characterised by various forms of extensive agriculture, provincial as well as district roads (gravel and tarred), packhouses, farm dams and irrigation canals. Additionally, the proposed site for the agricultural development is currently zoned as Agriculture I. The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment, however they have been assessed as a medium negative cumulative impact.
2.12	2.12 It is to be noted that the majority of shade cloth in the sub-region (the Makay Bridge area and surrounds) is predominantly white making the visual assault even more distasteful.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	Shade cloth in the vicinity of the Makay Bridge area falls beyond the scope of this assessment. However, it is the opinion of the VIA professional that the following mitigatory measures should be applied to the proposed new area under assessment on Sontule however the impact will remain medium negative: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.* • *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary)
2.13	2.13 Maintenance of the shade cloth is not a mitigating factor as it does not change the fundamental nature of the structure at	John Vosloo: John Vosloo Attorneys Legal Representative	*10 October 2022, email*	The EAP would concur with the commentator that maintenance of the shade cloth should be good business practice, however this sometimes does not take place

	all. Maintenance of the shade cloth is a matter of good business practice and not a mitigating factor to visual impacts	to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)		and thus in order to ensure good practise, it has been included as a mitigatory measure.
2.14	2.14 The Visual Impact Assessment goes to the question and evaluation or whether the structure or event results in any changes to the visual environment / landscape and sense of place or not. This can only take place through the eyes of the beholder and his or her perceptions. The potential rights of the developer must rank second to those of the beholder in these circumstances.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	As indicated above the Sundays River Valley is not in a natural state and is characterised by various forms of extensive agriculture, provincial as well as district roads (gravel and tarred), packhouses, farm dams and irrigation canals. Additionally, the proposed site for the agricultural development is currently zoned as Agriculture I. It is reasonable to expect changes over time which are associated with Agricultural activities and practises.
2.15	2.15 Whilst there was previously no requirement for an approved EIA to cover previously approved and planted orchards with shade cloth, new orchards that may be covered with shade cloth now do require a study / assessment to secure an EIA. This in itself is ample proof that shade cloth, its visual impacts and its intrusion is as a matter of fact highly relevant and is in truth recognized as a potential negative visual impact requiring an assessment of all relevant factors surrounding same.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The utilisation of shade cloth over proposed new orchards which form part of an assessment is not a listed activity requiring environmental authorisation. However, it is acknowledged that although the installation of shade cloth itself is not a listed activity, it is a potential impact that arises from other listed activities. For that reason and based on the comments received from I&APs (in particular, this I&AP) a Visual Impact Assessment was recommended in the approved Plan of Study for EIA (POSEIA) in the Scoping Report which included an assessment of cumulative impacts.
2.16	2.16 As to older approved orchards now being covered by shade cloth (with no obvious current prescripts) NEMA does prescribe a general duty of care (sec 28) which if implemented correctly will and should have the same effect as embarking on a prescribed assessment with its incumbent requirements, checks and balances. It is submitted that this is the exact state of affairs in the current situation in respect of the old orchard now covered with shade cloth.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The existing shade cloth on Sontule as well as within the local area fall beyond the scope of this assessment as well as the jurisdiction of DEDEAT on this assessment. However, the VIA rates the impact as a medium negative cumulative impact. The practise of erecting shade cloth over orchards has emerged in response to climate change which has resulted in greater variability of temperatures affecting fruit size, orchard water usage (~10% by 2050), and fruit cosmetic damage due to wind, hail, and sunburn (Bijzet and Weepener, 2016) (Citrus Research International, October 2016). This practise is evident in the Sundays River Valley, Gamtoos River Valley area and certain farming areas in the Western Cape.
2.17	2.17 The complaisance audit in respect of the old orchard does not pass with flying colours. By way of example, generally accepted buffers are not in place, installed shade cloth borders our client's property by less than 1 meter in certain areas creating serious security risks and making it impossible for our client to	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.*	*10 October 2022, email*	This issue falls outside of the scope of the current assessment process.

	properly patrol its borders. Hunting / poaching parties enter our client's property through the perfectly situated shade cloth protection up against the boundary fence hiding the offending parties till the last minute when they cross the boundary fence; holes are constantly made in the boundary fence for this very purpose, and generally removes the ability to monitor boundary security.	(Adjacent Landowner)		With regards to buffers over the existing orchards the following was included in the Comments and Responses trail contained in the Final Scoping Report: "*No documentation has been provided to support this statement. The Record of Decision for the existing orchards has been reviewed and it does not contain a condition requiring a 50m buffer along the eastern boundary of Sontule.* *The 50 meter buffer noted by the commentator on the eastern boundary of the site falls outside of the scope of this assessment*." The current assessment has assessed the need for buffers based on the proposed layout which forms part of this assessment. With regards to the hunting/ illegal poaching currently taking place the following was included in the Comments and Responses trail of the Final Scoping Report: "*The EMPr for the proposed Sontule agricultural expansion, should an environmental authorisation be issued, will include the requirement that staff must receive environmental awareness education, which will include, amongst others, that it is illegal to lay snares and poach animals. Sun Orange Farms' property must also be regularly checked, and any snares removed. In addition, Sontule's fence line must be regularly checked and any holes in the fence immediately repaired. This would include the fence that is common with the commentator.* *Current illegal activities should be reported to the relevant authorities."*
2.18	2.18 No consultation of any nature took place when the shade cloth was erected over the old orchard and no attempt was made to even try and facilitate our clients concerns in this regard.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The issue with regards to shade cloth over the existing orchards falls outside of the scope of this assessment process and the jurisdiction of DEDEAT for this EIA. With regards to the current assessment the following mitigatory measures are proposed by the VIA: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.*

				• *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary)
2.19	It is thus submitted that it would be inappropriate and unsuitable to permit the continued existence of the existing shade cloth over the old orchard or permit the installation of new shade cloth over the newer proposed expansion orchards for the reason set out above.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The issue with regards to shade cloth over the existing orchards falls outside of the scope of this assessment process and the jurisdiction of DEDEAT for this EIA. With regards to the current assessment the following mitigatory measures are proposed by the VIA: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.* • *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary)
2.20	Further, the visual impact assessment does not pass the required standards nor do the purported mitigating factors stand up to scrutiny to the extent that same will not in any significant manner mitigate the factors complained of.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The approach used in the VIA report has been developed by the author based on internationally and locally recognised best practice, namely the Landscape Institute – Institute of Environmental Management and Assessment 2013. *Guidelines for Landscape & Visual Impact Assessment*. 3rd Edition, Routledge, London, and Oberholzer, B., 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town. The author was a contributor to the latter reference.

				In addition, the author has 40+ years' experience in the field and has completed over 250 VIA reports during this period. He has also produced the following documents which include defining methodologies for visual impact assessments. He was on the panel that developed the Eskom *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (2005) and produced a research document for Eskom on *The Visual Impacts of Power Lines* (2009). In 2011, he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee (they manage a World Heritage Site) along with the *Visual Impact Assessment Training Module Guideline Document.* In 1999 the author received an ILASA Merit Award for his Specialist Impact Report: Visual Environment, Sibaya Resort and Entertainment World, indicating peer recognition to his contribution in the field. It is true that the VIA report states that *"the impact/risk will result in moderate alteration of the environment and will have an influence on decision-making if not mitigated. The impact will reduce moderately with the implementation of the appropriate mitigation measures, but the significance of the impact is expected to remain Medium Negative (-)."* The two primary mitigating actions, comprise the creation of buffer zones, with indigenous vegetation along the southern (50m) and western boundaries (10m), and the proposed use of a natural colour (green or brown) for the side walls of the shade cloth structures. Management measures have been proposed to suit the existing landscape character and the needs of the locality. The VIA, however, states that *"it should also be recognized that many mitigation measures, especially the establishment of planted/ vegetation screens and rehabilitation, are not immediately effective."* The proposed mitigation measures would reduce the negative effect of the shade cloth for close up views due to a 50m buffer (as opposed to the shade cloth occurring immediately at the boundary line) but the effect would not be immediate. The Medium Negative (-) effect for more distant views would not reduce substantially, because

				the proposed shade cloth would remain in view, although within the context of the existing landscape, which contains shade cloth and other agriculture related activities. It is respectfully submitted that the VIA specialist is an expert in his field and has done what the EIA Regulations and guidelines require of him, namely, to assess the impact, rate its significance and recommend mitigation measures. It is then the task of the competent authority, relying on the input of the VIA specialist, and taking into account I&AP comments, to determine whether the impact is acceptable, with or without mitigation.
2.21	It is humbly submitted that authorization should not be granted for the installation of shade cloth over the new expansion orchards and that the owners / developers should be directed to remove the existing shade cloth over the old orchards inter alia based on the abiove factors as read with the duty of good care as set out in NEMA.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	The issue with regards to shade cloth over the existing orchards falls outside of the scope of this assessment process and the jurisdiction of DEDEAT. With regards to the current assessment the following mitigatory measures are proposed by the VIA: • "*Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.* • *Natural colours (i.e., green or brown) to be used for side walls of the shade cloth.* • *Maintain shade cloth in a good condition.* ○ *Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.* • *Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured."* (Draft EIA Sontule Citrus, Executive Summary) The impact will however remain medium negative.
2.22	Our clients all persist in their objections to the proposed and existing shade cloth.	John Vosloo: John Vosloo Attorneys Legal Representative to Dawie van der Westhuizen; *et al.* (Adjacent Landowner)	*10 October 2022, email*	This comment is noted. The existing shade cloth falls beyond the scope of this assessment. The practise of erecting shade cloth over orchards has emerged in response to climate change which has resulted in greater variability of temperatures affecting fruit size, orchard water usage (~10% by 2050), and fruit cosmetic damage due to wind, hail, and sunburn (Bijzet and Weepener, 2016) (Citrus Research International, October 2016). This practise is evident in the Sundays

				River Valley, Gamtoos River Valley area and certain farming areas in the Western Cape.

- ***Comments received from DEDEAT***

1. Administrative Comments

COMMENTS RECEIVED FROM DEDEAT *ON THE FINAL SCOPING REPORT*				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
1.1	It is hereby confirmed that the FSR has been received and downloaded. Please find the official acknowledgement letter attached. Could you kindly confirm receipt of such?	Nicole Gerber, DEDEAT: EIM Case Officer	*8 July 2022, Email*	The EAP confirmed receipt of the official acknowledgement letter from DEDEAT, via email.
1.2	The Final Scoping Report (FSR) for the above application dated July 2022 and received on 08 July 2022, to undertake listed activities as contained in GN R. 327, GN R. 325 and GN R. 324 of the 2014 NEMA EIA Regulations as amended, is hereby acknowledged.	Nicole Gerber, DEDEAT: EIM Case Officer	*8 July 2022, Email*	Noted.
1.3	You are reminded that the activity may not commence prior to an environmental authorisation being granted by the Department.	Nicole Gerber, DEDEAT: EIM Case Officer	*8 July 2022, Email*	Noted. The applicant has been duly informed.
1.4	Please find the attached letter accepting the FSR and POSEIA for the above-mentioned application. Kindly confirm receipt of such.	Nicole Gerber, DEDEAT: EIM Case Officer	*22 August 2022, Email*	The EAP confirmed receipt of the acceptance letter from DEDEAT, via email.
1.5	The Department hereby accepts the FSR and POSEIA taking note of the above comment. The applicant may proceed with the tasks contemplated in the plan of study for environmental impact assessment, as contained in the FSR submitted on 08 July 2022.	Andries Struwig, DEDEAT: EQM Manager, received from Nicole Gerber, DEDEAT: EIM Case Officer	*22 August 2022, Email*	Noted. The assessment has moved into the EIA phase of the assessment process.
1.6	Please be advised that the evidence as attached is acceptable to the Department.	Andries Struwig, DEDEAT: EQM Manager, received from Nicole Gerber, DEDEAT: EIM Case Officer	*24 August 2022, Email*	In response to the request made by DEDEAT in correspondence dated 22 August 2022 for the EAP to provide *"…evidence of the specialist's relevant SACNASP registration in either Ecological Science or Zoological Science for assessing the animal species theme...",* DEDEAT was provided with a copy of the specialist's CV and SACNASP registration which outlines the expertise of the specialist in Ecological Science via email correspondence dated 23 August 2022. DEDEAT has hereby confirmed that the evidence provided was acceptable.

COMMENTS RECEIVED FROM DEDEAT DURING THE DRAFT EIA & EMPr REPORT COMMENT PERIOD				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
1.7	1. The Draft Environmental Impact Report (DEIR) for the above application dated September 2022 and received electronically on 08 September 2022, to undertake listed activities as contained in GN R. 327, GN R. 325 and GN R. 324 of the 2014 NEMA EIA Regulations as amended, is hereby acknowledged. 2. The Department notes that the PPP comment period, as included in the DEIR submission email dated 08 September 2022, will run from 08 September 2022 up to and including 10 October 2022. 3. The Department will issue a comment letter on the DEIR before the end of day on 10 October 2022.	Nicole Gerber, DEDEAT: EIM Case Officer	*15 September 2022, Comment Form*	As indicated by DEDEAT in their AoR of the DEIR, comment was received on the 10 October 2022.
1.8	The EAP is advised to remain cognisant of the contents of the acknowledgment letter of the application, as well as the acceptance of the FSR, as well as to remind the applicant in writing that the activity may not commence prior to an environmental authorisation being granted by the competent authority.	Nicole Gerber, DEDEAT: EIM Case Officer	*15 September 2022, Comment Form*	This comment is noted. The requirements outlineed in the correspondence from DEDEAT dated the 7 June 22 and 22 August 2022, have been taken into account in the compilation of this Final EIA. The Applicant, Sun Orange Farms (Pty) Ltd, has been reminded that activities may not commence on site prior to receipt of an environmental authorisation.
1.9	The following documents refer: 1. The letter acknowledging receipt of the application form and the DSR dated 07 June 2022; 2. The Draft Scoping Report (DSR) dated and received on 03 June 2022; 3. The comment letter on the DSR dated 14 June 2022; 4. The Final Scoping Report (FSR) and Plan of Study for EIA (POSEIA) dated July 2022 and received on 08 July 2022; 5. The acceptance of the FSR and POSEIA dated 22 August 2022; 6. The response and submission by Public Process Consultants received via email on 23 August 2022; and	Nicole Gerber, DEDEAT: EIM Case Officer	*10 October 2022, Comment Form*	This comment is noted. The Applicant, Sun Orange Farms (Pty) Ltd, has been reminded that activities may not commence on site prior to receipt of an environmental authorisation.

	7. The Draft Environmental Impact Report (DEIR) dated September 2022 and received electronically on 08 September 2022. The Department has reviewed the DEIR and hereby notes that the DEIR fulfils the requirements as set out in Appendix 3 of the 2014 EIA Regulations as amended. The Department has no further comments, but does however, reserve the right to request further information should such be required on submission of the FEIR. The EAP is to remind the applicant in writing that the activity may not commence prior to an environmental authorisation being granted by the competent authority.			

2. Specialist Studies

COMMENTS RECEIVED FROM DEDEAT ON THE FINAL SCOPING REPORT				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
2.1	The following documents refer: 1. The Draft Scoping Report (DSR) dated and received on 03 June 2022 for the above project; 2. The comment letter on the DSR dated 14 June 2022; and 3. The FSR received on 08 July 2022. The Department has reviewed the FSR and hereby notes the following: • Section 6.2.1 of the FSR indicates, in relation to the identified specialist studies required and the relevant protocols with respect to these, that certain sensitivity ratings have been found to differ from those listed in the screening tool;	Andries Struwig, DEDEAT: EQM Manager, received from Nicole Gerber, DEDEAT: EIM Case Officer	*22 August 2022, Email*	As part of the Scoping Process a verification of the site sensitivities identified by the screening tool was undertaken. The results of which were included in the Final Scoping Report (FSR). This included the Plan of Study for EIA (PoS) as Chapter Six of the report. The plan of study, amongst others, indicates the specialist studies that are proposed to be undertaken during the EIA phase of the assessment. Since some of the site sensitivities assigned by the screening tool were found to be incorrect, motivation was provided in the PoS to exclude / include certain specialist studies in this assessment.
2.2	The Department has reviewed the FSR and hereby notes the following: • A Terrestrial Biodiversity Impact Assessment has been identified as a requirement and has been included in the Plan of Study for EIA (POSEIA), which will be undertaken by a Terrestrial Biodiversity Specialist. Mr Jamie Pote;	Andries Struwig, DEDEAT: EQM Manager, received from Nicole Gerber, DEDEAT: EIM Case Officer	*22 August 2022, Email*	The Terrestrial Biodiversity Impact Assessment has been undertaken by Mr Jamie Pote and included as Chapter Six of this report.
2.3	The Department has reviewed the FSR and hereby notes the following: • The Plant Species Theme and the Animal Species Theme were identified as medium sensitivity and high sensitivity respectively, in the screening tool report. For both of these, you have provided motivation for these to be rated as low sensitivity. However, it is noted that on page 6.6, under the Animal Species Assessment section that the "The Terrestrial Biodiversity	Andries Struwig, DEDEAT: EQM Manager, received from Nicole Gerber, DEDEAT: EIM Case Officer	*22 August 2022, Email*	With reference to the quotation from page 6.6 of the Final Scoping Report, namely, "**expertise as a botanical specialist**". This is an error in the Final Scoping Report and should read "…**expertise as an ecological specialist**". DEDEAT was provided with a copy of the specialist's CV and SACNASP registration which

	Specialist has expertise as a botanical specialist and therefore will ensure that the minimum information requirements as outlined in the relevant assessment protocol (Animal Species Compliance Statement) are met in the Terrestrial Biodiversity Impact Specialist Assessment, including, amongst others, the potential occurrence of animal SCCs within the proposed development footprint, and the potential impact thereon." However, the Animal Species protocol indicates that the compliance statement "…must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science)." With the reference to the specialist having expertise as a botanical specialist, please provide evidence of the specialist's relevant SACNASP registration in either Ecological Science or Zoological Science for assessing the animal species theme in the DEIR.			outlines the expertise of the specialist in Ecological Science via email correspondence dated 23 August 2022. The specialist's CV and SACNASP registration have been included as an Appendix to the Terrestrial Biodiversity Impact Specialist Assessment. Refer to Chapter Six of the EIA Report.
COMMENTS RECEIVED FROM DEDEAT DURING THE DRAFT EIA & EMPR COMMENT PERIOD				
NO	**ISSUES RAISED**	**COMMENTATOR**	**DATE**	**RESPONSE**
NONE				

4.7 CONCLUDING REMARKS

No comments have been received subsequent to the submission of the Final Scoping Report to the competent authority, which have required amendments to the scope of the specialist assessments or the assessment of alternatives as contained in the accepted FSR and Plan of Study for EIA. Comments have been received from one commentator, prior to the submission of the Final EIA, which have been addressed in the Comments and Responses trail in Table 4.3 above. Copies of the correspondence to and from I&APs are included in Appendices E and F, respectively.

The project is currently at a stage where the Final EIA and EMPr is being submitted to the Competent authority, DEDEAT, for their decision-making. No comment period is proposed for the Final EIA. All I&APs will be notified of the outcome of the decision-making process via email.

CHAPTER FIVE: IDENTIFICATION AND ASSESSMENT OF ALTERNATIVES

5.1 APROACH TO THE ASSESSMENT OF ALTERNATIVES

Chapter One of the EIA Regulations 2014 (as amended), GN R326, provides the context for the "*Interpretation and Purpose of Regulations*", and with regards to "*alternatives*" (page 217), the following is provided:

""*alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the –*

(a) property on which or location where the activity is proposed to be undertaken;
(b) type of activity to be undertaken;
(c) design or layout of the activity;
(d) technology to be used in the activity; or
(e) operational aspects of the activity; and includes the option of not implementing the activity;"

In line with the above and as a baseline, the assessment of alternatives must include the assessment of the No-Go alternative (not implementing the activity).

The objectives of the Scoping Process are provided in GN R326, Appendix 2, Section 1. In relation to the assessment of alternatives the following, amongst others, are provided (page 260):

"*(c) identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;*
(d) identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;"

The content requirements for a Scoping Report is given in GN R326, Appendix 2, Section 2. In relation to the assessment of alternatives the following, amongst others, are provided (page 260):

"(1) (g) a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including-
(i) details of the alternatives considered; …
(ix) the outcome of the site selection matrix;
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such;
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;"

The Scoping Report must, therefore, at a minimum provide a description of the process followed to reach an alternative and if no location alternatives were investigated, the reason for not considering such. On 22 August 2022, acceptance of the Final Scoping Report (FSR) and Plan of Study for EIA was received from DEDEAT, which included as Chapter Five of the FSR, the identification and assessment of alternatives, as well as the approach to the assessment for the EIA phase of the assessment.

The NEMA (as amended) requires an Environmental Impact Assessment (EIA) Report to include the investigation and assessment of impacts associated with alternatives to the proposed project, including the option of not implementing the activity (Sections 24 (4)(b)(i) and 24(4A)).

GN R326, Appendix 3, 1 (h) (i) and (n), provides the scope of the assessment and the content of EIA reports, which with regards to the assessment of alternatives includes the following, amongst others:

h) (i) details of the development footprint alternatives considered;
(h) (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
(h) (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
(h) (ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and
(h) (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site, as contemplated in the accepted scoping report;
(l) (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
(n) the final proposed alternatives which respond to the impact management measures, avoidance and mitigation measures identified through the assessment;"

Section 24O (1)(b)(iv) of the NEMA (as amended), requires that the competent authority, when considering an application for Environmental Authorisation, considers: "*where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment*".

Within the legislative context outlined above, the assessment of alternatives should at a minimum include the following:

- The assessment of the No-Go alternative as a baseline scenario;
- The reasoning/ motivation for the elimination of an alternative; and
- The assessment of reasonable and feasible alternatives.

As is outlined below the following alternatives have been considered in this assessment process:

- No-Go alternative
- Property/ Location alternatives
- Land-Use alternatives
  - Grazing/ game
  - Citrus orchard establishment
- Layout alternatives (development footprints)

5.2 NO-GO ALTERNATIVE

The option of not implementing the activity, the No-Go option, must be assessed as a baseline. Based on a site visit to Sontule, as well as specialist input, the vegetation on Sontule is predominantly Sundays Valley Thicket (refer to Chapter Six of this report).

The condition of the vegetation on Sontule is considered to be relatively intact with some degradation in areas (cutlines; roads and existing orchards). Sontule is an existing working citrus farm and

approximately 133ha of the farm has been transformed for citrus orchards and associated infrastructure (dam, logistical services area, roads and lay down areas). In addition, ~4ha of the farm has been transformed to accommodate an airstrip and associated infrastructure.

The aquatic assessment confirmed that there are a number of non-perennial tributaries falling with the project area. These non-perennial tributaries likely historically drained into the perennial Sundays River system, however, there has been complete alteration/disconnection of the non-perennial tributaries falling within the project footprint and the Sundays River. No natural wetlands were identified on the property under assessment, based on desktop analysis and site investigation. NWM5 (NBA, 2018) identified one natural riverine wetland associated with the Sundays River within 500m of the development footprint. This river was noted to have prominent reed beds. It is worth noting, that this river will not be affected by the project development, given its distance from the site and existing road, canal and cultivated/developed areas acting as a buffer between the property and the Sundays River. A number of water storage dams occur within and surrounding the project footprint. One off-channel water storage dam occurs within the property and two instream water storage dams occur adjacent to the border of the property.

The No-Go option would entail not clearing the site for the proposed expansion of citrus orchards and a new off-stream farm dam, whilst retaining the remainder of the Sundays Valley Thicket. This will include the continued encroachment of exotic and invasive vegetation, if not actively controlled, and the resultant continued degradation of the vegetation over time. Conversely the No-Go option would result in the loss of potentially productive agricultural land in an area known for citrus production and at a site that forms part of an existing working citrus farm. The no-go option would result in the loss of a capital investment estimated to be approximately R25 million. The operational phase of the project will result in the creation of 97 employment opportunities with an annual income of approximately ~R3 million. In addition, since the applicant, Sun Orange Farms (Pty) Ltd forms part of a broad-based black ownership scheme, the no-go option would mean that several historically disadvantaged individuals (HDIs) do not receive the benefits of the proposed expansion. The no-go option would result in a loss of these economic opportunities, as well as the increased production of food for local and international markets, which is considered to be a negative impact.

While the No-Go option will have no significant negative biophysical environmental impacts, it will result in the loss of positive social and economic benefits which are associated with the Go option. Finally, the No-Go option will result in the farm not being optimally utilized for agriculture, for which it is zoned and well positioned. Therefore, the **No-Go option is not the preferred alternative**.

5.3 PROPERTY/ LOCATION ALTERNATIVES

Regarding the content of the scoping report, Appendix 2, Section 2 (1) (g) (x) requires that, if an alternative is not considered, the reasoning/ motivation for such is provided. In line with this regulation the following reasoning was provided for not including the assessment of property alternatives in the approved Scoping Report, however, layout development footprints have been considered, as contained in section 5.5 below.

5.3.1 Reasoning/ Motivation for the Elimination of an Alternative

Chapter One of the EIA Regulations 2014 (as amended), provides for the interpretation and purpose of the regulations, including, amongst others the assessment of alternatives, which may include the property or location upon which an activity is proposed to take place. This should not be confused with layout/ development footprint alternatives within a specific site, which will be included in this assessment process (see Section 5.5 below).

Sontule was considered suitable for the agricultural expansion of this nature due to amongst others, the fact that there is existing citrus and associated infrastructure on the farm, the availability of the land, soil suitability, and biophysical attributes (vegetation and aquatic) which would allow for cultivation, as well as conservation. In addition, the proposed site was identified due to its close proximity to existing irrigation infrastructure, access to irrigation water (LSRWUA canal system) and the logistical services area on the same farm which will be required to service the additional orchards.

The farm known as Sontule is zoned Agriculture I and ~137ha of the farm has been transformed for citrus orchards and associated infrastructure (dam, logistical services area, roads and lay down areas). Based on the recommendations by the various specialists (e.g., aquatic features and associated buffers, biodiversity conservation target areas, soil suitability, slope etc.), as well as technical input, a portion of Sontule measuring ~175ha (38% of the original extent) is not suitable for development.

Given that the proposed agricultural development will tie into existing agricultural activities on Sontule, it is not deemed feasible to assess other property alternatives.

Based on the experience of the EAP, land available for cultivation and which is zoned Agriculture I, which is situated adjacent to existing agricultural areas, have existing water use rights, suitable soils, and is near the LSRWUA canal system, is becoming increasingly scarce in the Sundays River Valley. Sontule meets the abovementioned requirements and thus, **no other reasonable or feasible property/ location alternatives are proposed to be assessed.** Layout/ development footprint alternatives within the farm, however, have been assessed (see Section 5.5 below).

5.4 LAND USE/ ACTIVITY ALTERNATIVES

5.4.1 Grazing (not preferred)

As noted in Chapter Three of this report, the vegetation on the farm is a combination of natural to degraded Sundays Valley Thicket. In general, Savannah type ecosystems are preferred when considering domestic livestock grazing as the primary farming activity. There is evidence of small scale game grazing on the farm. In order to pursue a game grazing venture, active intervention would be required to ensure the commercial viability of a grazing enterprise on this site.

Regarding grazing capacity for domestic stock and carrying capacity for game, PCV du Toit of the Grootfontein Agricultural Development Institute notes the following:

"*However, there is a need to distinguish between domestic grazers and game animals. It has been advocated for some time that the term grazing capacity should be reserved to instances where the stocking rate grazing capacity relation of domestic stock is described. This relation is a simple question of the number of animals which can be accommodated sustainably on a given area without the deterioration of the natural resources.*

The capacity of the land to carry game, should be referred to as carrying capacity. This stocking rate carrying capacity relation, should be reserved for the use of the land area to game relation. This carrying capacity is much more complex than the simple domestic stock: land area relation. Game, carrying capacity involves such factors as, inter alia*: area of suitable habitat, sufficient foraging area, appropriate cover and a large enough area to cater for social needs (Furstenburg 2002). However, on account of the animal population growth rate, of the different species occupying the land at the same time, this capacity of the land to carry game often becomes overstocked, resulting in the eventual over-grazing of the vegetation. When the area can no longer support the animal population,*

it crashes, leading to the inevitable, massive die-off of large numbers of game animals. The remainder starts to recover slowly at first on account of the poor vegetative cover and low available plant production resulting in the extremely low carrying capacity. Once the vegetation has recovered to such an extent that it attains its previous carrying capacity, animal numbers start building up again. The whole cycle of animal number build-up and the consequent overgrazing resumes. In order to combat over-grazing of the veld by game, expensive animal control measures have been instituted and such operations as culling and relocation of game are required, however, these practices seldom prove popular."

In addition to the above, it is important to note that the applicant's core business is citrus production, not cattle or wildlife production. The applicant, not having sufficient expertise in this regard, could potentially face the problems outlined in the reference above i.e., overgrazing, deterioration of the natural resources etc., if this activity were to be undertaken on the Farm. The applicant's experience in citrus production, however, will positively benefit the sustainable and optimal use of Sontule, as it is zoned for agriculture and is an existing working citrus farm. Thus, for the reasons outlined above, utilization of the farm for grazing by cattle and game is **not considered a feasible alternative and is, therefore, not the preferred land-use alternative** and will not be assessed further in this assessment process.

5.4.2 Citrus Orchard Expansion (preferred)

As outlined in Chapter One of this report, the area under assessment is located in the SRVM, is zoned Agriculture I and located on a working citrus Farm. In terms of the Section 8 Zoning Scheme Regulations this "*means the cultivation of land for crops and plants or the breeding of animals, or the operation of a game farm on an extensive basis on the natural veld or land, and includes only such activities and buildings as are reasonably connected with the main farming activities of the farm, but does not include the consent uses applicable to agriculture zone 1."*

The project applicant, Sun Orange Farms (Pty) Ltd, proposes to clear approximately 147ha for the expansion of the existing agricultural development on Remainder of Farm 632 (~459ha), Sundays River Valley Municipality (SRVM), for the establishment of additional citrus orchards and associated infrastructure (internal roads, lay down areas, internal irrigation pipes), hereafter referred to as Sontule. No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support.

In order to supply the proposed development with the required irrigation water, an irrigation dam is proposed to be constructed with a capacity to store approximately 49 000m^3 and a footprint of 3.7ha, which will be supplied from the LSRWUA canal system. Irrigation water will be reticulated to the proposed orchards via uPVC internal pipelines of varying diameters. The applicant has confirmed that they have 96ha of existing water use entitlements which are not currently in use on Sontule. Therefore, the applicant intends to utilise the spare water rights to irrigate the additional proposed orchards (~127ha effective irrigation area).

Sontule is located adjacent to existing agricultural activities on its northern, eastern and western boundaries (Chapter Three). The farm is currently being utilised as a working citrus farm (~133ha are transformed). The vegetation on the properties located towards the southern boundary seems to be near natural, although evidence of modification (cutlines and vehicle tracts) is evident. In addition, the property shows varying levels of degradation presumably associated with game grazing.

Based on the surrounding land uses, the proposed agricultural expansion on Sontule is not likely to cause a significant change in character within the surrounding landscape, as the areas north, west and east of the area under assessment are agricultural in nature. The highest impact on sense of place is anticipated during the construction phase, when soils are laid bare for planting.

Some of the key elements contributing to the sustainability of the agricultural expansion of Sontule is, the fact that it is an existing citrus farm, access to arable land, the site is zoned as Agriculture I, suitable soils, the topography of the site and access to as well as the availability of water. Based on the experience of the independent EAP in the area, access to such land in the Sundays River Valley, which meet the abovementioned requirements, is becoming increasingly scarce. The reason being that suitable land with sufficient access to water is already being utilized for commercial citrus and crop production. Potentially suitable land parcels do not always have ready access to canal water from the LSRWUA. Because of the distance to water, developments often require a larger capital investment, to ensure a reliable irrigation water supply. At present, Sontule meets the abovementioned criteria and is, therefore, considered to have a high agricultural potential and is potentially suitable for the proposed development.

The proposed agricultural expansion on Sontule will create several additional temporary construction phase, as well as permanent, operational and seasonal employment opportunities. In addition, a number of indirect employment opportunities associated with the fruit packing and processing industry, transportation and logistical companies, purchasing, as well as hiring of various products (chemicals, pallets, cartons), are anticipated to be created.

Based on market conditions, as well as fruit quality, the fruit produced as a result of the proposed agricultural development will be predominantly sold as fresh fruit to international markets (export), with poorer quality fruit being sold locally or processed at a local juicing factory. International markets generate income from foreign currency, thus, contributing to local economic growth.

For the reasons outlined above, **this is the preferred alternative**, which has been assessed in detail during the EIA phase of the assessment, and which includes preferred layout/ development footprint alternatives within the preferred site. Chapter Four of this report provides an overview of the methodology for the identification, rating, and assessment of impacts (both positive and negative) and the specialist studies undertaken during the EIA phase of the assessment.

5.5 LAYOUT ALTERNATIVES

The EIA phase of the assessment has assessed layout/ development footprint, alternatives on Sontule, based on the detailed specialist studies, as well as technical input.

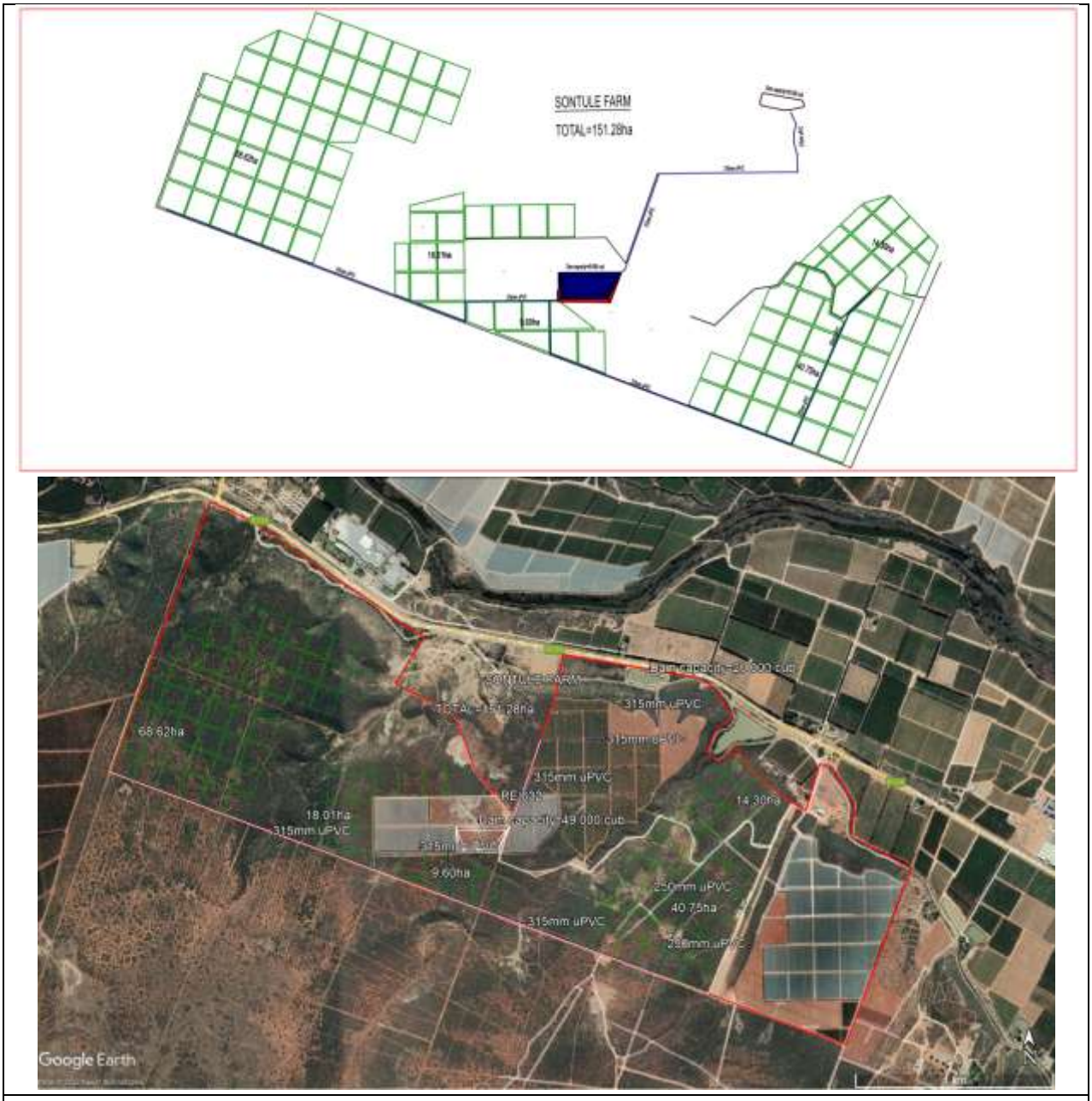
Specialist studies which formed part of this assessment are:

- Soil suitability - potential of soils for the establishment of citrus orchards
- Slope analysis - slopes in excess of 25% are not suitable
- Terrestrial Biodiversity – species of special concern, ecological corridors, biodiversity conservation targets
- Aquatic Biodiversity – aquatic sensitivity and buffer zones
- Heritage – Archaeological and Paleontological features on the farm
- Traffic – additional trip generation and access
- Irrigation - irrigation infrastructure layout
- Visual – potential alteration landscape impacting sense of place and visual impacts of the shade netting, in particular

The final layout (preferred development footprint within the site) for the project has been determined by specialists, technical input in the EIA phase of the assessment as well as public consultation. **Layout/ development footprint alternatives are feasible and are discussed in detail below.**

5.5.1 Alternative 1: Initial Draft Layout (not preferred)

The applicant had prepared a draft layout for discussion and evaluation, prior to commencement of the Scoping and EIA process, which was based on the Land Capability Study and Slope Analysis undertaken by the soil specialist (see Chapter Eight). Based on the soil specialist study, a total area of ~149ha on Sontule (RE/632) would be suitable for the cultivation of perennial crops and the layout proposed a total development footprint of ~151ha (including associated infrastructure) (see map 5.1 below). This layout did not include input from the Terrestrial or Aquatic Biodiversity Specialists and therefore was not preferred and was not assessed further.



Map 5.1: Initial draft layout (not preferred) based on soil suitability and slope.

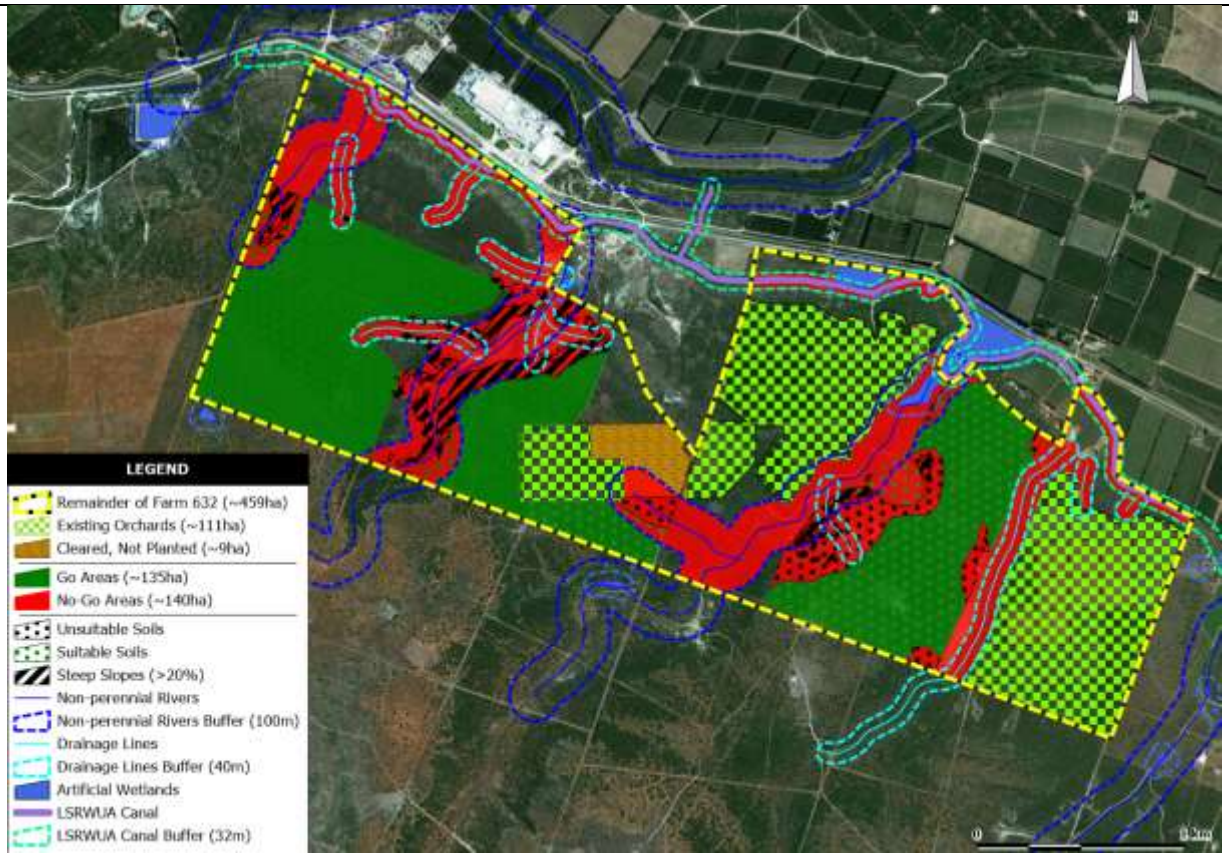
5.5.2 Alternative 2: Preferred Layout

In order to commence the process of identifying a preferred layout on the site, which was informed by, amongst others, environmental constraints, and potential sources of risk of an agricultural development of this nature, preliminary specialist input was obtained from the following specialists:

- Soil suitability including slope analysis
- Terrestrial Biodiversity
- Aquatic Biodiversity

The following conclusions were made, based on the preliminary input received from the abovementioned specialists, with regards to the development potential of a portion of Sontule (see map 5.2 below):

- Of the ~275ha portion of the farm that was investigated during this initial process, an area of ~140ha was determined to be unsuitable for agriculture ("No-Go Areas").
- An untransformed area of approximately ~135ha was initially identified as suitable for the commercial production of citrus.
- An area of approximately ~9ha was cleared as part of a previous Environmental Authorisation, however, it was never planted. This portion of the site would not be suitable for citrus trees, but would be a suitable location for associated infrastructure, for example, the proposed dam, irrigation infrastructure or loading areas.
- Therefore, an area of approximately 144ha was initially proposed for transformation on Sontule to accommodate the proposed citrus orchards and associated infrastructure.

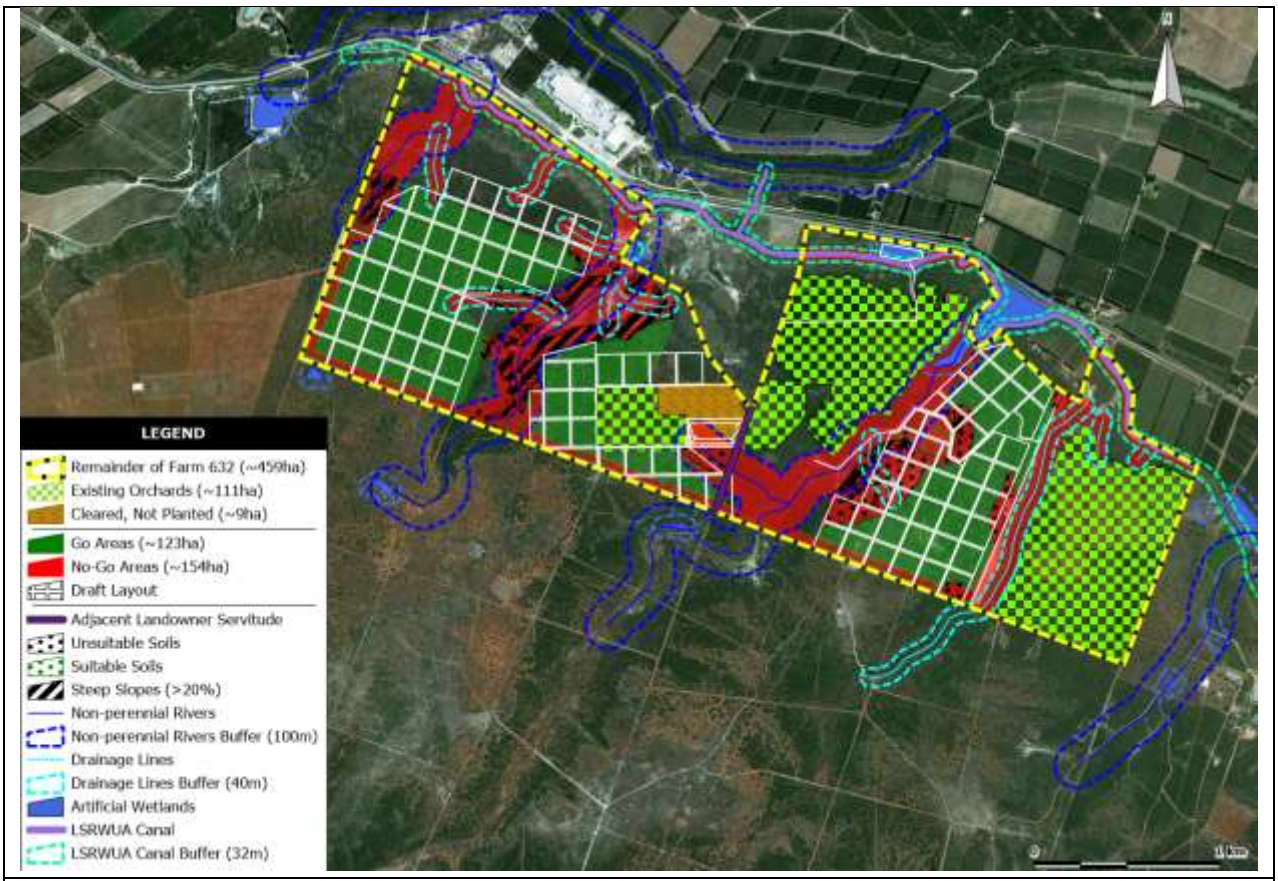


*Map 5.2: Initial mapping to inform a potential layout on the site (**not preferred**)*

Subsequent to this initial mapping process additional input was received from the abovementioned specialists, which resulted in this map (Map 5.2 above) being revised. Based on additional specialist

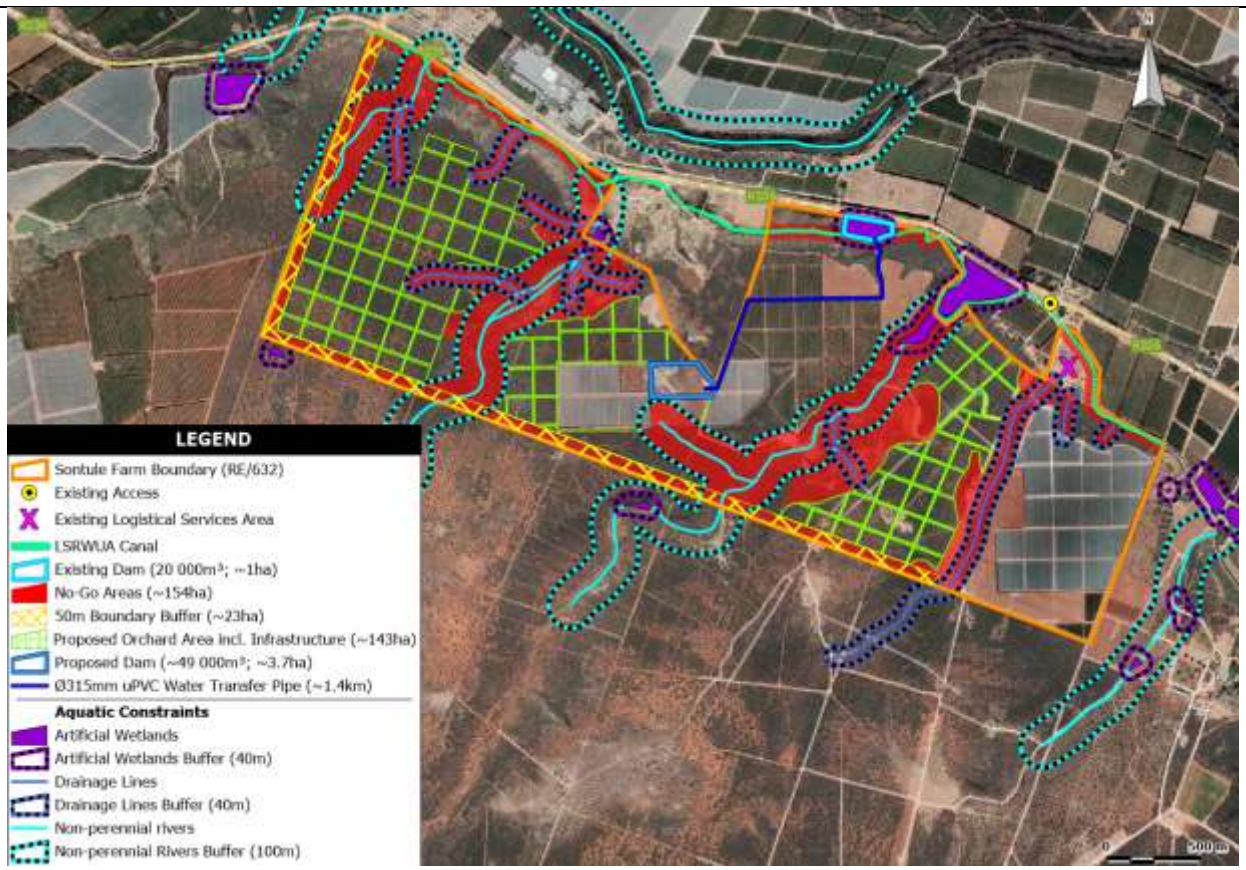
input, as well as comments received form I&APs during the Scoping process, the following additional factors further refined the proposed layout:

- An adjacent landowner requested that the applicant provide a servitude (~5m wide) across Sontule that will enable him to install irrigation and electrical infrastructure (pipeline and powerline infrastructure) which will be required to facilitate an agricultural development proposed on his farm (Portion 4 of Farm 632).
- The dam location which was initially proposed in the draft layout would have overlapped with the aforementioned servitude as well as a portion of the 100m aquatic buffer recommended around the eastern non-perennial river.
- The Terrestrial Biodiversity Specialist recommended a 50m no-development buffer adjacent to the western and southern boundaries of the farm. The buffer will preserve ecological process function by creating corridors within the farm, as well as between Sontule and adjacent farms. With the application of this restriction, the "Go Areas" on of Sontule were reduced to ~123ha, providing a potential combined development area of ~132ha, when including the area that had been previously cleared, but not planted (see map 5.3 below). Refer to Chapter Six.
- The soil specialist advised that a portion of the farm measuring ~15ha wasn't surveyed during the reconnaissance survey as it was inaccessible due to dense vegetation. However, it is the opinion of the soil specialist that the soils in this portion of the farm will be similar to the majority of the soils identified across the rest of the site. In other words, it is anticipated that these soils will have low - medium suitability for the commercial production of citrus, which can be improved by employing the amelioration methods that have been recommended for the rest of the proposed development on Sontule (refer to Chapter Eight). Thus, the portion of Sontule that could potentially be developed increased to **~147ha.**



*Map 5.3: Revised Opportunities and Constraints map indicating the conflicts with the initial draft layout (**not preferred**).*

The final preferred layout which has been assessed in full in this assessment process is indicated in map 5.4 below. A full description of the preferred layout alternative (Alternative 2) has been included in Chapter Two.



*Map 5.4: Final **preferred layout** alternative (alternative 2).*

5.6 CONCLUDING REMARKS

GN R326, Appendix 3, 3 (1) (h) (x) states the following: *"a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;"*

The preferred activity alternative to be undertaken on the property is the proposed expansion of citrus orchards and associated infrastructure, including construction of a new irrigation water storage dam, which was assessed in full in the EIA phase of the assessment. As a baseline the no-go alternative has been assessed in full.

Based on specialist and technical input as well as public participation, Layout Alternative 2 (Map 5.4), which entails the clearance of ~147ha, is the preferred layout/ development footprint alternative.

Chapter 6: Terrestrial Biodiversity Specialist Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

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CHAPTER SIX: TERRESTRIAL BIODIVERSITY ASSESSMENT

6.1 INTRODUCTION

This Chapter of the report presents the findings of the Terrestrial Biodiversity Impact Assessment conducted by Mr Jamie Pote (Independent Terrestrial Biodiversity Consultant). This assessment also meets the minimum information requirements for a Plant and Animal Species Compliance Statement so as to assesses, terrestrial biodiversity of the site, as well as the potential impacts on plant and animal species of conservation concern.

This chapter provides a detailed evaluation of the biophysical environment on the affected properties, the purpose being to inform the planning process as well as identifying the potential impacts the proposed agricultural development may have thereon.

6.2 PURPOSE OF REPORT

The key legislation that triggers the need for a terrestrial biodiversity assessment is the National Environmental Management Act (107 of 1998), EIA listing notices (2014, as amended). Refer to Chapter Four of this report for the complete list of listed activities triggered.

The report is furthermore compiled to fulfil the requirement for a Terrestrial Biodiversity Assessment as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), as gazetted on 20 March 2020. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.

In addition, the requirements relating specifically to the Terrestrial Plant and Animal (species) themes as stipulated in the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020, have also been fulfilled in this report.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources, which are fundamental to sustainable development.

6.3 SPECIALIST TERMS OF REFERENCE

The specialist terrestrial biodiversity assessment to include:

- Conduct a desktop assessment of available literature to identify and describe the status of the vegetation in terms of applicable local and regional biodiversity planning frameworks (e.g., Vegetation Map of South Africa, National Biodiversity Assessment 2019, Eastern Cape Biodiversity Conservation Plan, Subtropical Thicket Ecosystem Project and Sundays River Valley Municipality Biodiversity Sector Plan).
- Identification and evaluation of Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA) and any Biodiversity Corridors.

- Conduct field research to identify, map and describe the current state of the vegetation on site, supported by relevant photographs.
- Determine appropriate buffer zones for sensitive areas, as well as no-go areas on the site.
- Include the designation of areas to be set aside for conservation (biodiversity target areas), in terms of the relevant planning frameworks for the area.
- Identify and determine the relative abundance of Species of Conservation Concern (Vulnerable, Endangered or Critically Endangered and/or other protected species) within the study area or area of influence.
- Identify and determine extent of alien invasive species present and their distribution within the study area as well as levels of infestation and the potential for post-removal recovery of indigenous vegetation.
- Compile and provide a detailed vegetation sensitivity map of the site including detailed mapping of disturbance and transformation and sensitive or specialized habitats.
- Identify and assess plant and animal species of conservation concern as identified by the National Environmental Screening Tool and/or other databases, within the site.
- Identify and assess potential risks to nearby conservation areas (Addo Elephant National Park).
- Identify potential project related impacts (both positive and negative) for the construction and operational phases of the project.
- Identify overall risk of the proposed activity to the site and identify most suitable areas for the proposed development activity as well as no-go or go-but areas where applicable.
- Outline any legislative requirements (i.e. licences and permits) that need to be met for the proposed development to proceed.
- Outline mitigatory measures for the future management of potential project related impacts and include, where feasible, the individuals/ organizations responsible for implementation.
- Outline management recommendations for the construction and operational phases of the project.

6.4 APPROACH AND METHODOLOGY

The methodology and approach are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity Risk Assessment Report. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to provide the following:
    - Detailed field survey of vegetation, flora, and habitats present.
    - Comprehensive species list, highlighting species that are of special concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA, the National Forests Act and the Provincial Nature Conservation Ordinance No. 19 of 1974.

- Detailed mapping of the various habitat units including assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and species of special concern, the outcome being a detailed sensitivity map ranked into high, medium, or low classes.

- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for the Scoping Report, a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will address the following:
    - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
    - Description and assessment of the habitat units and site sensitivities ranked into high, medium, or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
    - A detailed species list highlighting the various flora and fauna species of conservation concern categories (Endemic, Threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
    - Identification of Impacts, as well as specific measures that may be required for alternative development plans.
    - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
    - A map indicating buffers (if required) to accommodate Regional Planning and other requirements, as well as any no-go areas.

This terrestrial biodiversity impact assessment and report has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

6.4.1 Assumptions and Limitations (including information gaps)

1. No assessment has been made of aquatic aspects relating to any wetlands, pans, and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report.
2. Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of any fire adapted vegetation that may be present may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data. The initial site visit was conducted during mid-spring 2021, during a prolonged drought period, providing some limitations. However, a second site visit was undertaken during winter 2022 after the area had experienced some heavy rainfall events.
3. Dense impenetrable thicket vegetation can pose limitations relating to access; however, the surveyed areas are deemed to be representative of the site, based on experience and a sampling method that will survey into thicket pockets where accessible. Comprehensive sampling is not

possible without causing destruction of vegetation, which is undesirable. While this can result in under-identification of species which may have isolated populations, all reasonable attempts have been made to minimise this risk.

4. All calculations (distance and area) are done in GIS (Hartebeeshoek 1994, Transverse Mercator 25) and any digitising has been undertaken using most recent available aerial photography.

6.4.2 Information sources

A comprehensive list of references, including data sources is provided in the Appendices. Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the site's potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O) and NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- Sub-Tropical Ecosystem Planning (STEP, 2002) – bioregional plan.
- Eastern Cape Biodiversity Conservation plan (ECBCP, 2007 and 2019) – critical biodiversity areas.
- Sundays River Valley Municipality Biodiversity Sector Plan and associated CBA maps.
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data - Chief Surveyor General (http://csg.dla.gov.za).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

6.4.3 Authority and I&AP Consultation Process

The EAP (Public Process Consultants) is responsible for all consultation in terms of the EIA process, including authority consultation.

6.4.4 Site visits

An initial site visit was conducted on 01 November 2021, during mid Spring and was shortly after some rainfall was received, followed by a site visit in June 2022, in mid-winter after good rainfall in the preceding summer and early winter months. Importantly an assessment of a site should include optimum (i.e., wet) and suboptimum (i.e., dry) conditions to allow for a more well represented assessment of the ecology of the area, as well as during different seasons in order to evaluate species, which tend to vary across the seasons in Thicket rather than having a single preferred season (i.e. spring/summer). The report is supplemented with observations made during a site visit conducted in February 2021.

Although the site falls within predominantly summer rainfall area, the area is within a bimodal rainfall area, meaning it receives both winter and summer rainfall. This does have an effect on vegetation and also flowering season of species which are adapted to this situation and growth and flowering can occur across different seasons. The influence on sampling will be evaluated in more detail during the final species assessment.

6.5 LEGISLATIVE FRAMEWORKS

A summary of the relevant legislation, which relates to potential terrestrial biodiversity impacts that may result from the proposed development, is provided in the text table below. The legislative implication (management measure) is also indicated and will be addressed in more detail in subsequent sections of this chapter.

LEGISLATION AND OBJECTIVE	LEGISLATIVE IMPLICATIONS
THE CONSTITUTION (108 OF 1996) The South African Constitution is the supreme law of the land and ensures that: '… *everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected for the benefit of present and future generations*. It requires that development be sustainable.	Measures must be implemented that 1) prevent pollution and ecological degradation; 2) promote conservation; and 3) secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development'.
NATIONAL WATER ACT (NWA) 36 OF 1998 Refer to Chapter 7.	Refer to Chapter 7 (Aquatic Biodiversity Assessment Report).

LEGISLATION AND OBJECTIVE	LEGISLATIVE IMPLICATIONS
NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA) 107 OF 1998 The NEMA provides for overarching principles that should inform South Africa's environmental management and governance. The NEMA is mainly regarded as a reasonable legislative measure required from the State to fulfil the environmental right (Section 24) of the Constitution. It requires development to be socially, environmentally, and economically sustainable. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. The Environmental Impact Assessment (EIA) Regulations, gazetted in terms of Section 24, trigger an authorisation process for certain activities.	The activity requires a**n Environmental Impact Assessment. This specialist assessment serves to inform the EIA process.** Refer to Chapter 4 for the full list of activities that require an Environmental Authorisation.
NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT (NEMBA) 10 OF 2004 The Act provides for the protection of listed endangered ecosystems and restricts activities according to the categorization of the area (not just by listed activity as specified in the Environmental Impact Assessment regulations). It promotes the application of appropriate environmental management tools to protect biodiversity. Chapter 3 allows for the publication of bioregional plans. Chapter 5 of the Act refers to the introduction and control of alien invasive species. The Threatened or Protected Species (ToPS) Regulations, in terms of Section 97 (Chapter 8), requires an authorisation process to be followed. The Provincial Department of Economic Development, Environmental Affairs and Tourism issues permits for "private" applications for NEMBA ToPS, whereas National DEA issues permits for	The ECBCP (2019) is a Systematic Biodiversity Plan which has been adopted by the competent authority (DEDEAT) and serves to replace ECBCP (2007) in its entirety. The ECBCP (2019) identifies Critical Biodiversity Areas in which certain activities will require environmental authorisation in terms of Listing Notice 3 of the NEMA Environmental Impact Assessment Regulations, as amended in April 2017. The ECBCP (2019 also describes land-use management guidelines relevant to Critical Biodiversity Areas and Ecological Support Areas. NOTE: Listing Notice 3 (12) ii refers to Critical Biodiversity Areas of a Bioregional Plan. The ECBCP (2019) **is not a Bioregional Plan, but a systematic biodiversity plan, and therefore this listed activity is not triggered in terms of this activity**. Where ESA areas are identified in systematic or bioregional plans, these do not constitute Critical

LEGISLATION AND OBJECTIVE	LEGISLATIVE IMPLICATIONS
Universities and Parastatals (SANRAL, TRANSNET etc.).	Biodiversity Area as defined in terms of the listed activities. All relevant Regional Planning findings will be considered in this assessment and will be supported by site verification.
NATIONAL FORESTS ACT (NFA) 84 OF 1998 Any area that has vegetation that is characteristic of a closed and contiguous canopy is defined as a 'forest' and as a result will falls under the authority of the Department of Forestry. The removal of any indigenous or protected trees or clearing of any woodland, thicket or forest requires a permit.	*Sideroxylon inerme* a Protected Tree species, is common in Thicket vegetation and is present on the site, but no Forest is present. Permits are required to be obtained from DFFE for the removal / damage to these tree species. Thicket vegetation is not considered to be a type of forest, as it does not meet all of the defining criteria.
PROVINCIAL NATURE CONSERVATION ORDINANCE (19 OF 1974) The Ordinance allows for conservation of the natural environment, and the protection of wildlife. Certain biota are scheduled and therefore protected. A permit must be obtained from Department of Economic Development, Environment Affairs and Tourism (DEDEAT), Provincial Environment Affairs (Biodiversity Unit), to remove or destroy any plants listed in the Ordinance.	Several protected species are present, which will require a permit from DEDEAT to be removed. Refer to the Species of Conservation Concern section.
ENVIRONMENT CONSERVATION ACT (ECA) 73 OF 1989 Section 20 of the Act requires for the appropriate disposal of waste and licensed waste disposal site, although any new waste licenses are subject to approval via the National Environmental Management: Waste Act (NEMWA).	All wastes (general and hazardous) generated should be disposed of at an ECA licensed waste disposal site, if applicable, by the contractor/ developer. ''If applicable'' - because: In terms of Section 81 of the NEMWA, permits issued in terms of ECA Section 20 are still valid unless a NEMWA permit has been requested by the Authority. If so, the licensed site will be NEMWA licensed. Waste disposal is not a component of the application, although any waste generated via agricultural activities should comply with any required storage and disposal mechanisms. For

LEGISLATION AND OBJECTIVE	LEGISLATIVE IMPLICATIONS
	example: hazardous and chemical wastes (includes empty containers) should be disposed of at registered landfill sites; and not buried or burnt on site.
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (NEMPAA) 57 OF 2003 The Act provides for the declaration of Protected Areas (PA's) in three forms (Chapter 3), namely Special Nature Reserves (Part 2), Nature Reserves (Part 3) and Protected Environments (Part 4). National Parks are the equivalent of National Protected Areas. Section 10 states that a Protected Area, declared in terms of provincial legislation, is either a nature reserve or protected environment.	The nearest boundary of the Addo Elephant National Park / Protected Area (PA) is situated ~11.4 km to the east of the site from the closest point of the proposed site boundaries. From a national and provincial perspective, the proposed development is not indicated as being within a focus area for expansion (NPAES), but focus areas lie 7 km to the north of the site boundaries.
CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA) 43 OF 1983 *[to be replaced by the Sustainable Use of Agricultural Resources Bill]* Section 4 of the Act and relevant regulations (GN R. 1048/GG9238 and any amendments), covers the requirement to protect cultivated land against erosion through the action of water; Section 6 relates to the prescription of measures which all land users must comply with, e.g., the prohibition of modifying run-off flow patterns; the control of invader plants; and the restoration of eroded land. **Section 7 protects any vlei, marsh, water sponge or watercourse which prevents land users (except on approval from the executive officer) from draining or cultivating any vlei, marsh or water sponge** or a portion thereof on his farm unit; or cultivating any land **within the flood area of a water course or within 10 metres horizontally outside the flood area of a water course**. Section 8 regulates the establishment of obstructions that affect the flow pattern of run-off water, where such obstructions (presumably includes dam	This Act applies to the proposed cultivation site as an agricultural application. The NEMA and NWA also effectively deal with the potential impacts of proposed developments in relation to erosion, alien invasive plants and impacts on aquatic resources. Several alien invasive plant species were recorded within the area under assessment. Predominant species include Prickly Pear and Jointed Cactus. Refer to the respective section below for further information. Refer to Chapter 7 (Aquatic Biodiversity Assessment Report) for more detail regarding aquatic resources that have been identified on site.

LEGISLATION AND OBJECTIVE	LEGISLATIVE IMPLICATIONS
berms) should not be permitted if these cause excessive erosion. A list of alien invasive species has been regulated but is superseded by the NEMBA listed alien invasive plants.	
NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT: ALIEN AND INVASIVE SPECIES REGULATIONS	The National Environmental Management Act: Alien and Invasive Species Regulations (gazetted on 18 September 2020) supersedes the CARA listed alien invasive species. Refer to respective section in report below.

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listed activities need to be assessed in this report1:

Listing Notice 1: Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

(i) the undertaking of a linear activity

The proposed development options will exceed 1 Ha and 20 Ha.

Listing Notice 2 Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—

(i) the undertaking of a linear activity

The proposed development options will exceed 20 Ha.

Listing Notice 3 Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres.

a. Eastern Cape

i. Outside urban areas

(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.

New internal access roads will be created, to provide access to the project. These roads are anticipated to exceed 4 metres in width. The area under assessment is located outside of an urban area, in the Eastern Cape. Portions of the site have been identified as a Terrestrial ESA but not CBA

1 *The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list.*

in terms of the Eastern Cape Biodiversity Conservation Plan (2019) and is located greater than 10 km from the nearest boundary of the Addo Elephant National Park (AENP), hence this listed activity ***will not be triggered.***

Listing Notice 3 Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(a) Eastern Cape

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004*;*

ii. Within critical biodiversity areas identified in bioregional plans.

It is proposed that a total area of 147ha will be cleared to accommodate the proposed agricultural expansion. A portion of the vegetation which is proposed for transformation has been identified as Albany Alluvial Vegetation in terms of the NBA mapping resources. This vegetation type has been listed as an Endangered ecosystem in terms of section 52 of the NEMBA. This vegetation type has not been identified on site.

The area under assessment is located outside of an urban area, in the Eastern Cape. Portions of the site have been identified as a Terrestrial ESA but not CBA in terms of the Eastern Cape Biodiversity Conservation Plan (2019). Based on the above, this listed activity ***will not be triggered.***

Implications:

The proposed activity will trigger the following:

- LN1, activity 27, exceeding the clearance of more than 1 Ha of indigenous vegetation.
- LN2, activity 15, exceeding the clearance of more than 20 Ha of indigenous vegetation, requiring a full Scoping and EIA process.
- LN3 activity 4 will not be triggered as the site is outside of any trigger areas.
- LN3 activity 12 (a) i and ii are not triggered because no Albany Alluvial Vegetation is proposed to be cleared and the site is outside of any trigger areas.

6.6 PROJECT DESCRIPTION

6.6.1 Activity Location and Description

The project applicant, Sun Orange Farms (Pty) Ltd proposes to expand existing agriculture on Remainder of Farm 632, Sundays River Valley Municipality, for the cultivation of citrus, including associated infrastructure (new farm dam, irrigation infrastructure and internal roads). The farm is situated between Kirkwood and Addo (Figure 6.1), measures approximately 462 hectares and is currently a working citrus farm with an additional 147.2 Ha of orchards and associated infrastructure (internal roads and laydown areas) being proposed. The footprint for the proposed new dam will be 3.18 Ha.

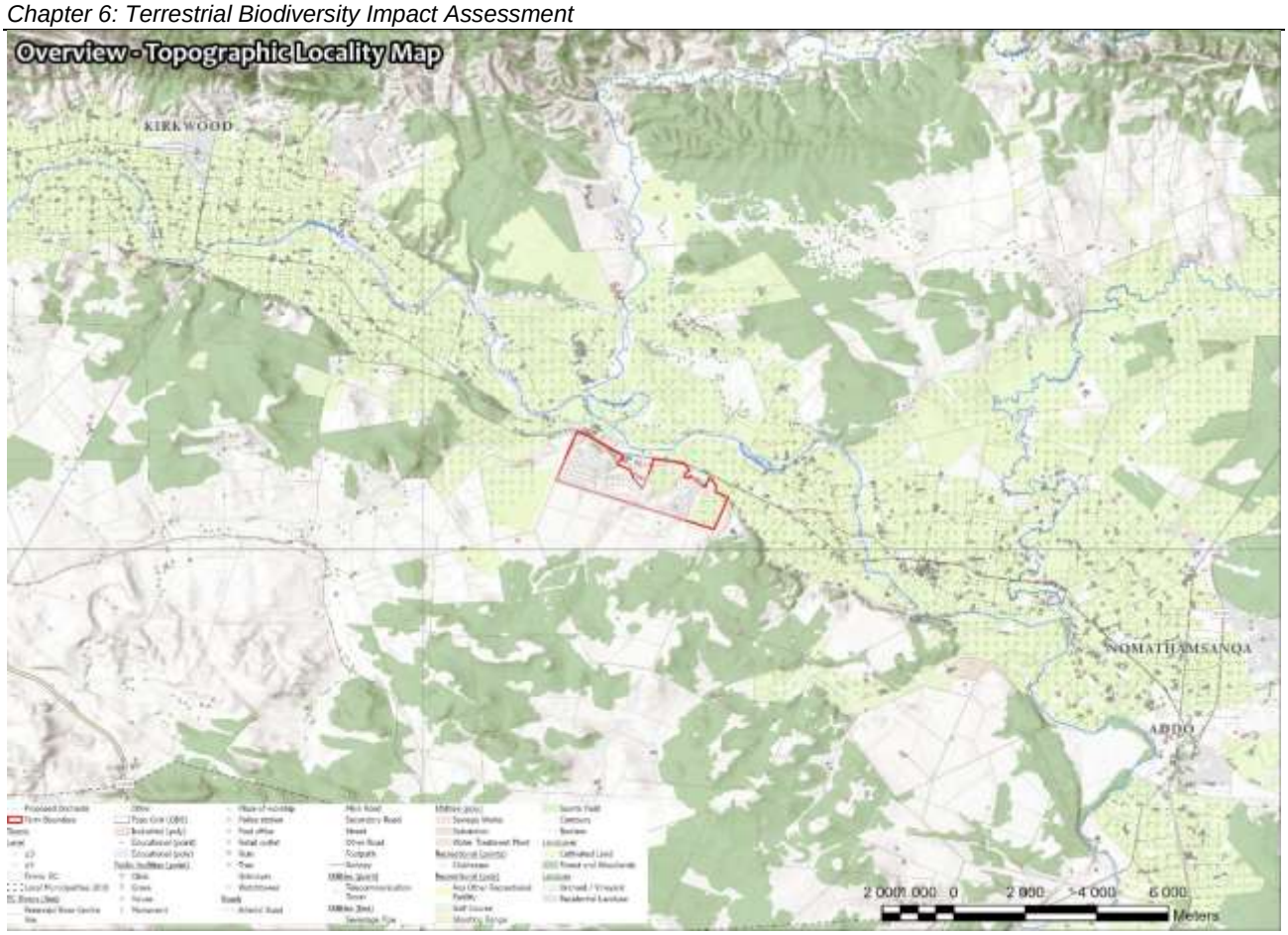

Figure 6.1. Site locality.

Proposed New Dam

The Sontule citrus development will require the construction of a new dam on site and will be supplied with water from the LSRWUA canal system via an existing dam on RE/632.

- The existing dam has a capacity of 20 000 m³
- The proposed new dam will be supplied with water from the existing dam via a Ø315mm uPVC pipe
- New dam specs:
    - Dam wall height ~5 meters
    - Total proposed dam footprint ~37 000 m²
    - Estimated dam capacity ~49 000 m³
- New pumphouse (electrical consumption for pumps ~75 kw)
- Relay water to orchards via pipes of varying sizes between Ø250 mm and Ø315 mm uPVC pipe

There are 130 hectares of water rights assigned to this farm. The applicant has approximately 96 Ha (864 848 m³) of spare water rights, which are not currently in use available to irrigate the proposed agricultural development.

Internal Irrigation Infrastructure

Irrigation water be supplied to the orchards with uPVC pipes varying in size from 250 mm – 315 mm. Irrigation water will be reticulated within the orchards via a network of underground PVC irrigation

pipes and valves, with varying internal diameters (60 mm to 160 mm). The applicant proposes to utilise drip/ micro irrigation as the preferred method of water delivery to the trees within the orchards.

Electrical Infrastructure

It is anticipated that a new pump station will be required at the new dam. This will also require the installation of a new ESKOM transformer (500 kVA), for which the applicant is in the process of applying, as well as an upgrade to the existing transformer. A new 22 kV line will be required to be installed between the two transformers.

Access

Access to the site and proposed orchards will be from the existing gravel roads on the farm. The internal roads will be between 4 and 9 metres in width.

6.6.2 Aspects of the Project that Could Potentially have Biodiversity Related Impacts.

The key components of the project and their respective impacts upon the terrestrial vegetation and faunal environment are as follows:

COMPONENT	POTENTIAL BIODIVERSITY AND ECOLOGICAL IMPACTS
Citrus Orchards	
The construction of citrus orchards will require clearing within its footprint	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the citrus orchards.
Infrastructure	
Access Roads and Irrigation Pipelines will require clearing of vegetation.	The terrestrial environment will permanently be impacted where vegetation clearing is required for infrastructure relating to the operation of the citrus orchards.

6.7 SYSTEMATIC PLANNING FRAMEWORKS

A screening of Systematic Planning Frameworks for the region (summarised in Table 6. 1), which forms the basis of this report include the following features:

Critically Endangered and Endangered Ecosystems.

Vulnerable Ecosystems.

Critical Biodiversity Areas and Ecological Support Areas.

River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers.

Protected Areas and National Protected Area Expansion Strategy (NPAES) areas.

Critical Habitat for listed endemic or protected species, including Key Biodiversity Areas and/or Important Bird Areas.

Table 6. 1: Summary of Regional Planning Biodiversity features.

FEATURE	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool (2020) (Terrestrial Biodiversity)	Very High Terrestrial Biodiversity Medium & Low Plant Species High & Medium Animal Species Low & Very High Aquatic Sensitivity	ESA 1 & 2, FEPA quinary catchments, Endangered ecosystem Several plant and animal species of concern are potentially present FEPA quinary catchments
National Vegetation Map (NVM, 2018)	Sundays Valley Thicket (AT 51) Albany Alluvial Vegetation (AZa 6)	Least Concern Endangered (Confirmed no Albany Alluvial Vegetation on site)
Regional Planning: Sub-Tropical Ecosystem Planning (STEP, 2007)	Sundays Spekboom Thicket Sundays Valley Thicket	Vulnerable Vulnerable
Critically Endangered and Endangered Ecosystems (NBA, 2019)	Albany Alluvial Vegetation mapped on north side of site	N/A Confirmed no Albany Alluvial Vegetation on site
Vulnerable Ecosystems (NBA, 2019)	None	N/A
Eastern Cape Biodiversity Conservation Plan (2007)	Terrestrial ESA 3	Maintain terrestrial and aquatic connectivity as well as ecological function.
Eastern Cape Biodiversity Conservation Plan (2019)	Terrestrial ESA 1 & 2	Maintain terrestrial and aquatic connectivity as well as ecological function.
Sundays River Valley Biodiversity Sector Plan (2012)	Other Natural Area (ONA) ESA No Natural Area Remaining (NNR)	Sustainable Management within general rural land-use principles. Maintain ecological processes. Sustainable Management within general rural land-use principles. Favoured areas for development.
Protected Areas (SAPAD)	None directly affected, Addo Elephant National Park is situated 11.5 km to the east and 13 km to the north.	These protected areas nor any ecological processes associated with them are directly affected by the proposed project, however due to proximity to the park, mobile faunal species may be transient between the site and the Park and thus be indirectly affected.

FEATURE	DESCRIPTION	IMPLICATIONS/COMMENT
NPAES	None directly affected. Closest NPAES areas are indicated 7 km to the north.	No NPAES or ecological processes within these areas are likely affected. Highly mobile faunal species that occur in these areas may interact with the site.
Strategic Water Source Areas (SWSA)	Not situated within any designated SWSA	N/A
Freshwater Ecosystem Priority Areas (FEPA's)	Situated within catchment of the Sundays River (0.3 km to 1.2 km to the north), classified as CLASS D: LARGELY MODIFIED. The site is within the N40E quaternary catchment.	Site is in proximity to non-perennial tributaries of the Sundays River, which is extensively modified and generally surrounded by intensive agricultural activities. Specific activity may have impacts to upper tributaries of the Sundays River, however none of the watercourses reach the Sundays River as they are cut off by a canal and other development including roads and orchards to the north of the site.
Regional Hotspots & Regions of Endemism	Site is within the Albany Centre of Endemism, being within the Gamtoos-Groot River basin.	Several endemic species are known form the wider surrounding area, however the likelihood of any being significantly affected by the proposed activity, having a limited and localised footprint are unlikely to be significant.
Important Bird Areas (IBA's)	The site is not within any Important Bird Areas (IBA's). The closest IBA's include Alexandria Coastal Belt IBA 32 km to the south-east, Swartkops Estuary, Redhouse & Chatty Salt pans 34 km to the south-west & Algoa Bay Islands 35 km to the south.	The specific activity is unlikely to have any impact on IBA's, although it may be within the foraging range of some bird species. It is unlikely to have any significant cumulative impact to such bird species above background levels of disturbance already present.
Key Biodiversity Areas (KBA's)	None	Activity unlikely to have any impact on any other KBA's
Marine/Coastal areas	Nearest Marine Protected Area is the Addo Elephant Marine Protected Area over 30 km to the south-east	Activity unlikely to have any impact on the marine environment.
RAMSAR sites	None in proximity	Activity unlikely to have any impact on any RAMSAR sites.
Within 32 m of non-perennial watercourses	Several non-perennial watercourses are present within the site boundaries.	Refer to Aquatic Biodiversity Specialist report. Impacts to riparian vegetation associated with watercourses to be avoided and only permitted for

FEATURE	DESCRIPTION	IMPLICATIONS/COMMENT
		crossings of necessary infrastructure (incl. pipelines and roads).
Within 100 m of perennial rivers	The site is between 300 m and 1.2 km from the Sundays River to the north, the closest proposed lands are 500 m from the river.	Terrestrial biodiversity process impacts to any perennial river will likely be negligible due to not being in proximity.
Within 500 m of natural wetlands	Several natural wetlands are identified in the area as well as several man-made dams with some having riparian vegetation comprised of primarily reedbeds. No natural wetland features are affected or within 500 m of the proposed orchards.	Refer to Aquatic Biodiversity Specialist report. All wetlands and artificial dams that provide riparian habitat should be avoided.
Forest	None directly affected.	No forest pockets nor any ecological processes associated with them are affected by the proposed activity.
Surrounding Land Uses	Mostly irrigated agriculture with some game farming.	Very high levels of disturbance are present to the north of the site, associated with the Sundays River, being a high value agricultural area, with low to moderate levels of transformation to the south. Substantial areas of intact Sundays Valley Thicket vegetation are still present in the broader area, to the south, east and west of the site.
Critical Habitat for listed endemic/ protected species	There are several endemic, range restricted, red listed or otherwise protected flora and fauna species in the surrounding area and vegetation units that are known to have limited distributions, which will be assessed in more detail in the report.	

6.7.1 National Environmental Screening Tool

The National web-based Environmental Screening Tool allows for the generating of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation. The National Environmental Screening Tool indicates the following, which have relevance to this assessment:

- Terrestrial Biodiversity Sensitivity - Very High (*Figure 6.2*).
- Plant Species sensitivity – Low and Medium (*Figure 6.3*).
- Animal Species sensitivity - Medium and High (*Figure 6.4*).
- Aquatic Sensitivity - Low and Very High (*Figure 6.5*).

Figure 6.2. Terrestrial Biodiversity Sensitivity.

Figure 6.3. Plant Species Sensitivity.

Figure 6.4. Animal Species Sensitivity.

Figure 6.5. Aquatic Sensitivity.

The key biodiversity features that are indicative of this sensitivity, which will be assessed further in this report, include the following:

Sensitivity	Feature(s) in proximity	Affected Project Components
Terrestrial Sensitivity		
Very High	Ecological Support Area 1 & 2, FEPA Sub-catchments, Endangered ecosystem	Entire development footprint
High	None	
Medium	None	
Low	None	
Plant Sensitivity		
Very High	None	
High	None	
Medium	Sensitive Species 1268,1248, 1252, 91, 19, *Selago zeyheri, Duvalia pillansii, Justicia orchioides subsp. Orchioides & Asparagus spinescens*	Entire development footprint
Low	Low Sensitivity	Already transformed portions (ie. existing orchards)

Animal Sensitivity		
Very High	None	
High	*Circus maurus* (bird)	Entire development footprint
Medium	*Aneuryphymus montanus (*insect*), Neotis denhami (*bird*), Acinonyx jubatus (*mammal*) &* Sensitive species 7.	Already transformed portions (ie. existing orchards)
Low	None	
Aquatic Sensitivity		
Very High	Wetlands, FEPA quinary catchments	Portion of the development footprint adjacent to the western boundary.
High	None	
Medium	None	
Low	Low Sensitivity	Portion of the development footprint in the centre of the site as well as already transformed portions (ie. existing orchards)

The screening tool identifies Very High Terrestrial Biodiversity (ESA 1 & 2, FEPA Sub-catchments, Endangered ecosystem); Medium & Low Plant Species (Sensitive Species 1268,1248, 1252, 91, 19, *Selago zeyheri, Duvalia pillansii, Justicia orchioides subsp. Orchioides & Asparagus spinescens*); High & Medium Animal Species (*Circus maurus* (bird), *Aneuryphymus montanus* (insect), *Neotis denhami* (bird), *Acinonyx jubatus* (mammal) & Sensitive species 7) and Low & Very High Aquatic Sensitivity (Wetlands, FEPA quinary catchments) in proximity to the site.

The specific sensitives, as well as any site-specific sensitivities that may not have been identified by the screening tool, will be assessed further in the respective sections in this report. The site assessment has physically screened for the presence of the SCC identified, and other possible SCCs not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed.

6.7.2 Vegetation of Southern Africa

A single vegetation unit (*Figure 6.6*) is primarily affected by the proposed project (National Vegetation Map, 2018). The site is located entirely within Sundays Valley Thicket, having a Least Concern Conservation Status as per the National Biodiversity Assessment (NBA, 2019). Surrounding vegetation units include Albany Alluvial Vegetation (Endangered) to the north and west, generally associated with floodplains adjacent to larger perennial rivers. None of this vegetation type has been identified within the proposed development footprint.

Figure 6.6. Vegetation and Conservation Status as per National Vegetation Map (NVM, 2018) and National Biodiversity Assessment (NBA, 2019).

Sundays Valley Thicket (AT 51)

Type history: STEP map - Gamtoos Thicket (16 %), Sundays Thicket (82 %); 2012 VEGMAP – AT 4 Gamtoos Thicket (17 %), AT 6 Sundays Thicket (83 %)

Distribution: This vegetation type occurs in the Eastern Cape Province. Primarily in the lower Sundays River Valley, from near Kleinpoort in the west toward Paterson and Colchester in the east. Also centred around Uitenhage in the lower Coega and Swartkops River Valleys, and in the middle reaches of the Gamtoos River Valley and some smaller rivers to the west (e.g., Kabeljous River), south of the Baviaanskloof Mountains.

Vegetation & Landscape Features: The vegetation type occurs on undulating plains, low foothills, and mountain slopes. Medium-sized to tall (3 - 5 m) dense thicket in which the woody tree and shrub component, and the succulent component, are well developed, with many spinescent species. There are no distinct strata in the vegetation as the lower and upper canopy species intertwine, often with a wide variety of lianas linking the understorey with the canopy. Emergents are uncommon, but *Euphorbia grandidens*, *E. triangularis*, and occasionally *Cussonia gamtoosensis* and *C. spicata* emerge above the canopy. The abundance *of Portulacaria afra* and other succulent shrubs (e.g., *Aloe speciosa, Euphorbia caerulescens*) increases in more arid sites, while local soil conditions also influence composition of the vegetation -there is thus considerable structural heterogeneity within this vegetation unit.

Geology and Soils: The vegetation type typically occurs on the Kirkwood Formations, Sundays River and Enon Formations, in deep loamy-clayey soils. The main land types are Fc, Ae and Ag.

Climate: Non-seasonal rainfall dominates the region, with MAP between 210 mm and 631 mm. Frost is present between 2 and 13 days per year. The mean monthly maximum is 28.09 °C in February and the mean monthly minimum is 6.23 °C in July. Altitude ranges from 2 - 673 masl.

Important Taxa[2] (d=dominant, e=South African endemic, et=possibly endemic to a vegetation type)

- **Succulent shrubs**- *Portulacaria afra (d), Euphorbia caerulescens (d), Adromischus cristatus var. cristatus (e), Adromischus sphenophyllus, Bulbine frutescens, Cotyledon orbiculata, Cotyledon velutina (e), Crassula capitella subsp. capitella (e), Crassula capitella subsp. thyrsiflora (e), Crassula cordata (e), Crassula cultrata (e), Crassula mesembryanthemoides (e), Crassula ovata (e), Crassula perfoliata var. coccinea (e), Crassula rogersii (e), Delosperma echinatum (e), Delosperma uniflorum (e), Euphorbia mauritanica, Exomis microphylla (e), Gasteria bicolor, Kalanchoe rotundifolia, Lampranthus productus (e), Mestoklema tuberosum (e), Pachypodium bispinosum (e), Pachypodium succulentum (e), Pelargonium carnosum, Mesembryanthemum articulatum, Roepera foetida, Rhigozum obovatum (d).*
- **Small trees-** *Euclea undulata (d), Pappea capensis (d), Schotia afra (d), Cussonia gamtoosensis (e), Cussonia spicata, Encephalartos lehmannii (e), Ptaeroxylon obliquum, Sideroxylon inerme*.
- **Succulent herbs-** *Curio radicans (d), Crassula expansa, Crassula spathulata (e).*
- **Succulent trees-** *Aloe africana (d, e), Aloe ferox, Aloe speciosa (d), Euphorbia grandidens*.
- **Geophytic herbs**- *Sansevieria hyacinthoides (d), Sansevieria aethiopica, Cyanella lutea, Cyrtanthus loddigesianus (e), Drimia altissima, Drimia anomala (e), Drimia intricata, Freesia corymbosa (e), Hypoxis argentea, Oxalis smithiana, Trachyandra affinis (e), Tritonia securigera (e).*
- **Herbs-** *Abutilon sonneratianum, Aizoon glinoides (e), Arctotheca calendula, Commelina benghalensis, Cyanotis speciosa, Emex australis, Gazania krebsiana, Hibiscus pusillus, Hypoestes aristata, Lepidium africanum, Lotononis glabra (e), Plectranthus madagascariensis, Stachys aethiopica*.
- **Low shrubs**- *Asparagus crassicladus (e), Asparagus striatus (e), Asparagus subulatus (e), Barleria obtusa, Chascanum cuneifolium (e), Chrysocoma ciliata, Felicia muricata, Hermannia althaeoides (e), Justicia cuneata, Justicia orchioides (e), Lantana rugosa, Leonotis pentadentate, Limeum aethiopicum, Osteospermum imbricatum (e), Rhoiacarpos capensis(e), Senecio linifolius, Solanum tomentosum (e).*
- **Semi-parasitic shrubs-** *Colpoon compressum*.
- **Epiphytic parasitic shrubs**- *Viscum rotundifolium.*
- **Graminoids-** *Cynodon dactylon (d), Eragrostis obtusa (d), Panicum maximum (d), Eragrostis curvula, Eustachys paspaloides, Panicum deustum, Sporobolus fimbriatus, Stipa dregeana, Themeda triandra*.
- **Tall shrubs**- *Azima tetracantha, Brachylaena ilicifolia, Cadaba aphylla, Capparis sepiaria var. citrifolia, Carissa bispinosa, Ehretia rigida, Gymnosporia capitata (e), Gymnosporia*

[2] All taxonomic names are the latest names as they were listed in the Biodiversity Database of South Africa (BODATSA) on the 11 January 2019).

polyacantha (e), Maerua cafra, Mystroxylon aethiopicum, Nymania capensis, Plumbago auriculata, Putterlickia pyracantha (e), Searsia longispina (e), Scutia myrtina.

- **Herbaceous climbers-** *Pelargonium peltatum (d, e), Cissampelos capensis, Cynanchum ellipticum, Cyphostemma quinatum, Jasminum angulare, Kedrostis capensis, Rhoicissus digitata, Rhoicissus tridentata.*
- **Woody succulent climbers-** *Cynanchum viminale, Crassula perforate.*
- **Woody climbers-** Asparagus aethiopicus, Asparagus asparagoides, Asparagus multiflorus (e), Asparagus volubilis (e).

Conservation: Least Concern (NBA, 2019)

- **Conservation Target:** 19 %.
- **Conserved in:** Addo Elephant National Park, Cape Floral Region Protected Areas: Baviaanskloof.
- **Area transformed:** 11.86 %.
- **Threat activities:** Cultivation, urban sprawl, Erosion is low to medium.
- **Protection Level:** Moderately Protected.

Albany Alluvial Vegetation (Aza 6)

Including Stream-bank Bush (Story 1952). Riverine Bush (Martin & Noel 1960). Baviaans Doringveld, Gamtoos Doringveld & Sundays Doringveld (Vlok & Euston-Brown 2002, Vlok et al. 2003).

Distribution: Eastern Cape Province: Between East London and Cape St Francis on wide floodplains (usually close to the coast where the topography becomes flatter) of the large rivers such as the Sundays, Zwartkops, Coega, Gamtoos, Baviaanskloof, Great Fish River etc. This alluvial unit is embedded within the Albany Thicket Biome. Altitude ranging from 20–1 000 m.

Vegetation & Landscape Features: Two major types of vegetation pattern are observed in these zones, namely riverine thicket and thornveld (*Vachellia* (*Acacia) natalitia)*. The riverine thicket tends to occur in the narrow floodplain zones in regions close to the coast or further inland, whereas the thornveld occurs on the wide floodplains further inland.

Geology, Soil & Hydrology: Underlain by Jurassic-Cretaceous sediments of the Uitenhage Group. The alluvial zones (recent alluvial deposits of various textures, but usually with high clay content) can become flooded following the west-east passage of frontal systems in autumn and winter or during intensive local storms in summer.

Climate: Characterised by undifferentiated, year-round precipitation regime, with only two slight peaks in March and November. The overall MAP is 350 mm (range 300–717 mm). Warm-temperate climate (overall MAT 18 °C; range 15.7–18.3 °C). The river valleys are often hotter than the surrounding landscape (due to exposed steep slopes), whereas riverine zones closer to the coast enjoy an ameliorated climate due to its proximity to the sea.

Important Taxa: (d=dominant, [B]Brackish habitats):

Riparian thickets

- **Small Trees**: *Vachellia* (*Acacia) natalitia (d), Salix mucronata subsp. mucronata (d), Schotia afra var. afra (d), Acacia caffra, Searsia (Rhus) longispina.*
- **Succulent Trees**: *Aloe africana, A. ferox.*
- ***Tall Shrubs**: Azima tetracantha, Cadaba aphylla.*

- ***Low Shrubs****: Pentzia incana (d), Asparagus striatus, A. suaveolens, Carissa haematocarpa.*
- **Succulent Shrubs**: *Amphiglossa callunoides, Lycium cinereum.*
- **Graminoids**: *Sporobolus nitens (d), Digitaria eriantha, Eragrostis curvula, E. obtusa.*

Reed beds

- **Megagraminoids**: *Cyperus papyrus (d), Phragmites australis (d).*

Flooded grasslands & herblands

- **Succulent Shrubs**: *Cotyledon campanulata[B], Glottiphyllum longum[B], Malephora lutea[B], M. uitenhagensis[B].*
- **Semiparasitic Shrub**: *Thesium junceum[B].*
- **Succulent Herbs***: Haworthia sordida var. sordida*[B]*, Orbea pulchella*[B]*.*
- **Herb**: *Rorippa fluviatilis var. fluviatilis.*
- **Graminoid**: *Cynodon dactylon[B] (d).*

Conservation: Endangered (NBA, 2019)

Conservation Target: 31%

Conserved in: Only about 6% statutorily conserved in the Greater Addo Elephant National Park, Baviaanskloof Wilderness Area, Loerie Dam, Springs, Swartkops Valley and Yellowwoods Nature Reserves and the Double Drift Reserve Complex. About 2% enjoys protection in eight private conservation areas.

Area transformed: More than half of the area has been transformed for cultivation, urban development, road building and plantations.

Threat activities: Alien invaders include *Acacia saligna*, *Nerium oleander* and *Eucalyptus* species.

Protection Level: Poorly Protected

Remarks: Vlok & Euston-Brown (2002) consider this vegetation as important temporary habitats and migration corridors for larger herbivores such as elephant (in the past), rhinoceros, eland and kudu.

6.7.3 National Biodiversity Assessment

The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The NBA is especially important for informing the National Biodiversity Strategy and Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES) and informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 and 34%).

The outcome of the most recent National Biodiversity Assessment (2019) indicates that the primary vegetation unit occurring within the area under assessment, Sundays Valley Thicket, has a Least

Concern Conservation Status (*Table 6. 1:, Figure 6.6*), which is the lowest status. This indicates that more than 60 % of the unit remains, and that ecosystem functioning is not under imminent threat by loss of natural habitat. There are moderate levels of utilization of the site, inclusive of current citrus related activities, leading to varied levels of degradation and transformation.

Implications:

- The vegetation unit occurring on the site is categorised as having a Least Concern Conservation Status and is not considered to be under immediate threat (low), with more than 60 % considered to still be still intact. The conservation target is 19 %, thus the conservation value at a regional level for the site is at the low end of the scale.
- Development of the site is thus unlikely to significantly affect conservation of the vegetation unit based on current conservation status rating (NBA, 2019).

6.7.4 Sub-Tropical Ecosystem Planning (STEP)

The Sub-Tropical Ecosystem Plan, which was undertaken in the early 2000's served to conduct a comprehensive conservation planning exercise in the Subtropical Thicket Biome, which occurs within the Eastern and Western Cape provinces. Much of the principles have been refined and incorporated into more recent Systematic Plans and is generally regarded as being superseded by the more recent plans. The findings of STEP do however form a solid baseline for comparison of other, more recent plans, within the Subtropical Thicket Biome.

STEP (2006) identified two vegetation units (*Figure 6.7*) as being affected by the proposed activity. **Sundays Spekboom Thicket** predominant with **Sundays Doringveld** to the north which are described in more detail below. Sundays Spekboom Thicket was designated a *Vulnerable* Conservation Status (2006). This STEP (2006) classification corresponds somewhat to the more recent National Vegetation Map (2018) classification, with Sundays Spekboom Thicket not differentiated from the broader Sundays Valley Thicket and Albany Alluvial Vegetation corresponding to Sundays Doringveld. Sundays Spekboom Thicket and Sundays Doringveld were both designated a Vulnerable Conservation Status at the time of publication of STEP (2006). These statuses are no longer applicable, other than providing historical context.

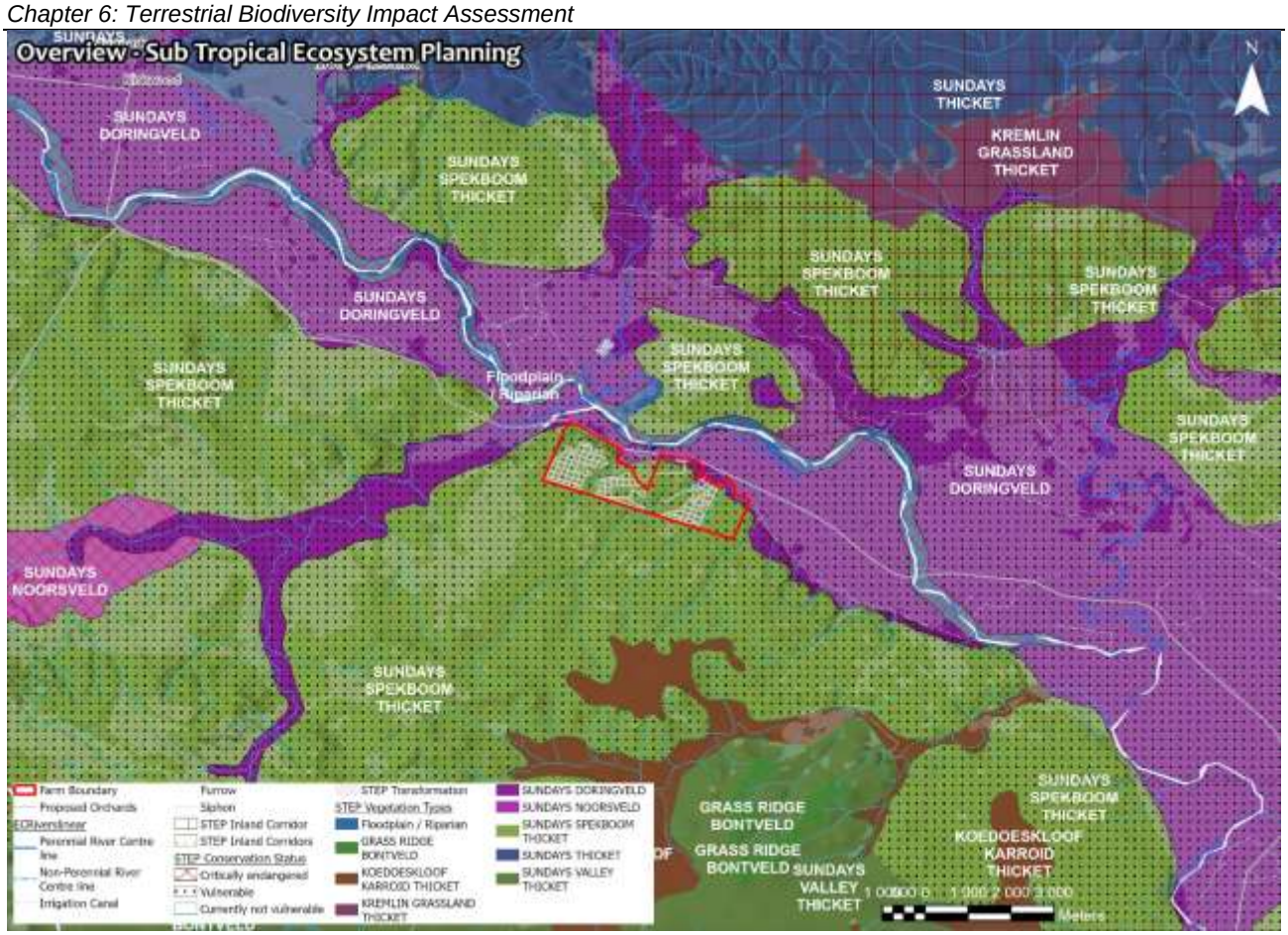

Figure 6.7. Sub-Tropical Ecosystem Planning vegetation units and status (STEP, 2007).

Sundays Spekboom Thicket.

The local dominance of Spekboom (*Portulacaria afra*) and related abundance of the woody species present vary along a rainfall gradient. In arid sites (such as those south of Kirkwood) Spekboom is dominant with other succulents such as *Euphorbia ledienii* not uncommon, but the woody trees and shrubs such as *Euclea undulata* and *Pappea capensis* are sparse. In higher rainfall sites (such as in the Addo National Park) the woody component is much better developed with *Pappea capensis*, *Putterlickia verrucosa, Rhigozum obovatum, Searsia (Rhus) pterota, Searsia (Rhus) longispina* and *Schotia afra* abundant, but *Euphorbia ledienii* is rare here. The local soil condition also affects the species composition. On, for instance, deep alluvial soils next to the Sundays River, Spekboom and several other succulent species, are abundant, the woody component is very poorly developed. There is thus a fair amount of heterogeneity within the Sundays Spekboom Thicket unit, which could be distinct subtypes that are not recognised here.

Sundays Doringveld

This unit is restricted to the often deep, red, alluvial soils in the floodplains of the Coega, Sundays and Zwartkops rivers. *Vachellia* (*Acacia) karoo, Aloe ferox* (often also with *A. ferox* x *A*. *africana* hybrids present) and *Pentzia incana* abundant. When pristine, the grass component (*Eragrostis* and *Panicum* species) is well developed. At present these grasses are largely absent, with only *Cynodon dactylon* abundant in the heavily grazed sites. Small succulents are usually abundant (e.g. *Cotyledon campanulata, Glottiphyllum longum, Malephora lutea,* etc.), especially amongst the woody shrubs (*Cadaba aphylla, Lycium cinereum, Lycium ferocissimum, Pentzia incana*, etc.). Some of these succulents are rare species (e.g. *Orbea pulchella*) or unique genotypes of uncommon species (e.g. *Euphorbia* sp.nov. Palmer1336, *Haworthia sordida var. sordida*, etc.) that only occurs in this unit. A

few very rare shrublets (e.g. *Aphiglossa callunoides, Thesium junceum*, etc.) occur in these floodplains, with at least one of the highly localized endemic species of this environment (*Brachystelma tabularum*) probably already extinct due to agricultural and urban development.

6.7.5 Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007)

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning. In terms of the Biodiversity Act (Act 10 of 2004), the Minister or the MEC for environmental affairs in a province may determine a geographic region as a bioregion for the purposes of the Act and publish a plan for the management of biodiversity in that region. This plan is termed a 'bioregional plan' and must contain "measures for the effective management of biodiversity" in the region. A bioregional plan must contain a map of CBAs, including terrestrial and aquatic features and ecological corridors. The map must show four main categories:

- Existing protected areas
- Critical Biodiversity Areas (for example, Threatened Ecosystems, Ecological Corridors, Special Habitats, Wetlands and Priority Sub-Catchments)
- Other Natural Habitat
- Areas where no natural habitat remains.

A bioregional plan must contain, amongst other things, guidelines for land-use planning and decision-making, linked to the features and categories on the map. *Figure 6.8.* indicates the ECBCP (2007) categorisation of the site and surrounding area.

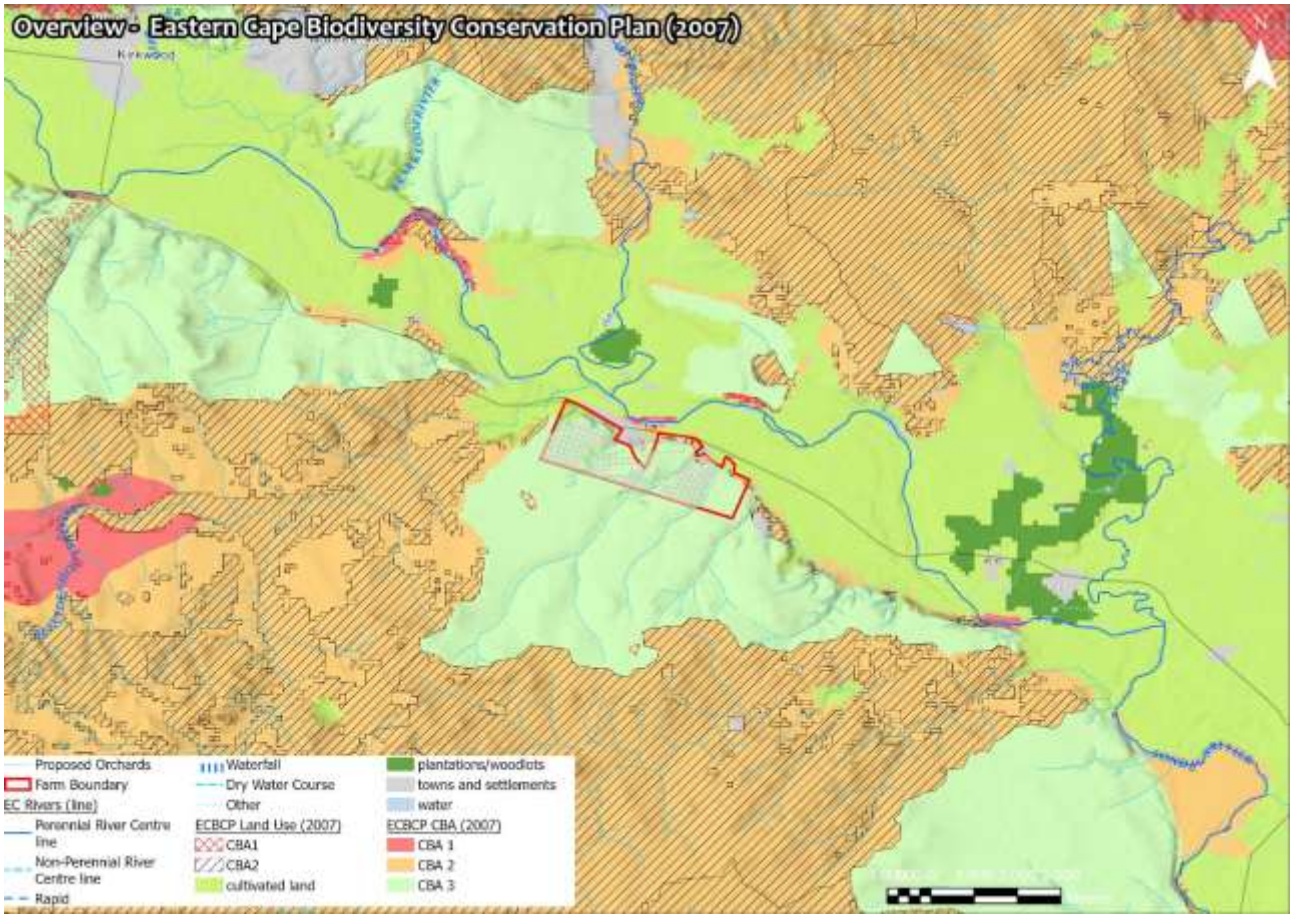

Figure 6.8. Eastern Cape Biodiversity Conservation Plan (2007) designation.

At the time of publication of the Eastern Cape Biodiversity Conservation plan (ECBCP) in 2007, there were several regional and national conservation planning initiatives overlapping with the province, including NSBA, DWAF Forest Conservation Planning, Wild Coast Conservation Plan, Pondoland Systematic Conservation Plan, STEP, SKEP, C.A.P.E and Grasslands Programme conservation plans, and the Maloti Drakensberg Transfrontier Project conservation plan. The aim of the ECBCP was thus to integrate these existing conservation plans and to fill in the 'gap areas', thereby providing a single, user friendly, biodiversity land-use decision support tool for the whole province. The ECBCP was not gazetted as a bioregional plan. ECBCP (2007) has been more recently refined utilising more recent landcover data and is superseded by the ECBCP (2019).

The site overlaps entirely with areas designated as CBA 3 (Functional Landscapes). Surrounding the site, the ECBCP (2007) identifies cultivated land to the north with CBA 2 & 3 to the south. ECBCP (2007) recommends that land use in these areas (Functional landscapes) should "*manage for sustainable development, keeping natural habitat intact in wetlands (including wetland buffers) and riparian zones. Environmental authorisations should support ecosystem integrity".*

Implications:

- The proposed activity intersects with ECBCP (2007) designated CBA 3 areas.
- Surrounding areas of the site are generally natural, extensive with limited fragmentation of ecological processes to the south, but extensive fragmentation to the north.
- In terms of the land use management guidelines, the ECBCP (2007) indicates that biodiversity should be maintained in wetlands and riparian zones and managed for sustainable development.

6.7.6 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019): Terrestrial

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) was undertaken in this assessment. Some of the reasons for this include: an updated land cover map, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the province that require integration. In addition, significant strides have been made with respect to defining and mapping biodiversity pattern and biodiversity processes, which have been standardised to ensure a level of consistency throughout the country (SANBI, 2017). The ECBCP (2019) will replace the ECBCP (2007) in its entirety. The Department of Economic Development, Environmental Affairs and Tourism issued a Provincial Notice on 19 October 2020 (PN. No. 173 of 2020) in the Provincial Gazette (No. 4460) citing "Notice of Intention to Publish and Gazette the Final Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) for implementation, in terms of The National Environmental Management Act". It further noted that "Listing Notice 3 (12) refers to Critical Biodiversity Areas of a Bioregional Plan. The ECBCP (2019) is not a Bioregional Plan, but a systematic biodiversity plan, and therefore does not constitute a listed area in terms of this activity". In addition, Ecological Support Areas are not deemed to be Critical Biodiversity Areas. None the less, the bioregional plan will still serve to guide sustainable development.

The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, *"Guideline regarding the determination of Bioregions and the Preparation of and*

publication of Bioregional Plans". The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in Table 6.2. In this instance (Figure 6.9), the portion of the site that is proposed for development is situated within Ecological Support Area 1 (ESA 1). The primary function of Ecological Support Areas is to perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience (Table 6.2) and must be maintained in a functional state to maintain ecological function and ecosystem services.

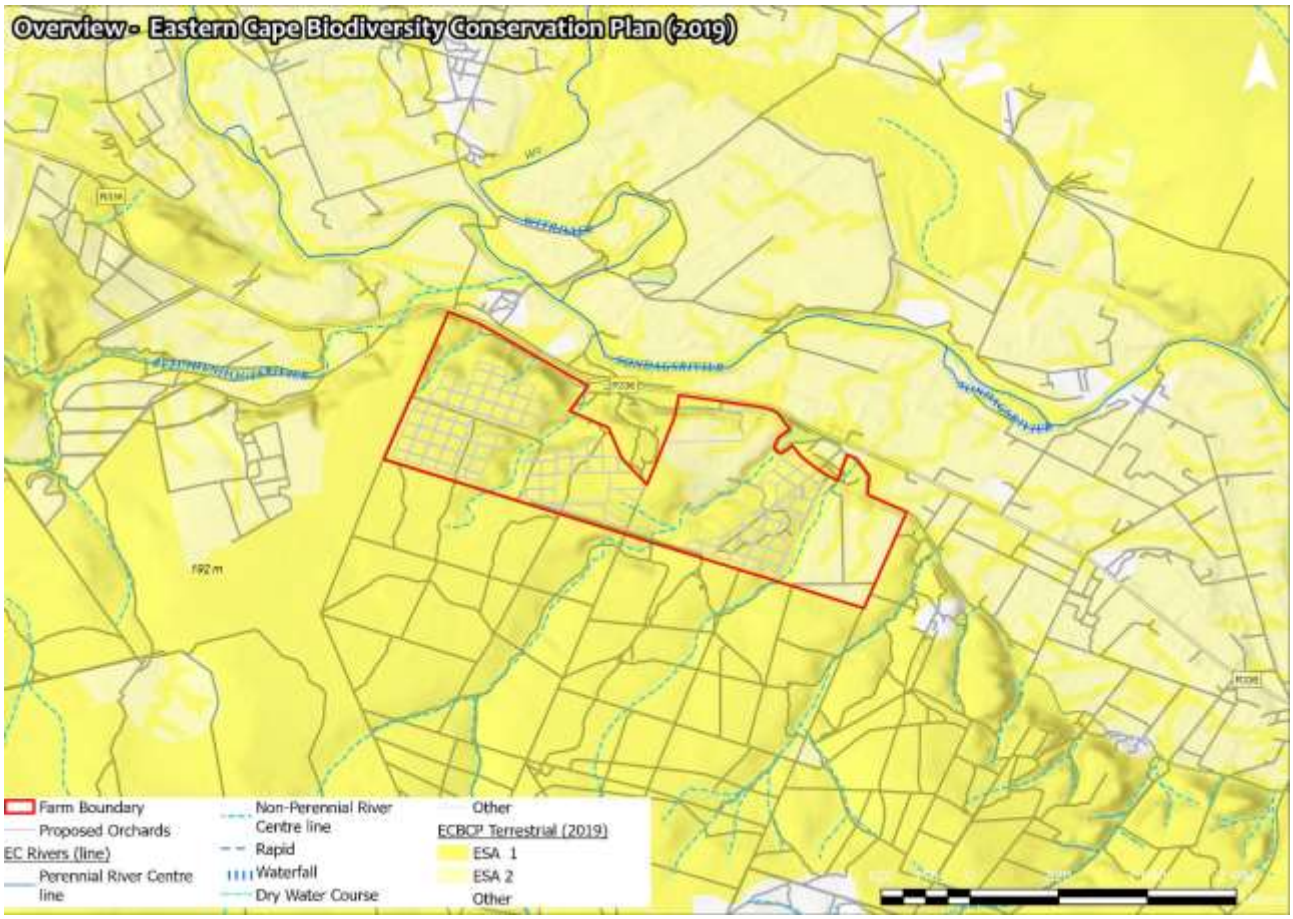

Figure 6.9. Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019).

Table 6. 2: Linking CBA categories to management objectives.

CBA MAP CATEGORY	DESIRED STATE	LAND MANAGEMENT OBJECTIVE
Ecological Support Area 1 (ESA 1)	Functional	Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA 1, the following objectives apply: • These areas are <u>not required to meet biodiversity targets</u>, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. • These systems may vary in condition and maintaining function is the main objective, therefore: 1. <u>Ecosystems still in natural, near natural state should be maintained</u>.

CBA MAP CATEGORY	DESIRED STATE	LAND MANAGEMENT OBJECTIVE
		2. Ecosystems that are moderately disturbed/degraded should be restored.
Ecological Support Area 2 (ESA 2)	Functional	Maintain current land use with no intensification. For areas classified as ESA 2, the following objectives apply: • These areas have already been subjected to severe and/or irreversible modification. • These areas are not required to meet biodiversity targets, but they may still perform *some* function with respect to connectivity, ecosystem service delivery and climate change resilience. • Objective is to maintain remaining function, therefore: 1. Areas should not undergo any further deterioration in ecological function. 2. Opportunities to change land use practices to improve ecological function (i.e., cultivation agriculture to livestock grazing agriculture) are desirable in ESA 2 areas.
Other Natural Areas (ONA) and No Natural Habitat Remaining (NNHR)	Production	No desired state or management objective is provided for ONA or NNAR.

Description of land use types and activities as per the ECBCP (2019)

A range of various land use types and activities associated with the Eastern Cape are described below. These have been derived from SPLUMA land use categories, municipal zoning scheme definitions and predominant land uses, and practices present in the Eastern Cape. Each category has been expressly linked to a corresponding SPLUMA land use category for the purposes of facilitating the integration of the CBA map land use guidelines into other spatial planning products such as Spatial Development Frameworks. These land uses are described in more detail in Table 6.3 below.

Table 6. 3: Description of Land Use Types and Activities.

Agriculture
A range of agricultural activities have been considered in this land use type, including: • Extensive game and livestock farming (where 'extensive' means low stocking rates over large areas, with minimal additional food supplementation). • Intensive livestock and game ranching. • Agricultural infrastructure, including agri-industrial facilities, agri-villages, buildings, houses, sheds, and intensive animal production facilities (e.g., feedlots); and • Arable land, including cultivation of irrigated and dryland crops, woodlots, orchards, and multi- cropping systems. This land use zone corresponds to the SPLUMA scheduled 'agricultural' land use purpose.

Many agricultural activities may impact on, and are largely incompatible with, biodiversity conservation objectives. If poorly managed, they may accelerate degradation by causing habitat loss, soil erosion and hydrological changes. Associated impacts vary from moderate to severe depletion of natural biota and disturbance of ecosystem function. However, agriculture may also contribute to the overall functionality of a landscape by maintaining connectivity necessary for the movement and foraging of animals.

Extensive Game and Livestock Farming

Extensive Livestock and Game farming is the utilisation of large areas of natural (unimproved) rangelands with the commercial objective of producing livestock or game animals (excluding feedlots and game breeding farms). This land use is considered to be compatible with biodiversity objectives of some CBAs and ESAs, under certain conditions, including:

- A biodiversity and veld condition assessment should underpin the calculation of carrying capacity.
- Game and livestock stocking rates should not exceed the recommended carrying capacity. Overgrazing, which results in a loss or degradation of an ecosystem, is in conflict with NEMA principals and is governed by Section 28 of NEMA which regulates the 'Duty of care and remediation of environmental damage'.
- Give preference to stocking game species that fall within their natural distribution range in the province.
- Sensitive habitats and species-rich areas should be set-aside for the purposes of biodiversity conservation.
- Ecologically and economically sustainable management is applied.

Intensive Game Breeding

Game breeding involves the subdivision of grazing veld into small camps (less than 100 Ha) using fencing that does not allow free movement of naturally occurring wildlife (e.g., small mammals, reptiles, etc.).

Game breeding involves supplemental feeding of animals allowing stocking rates in excess of recommended carrying capacities and is considered a form of feedlot production. The forms of fencing used create impenetrable barriers to wildlife movement in the landscape.

Game breeding should not be permitted in CBAs or ESAs as is not considered compatible with the land management objectives for these categories.

Feedlots and agri-processing

Feedlots and agri-processing facilities are intensive farming operations which involve high animal densities and almost exclusive supplemented feeding and include piggeries, broiler houses, dairies, aquaculture, and livestock feedlots. These facilities produce waste streams that require treatment and disposal and should be operated in line with authorisation conditions. Since pollution may be felt beyond the direct footprint of the land use activity itself, this land use activity may impact on ecosystem functionality.

Feedlots and agri-processing activities are not compatible with land management objectives for CBAs. They may be considered within Terrestrial ESAs (i.e., ESA 2 areas with imposed restrictions), but should not be considered in aquatic ESAs associated with CBA rivers.

Cultivation

A number of different types of cultivation have been aggregated into this land use type and is fundamentally used to describe any earth-turning activity or a replacement of natural vegetation, including:

- Irrigated crop cultivation
- Dryland crop cultivation (e.g., orchards, pastures, groves, plantation forestry)

Cultivation is not considered compatible with the land management objectives of CBAs and ESA 1.

Roads and railways

Roads and railways include all existing and future planned linear infrastructure, such as hardened roads and railways. This land use zone corresponds to the SPLUMA scheduled 'Transport' land use purpose. These land uses are not consistent with the land management objectives of CBAs and ESAs. In cases where technical options are limited, these activities may only take place in CBAs and ESAs under specific conditions of authorisation and contingent on biodiversity offsets.

Other utilities

'Other utilities' describes a range of services such as water and sewage treatment works, associated pipeline reticulation, and other linear infrastructure including canals and power lines. Utility land uses generally fall within the 'Government' land use purpose of SPLUMA where it is defined as "use of land by national, provincial or municipal government to give effect to its governance role." This may, in some cases, be extended to parastatal companies such as water service boards and Eskom. In the case of renewable energy on private land, municipal zoning schemes are used. The different types of utilities have been discussed separately below.

Linear Structures: Pipelines, Canals, Catchment Transfers and Power Lines

These activities include large bulk water transfer schemes and catchment transfers, power lines, canals, pipelines (including oil and gas).

Activities involving catchment transfers and canals will affect flow regimes in rivers and wetlands. For this reason, they are not compatible with the management objective for CBA rivers.

Power lines, substations and pipelines can be compatible with the management objective of CBAs, and ESAs provided that appropriate design (above-ground pipelines, below-ground power lines, etc) and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, bird collision and electrocution avoidance are enforced.

Implications:

- The entire proposed activity will fall within ECBCP (2019) designated ESA 1 area.

- Extensive cultivation (citrus orchards) is not considered compatible with the land management objectives of ESA 1 and ecosystems still in natural, near natural state should be maintained.
- While the land use guidelines do indicate that the proposed use is not within the guidelines, a key objective within ESA is to maintain overall functionality of the landscape by maintaining connectivity necessary for the movement and foraging of animals.

6.7. 7 Addo Biodiversity Sector Plan: Sundays River Valley (2012)

The Sundays River Valley Municipality Biodiversity Sector Plan (Addo BSP, 2012) serves to guide biodiversity related assessments. The Addo BSP was published in 2012 and serves as a major refinement of the original ECBCP (2007), incorporating more recent datasets as well as more refined conservation planning, but it was not adopted as a Bioregional Plan by the competent authority. It still serves as a valuable tool to support land-use planning and decision-making in Critical Biodiversity Areas and Ecological Support Areas for sustainable development.

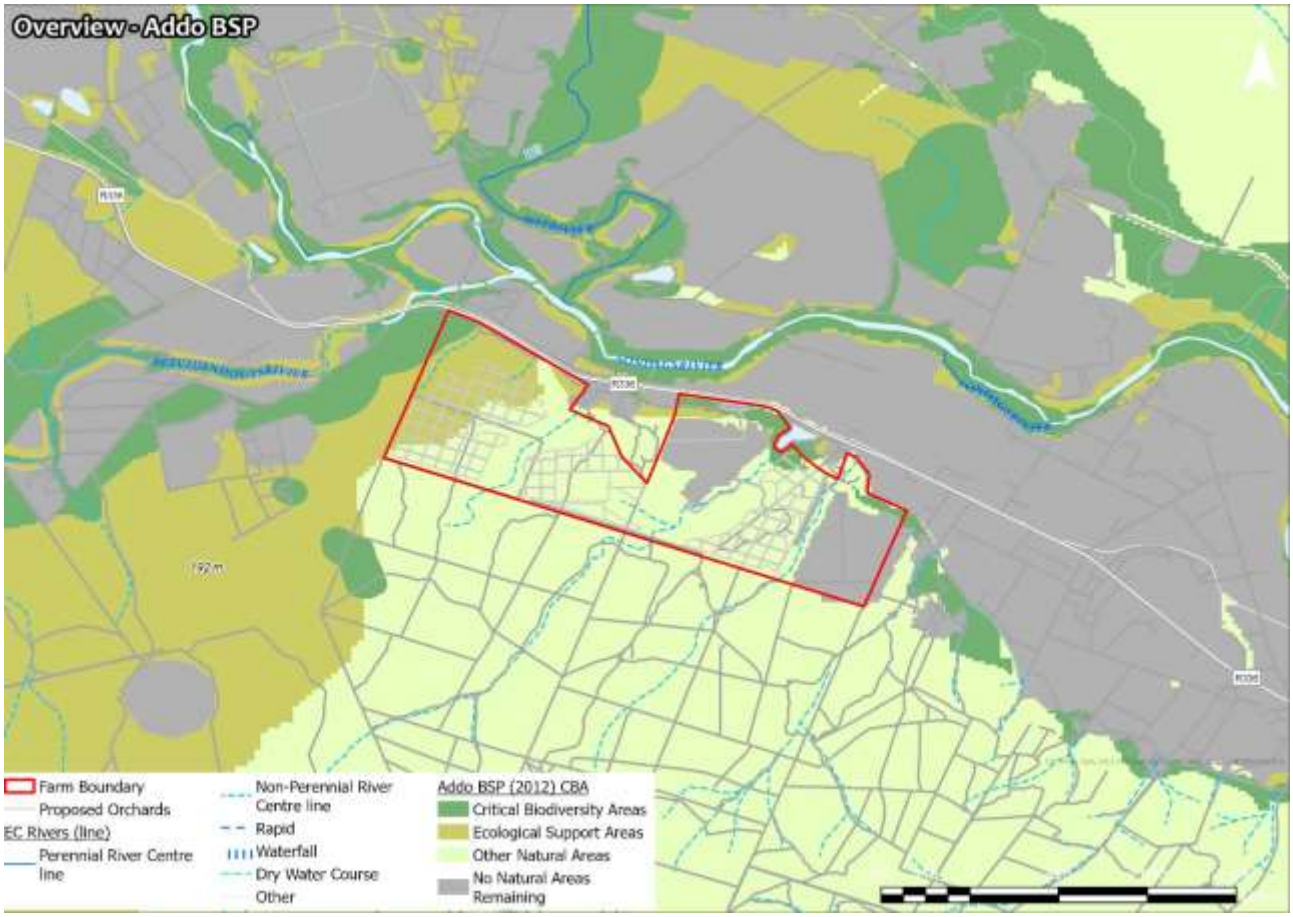

Figure 6.10. Addo Biodiversity Sector Plan designation.

A refined and updated Sundays River Valley planning domain was developed through integrating existing and new data. The principal inputs were the existing *ECBCP* (2007), the *Freshwater Ecosystems Priority Areas* (Nel, et al., 2011) and a new land cover layer developed specifically for the project (Skowno and Brown, 2012). Other input layers included, Addo Elephant National Park interface zones (SANParks pers com), Baviaanskloof Mega Reserve biodiversity assessment CBAs (Skowno, 2007), *NPAES focal areas* (Jackelman, et al., 2008), *MPAH (*Maputaland-Pondoland-Albany Hotspot*) Priority Areas* (Holness, 2011) and *National Climate Change Resilience* Layers (Holness, *in prep*).

The findings of the more recent ECBCP (2019), being the most recent conservation planning tool for the affected area, aligns strongly with the Addo BSP and would be considered to supersede the Addo BSP until such time as a local Bioregional Plan is developed and adopted by the competent authority that aligns with the ECBCP (2019). A stark contrast between the Addo BSP (Figure 6.10) and the most recent ECBCP (Figure 6.9) is that the Addo BSP designates the site as primarily Other Natural Area with a portion of ESA along the western boundary rather than the entire undeveloped portions of the site being ESA 1 (as per the ECBCP, 2019). Similarly, cultivated areas are designated No Natural Area Remaining rather than ESA 2 (ECBCP, 2019.

The Sundays River Valley (Addo) BSP identified most of the proposed footprint to be falling entirely within a designated Other Natural Areas (ONA), which would permit the proposed activity.

Implications:

- The Sundays River Valley BSP (Addo BSP, 2012) conservation category designation does not align closely with the recently revised ECBCP (2019) designations.
- In terms of the Addo BSP, the proposed activity would be considered to be permissible in terms of the land use management guidelines.

6.7.8 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans or Systematic Conservation Plans.

6.7. 9 Protected areas

The South Africa Protected Areas Database (SAPAD), a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa.

The Addo Elephant National Park (Figure 6.11) is situated 11.5 km to the east and 13 km to the north of the site, with several other formal protected areas located more than 20 km away. Since the habitat on site is contiguous with the Addo Elephant National Park, it is feasible that certain faunal species (birds and mammals) from the park may be transient to the site. However, it is unlikely that any significant ecological interactions will take place between the site and the park as the highly developed Sundays River Valley is located between the site and the park to both the north and east.

Table 6. 4: List of Protected Areas in vicinity.

NAME	DISTANCE
Addo Elephant National Park	11.5 km to the east and 13 km to the north
Uitenhage Nature Reserve	24 km south-west
Zwartkops Valley Nature Reserve	33 km south
Groendal Wilderness Area	28 km south-west

When projects are in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

Neither these protected areas nor any ecological processes associated with them are likely to be affected by the proposed project.

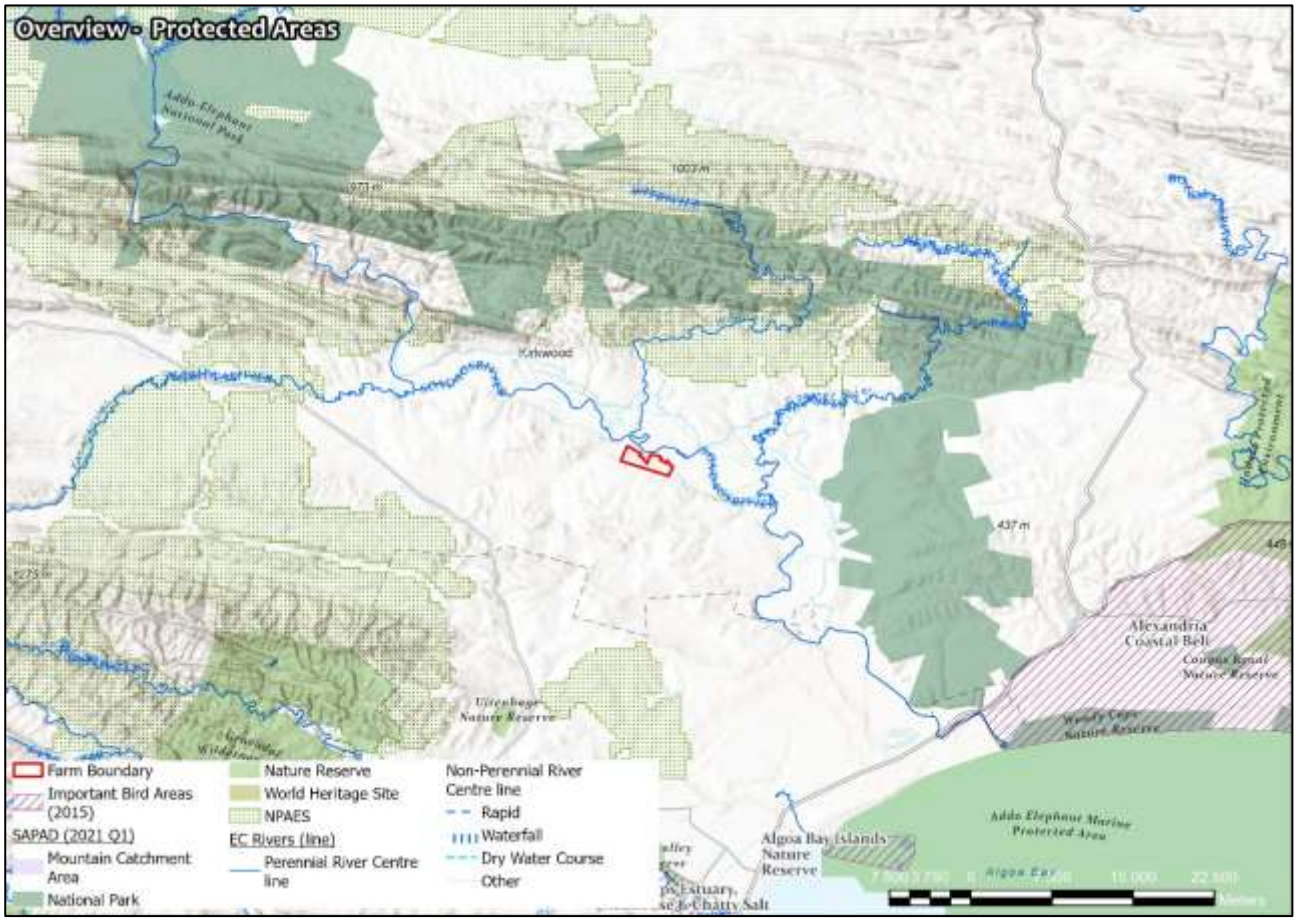

Figure 6.11. Protected Areas in vicinity.

No RAMSAR sites are affected or situated in proximity to the site and, although the Addo Elephant Marine Protected Area is an extension of the Addo Elephant National Park, it is situated over 30 km to the south-east and will not be affected directly or indirectly.

Implications:

The activity will have no direct or cumulative impact on any protected environment but due to proximity to the Addo Elephant National Park, it is feasible that the site may be within foraging range of certain highly mobile bird and mammal species that are present in the park (or *vice versa*).

6.7.10 Strategic Water Source Areas

Strategic water source areas (Figure 6.12.) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural "*water factories*", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas

can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

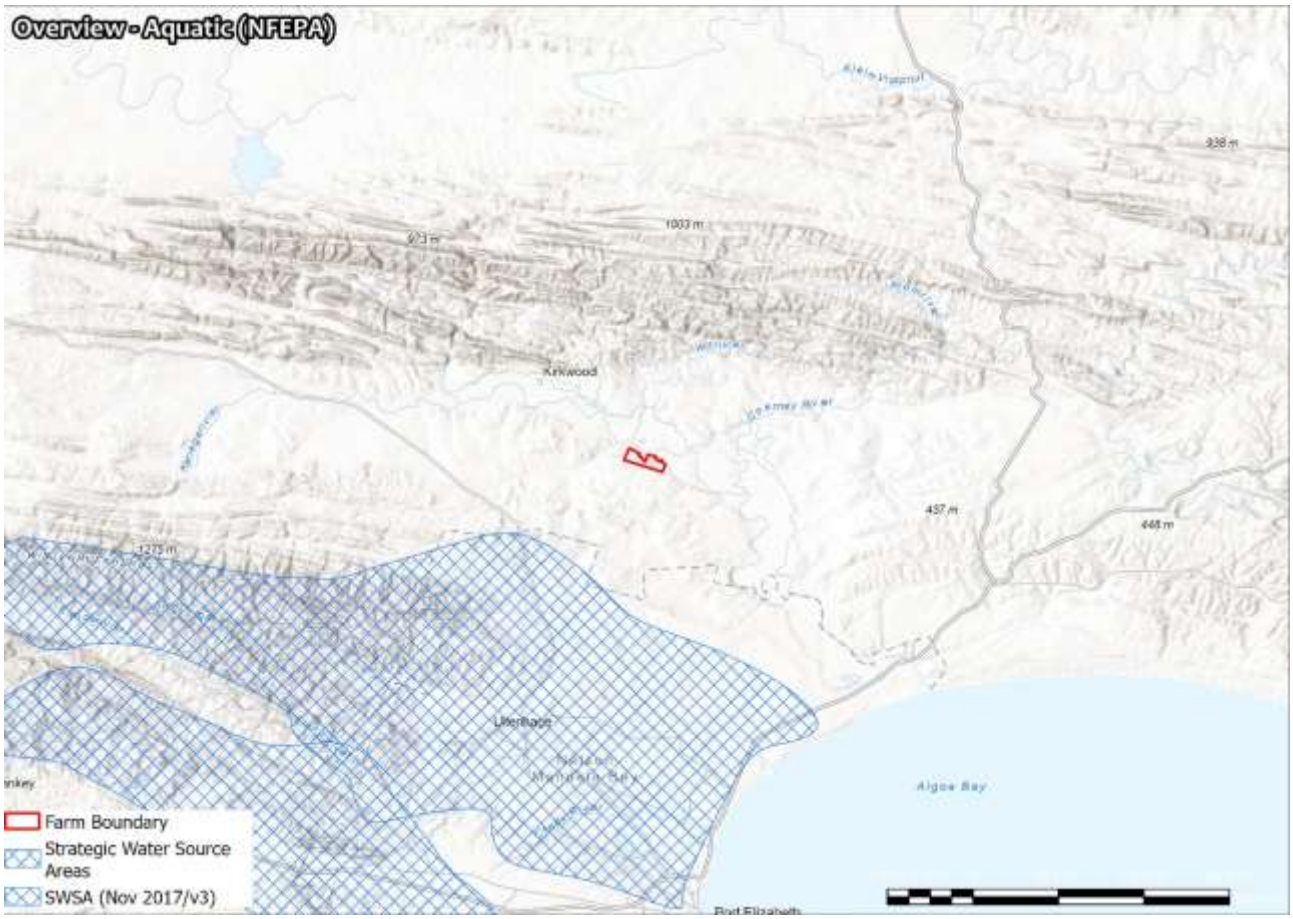

Figure 6.12. South Africa Water Source Areas (2017).

Overloading with nutrients and other pollutants from urban, agricultural, and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five percent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

The site is not situated within any Strategic Water Source Area (SWSA) and the specific activity is unlikely to have an impact of significance on any Strategic Water Source area, as it will not alter water flows. It is noted that the irrigation water will be abstracted from the LSRWUA canal and will be utilising water that is within the existing allocation for the property and will hence not alter downstream water flows.

Implications:

The site is outside of any SWSA, and it is furthermore unlikely to have any significant impacts on any critical water supply to downstream economies and urban centres because of development of this site, which is small and will not significantly affect water flow or catchment runoff.

6.7.11 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland, and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or '*FEPAs*'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

1. Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of special concern (e.g., very restricted distributions in South Africa)
2. River ecosystem types – 20% of total length per type
3. Wetland ecosystem types – 20% of total area per type
4. Wetland clusters – 20% of total area per wetland vegetation group
5. Free-flowing rivers – 20% of total length per ecoregion group
6. Priority estuaries – 100% of all priority estuaries, which already considered biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands, and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation, and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or "riparian habitat" along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter ('food') in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its "riparian habitat" by a buffer area.

Concerning terrestrial fauna and flora components associated with Freshwater Ecosystem Priority Areas (Figure 6.13), several non-perennial watercourses traverse the site, which could potentially

be impacted by the proposed agricultural expansion. These non-perennial watercourses are tributaries of the Sundays and four such watercourses flow through the farm portion in a north-south direction. It is however noted that due to the LSRWUA canal which runs adjacent to the northern boundary of the farm portion, as well as significant agricultural related transformation between the site and the Sundays River, these non-perennial watercourses are disconnected from the Sundays River and hence neither flow directly into the river nor is there any ecological continuity or connectivity between the site and the Sundays River. Connectivity upstream is however maintained to the south of the site where no significant development is present.

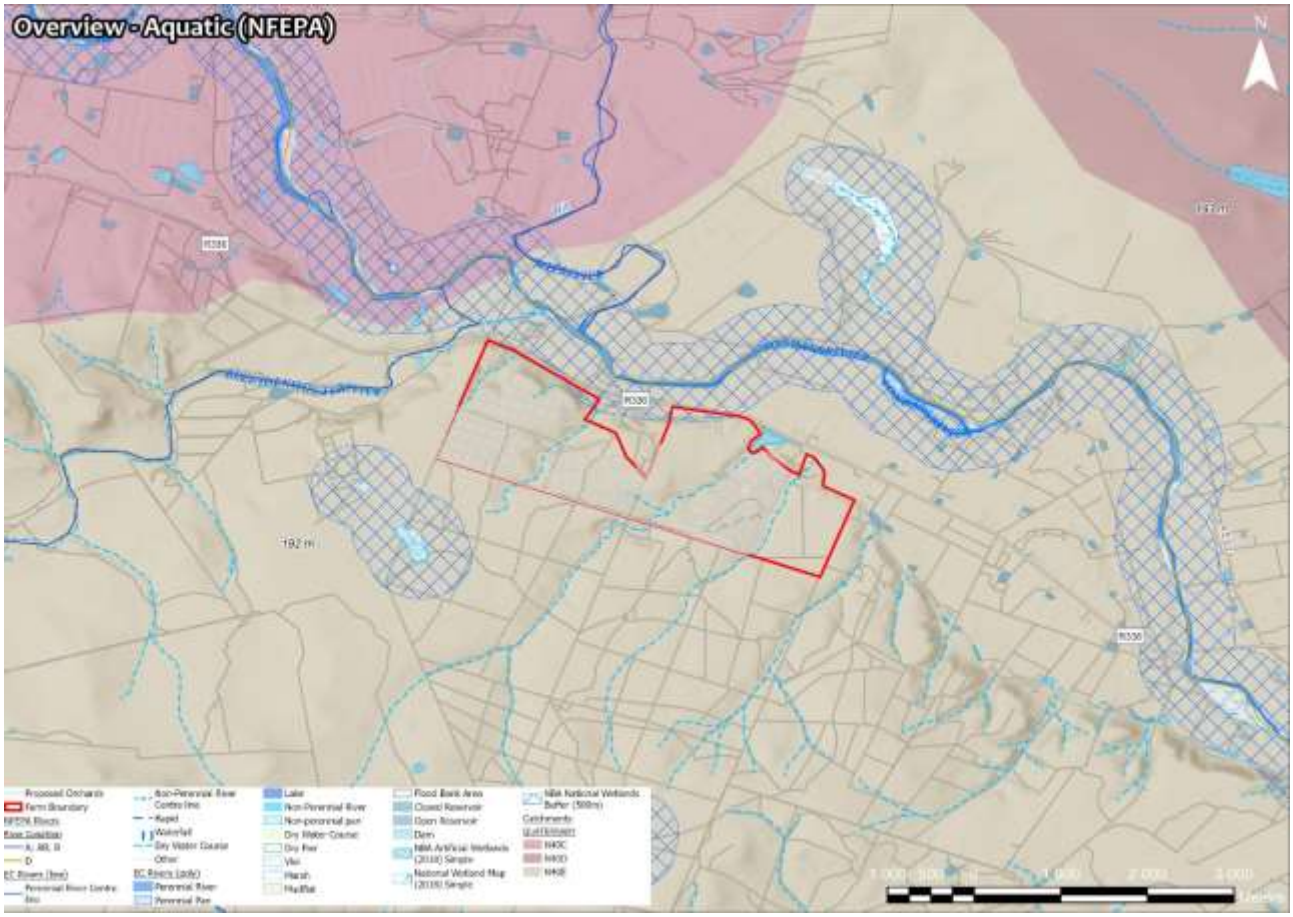

Figure 6.13. Position of non-perennial watercourses and wetlands in relation to the site.

The Sundays River, which is classified under NFEPA as CLASS D: LARGELY MODIFIED, is situated between 300 m and 1.2 km to the north of the farm portion and 500 m or more from any proposed orchards. It is unlikely to be affected significantly because of the development of the site, as any crossings of watercourses and drainage lines on site will only require the construction of a temporary trench during installation of pipelines and will not alter stream flow. Orchards are likely to avoid watercourses and drainage lines.

In general, riparian vegetation along watercourses that are situated in solid thicket is not well defined and typical riparian species such as sedges and reeds are absent. Typical riparian species generally only occur in areas that were previously disturbed. In terms of possible impacts to terrestrial biodiversity in areas having such riparian vegetation (i.e., previously disturbed), any impacts (such as installation of a pipeline or road) are likely to be temporary and would likely rehabilitate to the preconstruction state within 2 years. Furthermore, as is evident from Figure 6.13, similar non-perennial watercourses are generally widespread and any fauna that is displaced would have suitable similar habitat nearby.

Implications:

The proposed activity is unlikely to have any impact of significance on the already heavily modified Sundays River, situated downstream, but effectively disconnected from the site. Aquatic impacts will be assessed separately in Chapter 7.

6.7.12 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019): Aquatic

As per *Figure 6.14*, the citrus orchard expansion will potentially require a few minor designated Aquatic CBA areas (CBA 2 and ESA 1) to be traversed for road and pipeline requirements. It will not result in extensive transformation of aquatic CBA area, as long as respective buffers are maintained and pipeline and road routes follow existing cutlines or roads as far as possible, where any riparian vegetation would likely already be disturbed.

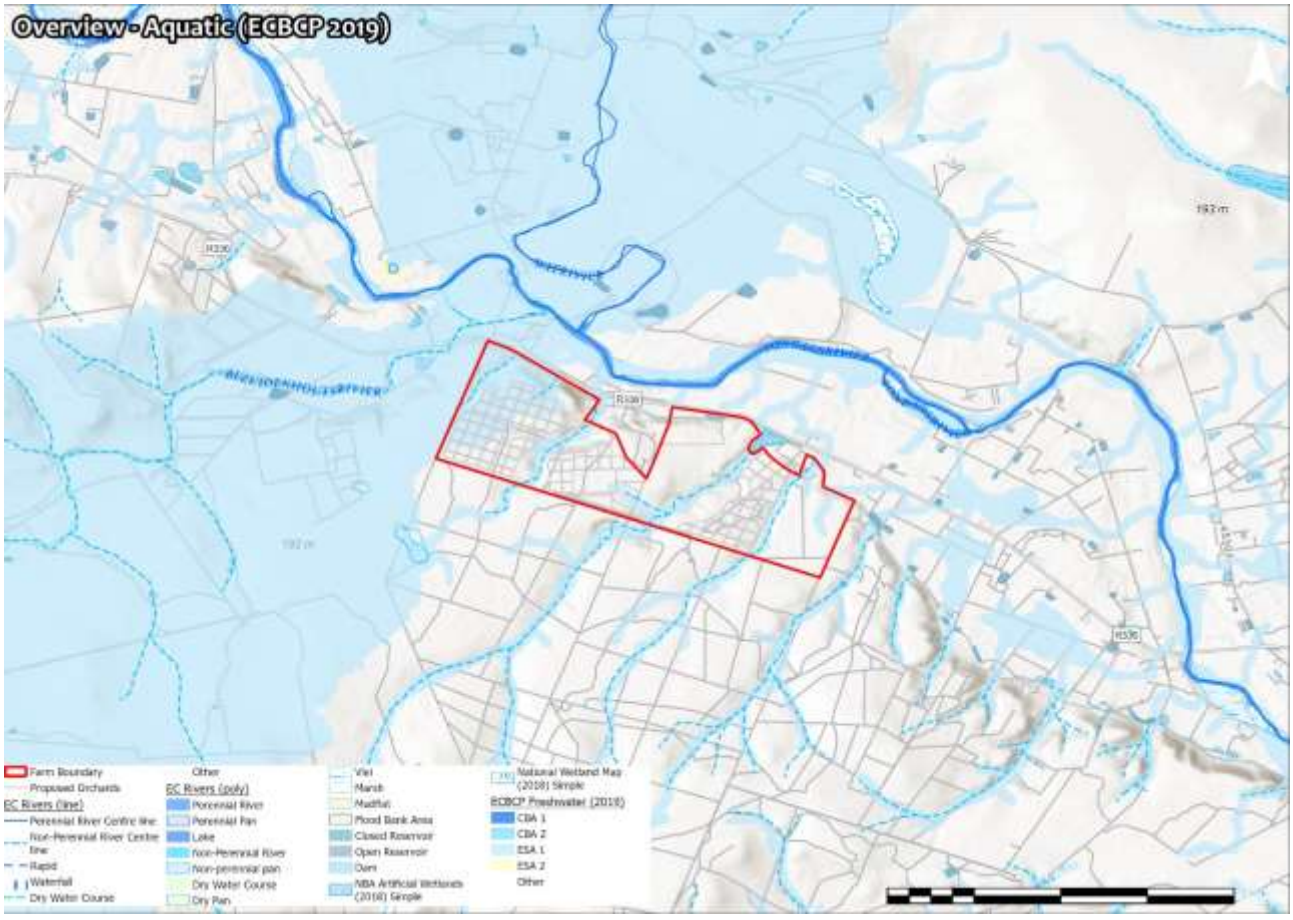

Figure 6.14. Proposed activity relative to designated Aquatic CBA areas (ECBCP, 2019).

Implications:

The proposed activity is unlikely to have any impact of significance on the Aquatic CBA areas, which are limited in extent in the specific project area. Aquatic impacts will be assessed separately in Chapter 7.

6.7.13 Key Biodiversity Areas

Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
- To gather new data regularly and monitor IBA's to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

The site is NOT near any Important Bird Area, although it is feasible that the site is within the foraging range of species that are known from the nearby Alexandria Coastal Belt IBA 32 km to the south-east, the Swartkops Estuary, Redhouse & Chatty Salt pans 34 km to the south, the Algoa Bay Islands 35 km to the south and the Kouga-Baviaans Complex 70 km to the south-west. Due to the limited scale of the project, and in the context of the existing fragmentation and disturbances on the site, it is unlikely that disturbances to such faunal species will exceed current baseline levels.

Implications:

The activity is unlikely to pose any significant risk to bird species specifically known from the IBA's in the region.

6.7.14 Sustainable Development Goals

The concept of National Sustainable Development Strategy (NSDS) was proposed in 1992 in Agenda 21 (§ 8.7) where countries were called upon to integrate economic, social, and

environmental objectives into one strategically focused blueprint for action at the national level. The NSDS "should be developed through the widest possible participation". And it "should be based on a thorough assessment of the current situation and initiatives".

Every country needs to determine, for itself, how best to approach the preparation and implementation of its national sustainable development strategy depending upon the prevailing political, historical, cultural, ecological circumstances. A "blueprint" approach for national sustainable development strategies is neither possible nor desirable. The particular label applied to a national sustainable development strategy is not important, as long as the underlying principles characterizing a national sustainable development strategy are adhered to and that economic, social, and environmental objectives are balanced and integrated (National Sustainable Development Strategies (NSDS): https://sdgs.un.org/topics/national-sustainable-development-strategies).

The approach, assessment methodology and recommendations contained within this report are directly in line with Sustainable Development Goal 15 (Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).

6.7.15 Regional Hotspots and Centres of Endemism

The site is situated within the Albany centre of endemism. The location of the proposed activity in proximity to the centre of Endemism suggests that a desktop screening and site verification for possible endemic species should be undertaken. Additional screening of endemic species has thus been undertaken and is **provided** in the respective section relating to Species of Conservation Concern. It is noted that a residual risk will be present, as solid thicket tends to be impenetrable and difficult to sample without implementing destructive techniques, although all reasonable attempts have been made to locate any such species.

6.7.16 Ecological Processes and Corridors

Critical Biodiversity Areas

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, to meet conservation targets, development within these areas is not encouraged. The following issues need to be addressed when considering development within a CBA:

- Are there alternative areas within the site but outside of the CBA that could be developed?
- Does the project undermine the overall ecological functioning of the broad CBA area?
- Can mitigation measures reduce the impact of the development on ecological processes?

The land use of the affected immediate area is classed as natural land. The site is designated as an ESA 1 area (ECBCP, 2019).

Implications:

As per ECBCP 2019, as an ESA 1 and 2, the site is not deemed to be required to meet conservation targets, however ecological connectivity and functionality should be maintained.

Ecosystem Processes and Function

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features

could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots.

The site falls within a designated Ecological Support Area (Figure 6.9).

Implications:

The site is within an area designated as Ecological Support Area (ESA 1 and 2), which specifies that ecological function and ecosystem services should be maintained.

Ecosystem Services

"Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling". (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide[3]:

- buffers against natural hazards such as fire and floods[(e)]
- carbon sequestration (storage), important for reducing the impacts of climate change[(e)]
- regulation of water supply[(e)]
- grazing for wild animals and livestock[(e)]
- natural spaces for recreation & tourism[(e)]
- the air we breathe[(e)]
- spiritual, ritual and ceremonies[(e)]
- horticultural & wildflower industries
- natural heritage[(e)]
- food, timber, fibre, and medicinal plants[(e)]

Rivers are central to human welfare and economic development. They provide:

- water for agricultural, industrial, and domestic uses[(e)]
- flood attenuation and regulation[(e)]

[3] Within the study area, terrestrial ecosystem services are marked [(e)].

- food and medicinal plants [(e)]
- transport and/or purification of biodegradable wastes[(e)]
- tourism, recreational and cultural use[(e)]
- enhanced property values

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use, and craft materials
- enhanced property values

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

- support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g., fire, pollination, seed dispersal), in response to global climate change.
- are important areas for storing carbon to reduce the impacts of global climate change
- are important areas for regulating water supply (e.g. filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments)
- supply good quality water from mountain catchment areas, both surface and groundwater.
- the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services).
- are of important scenic value, contributing to tourism and the 'sense of place'. [(e)]
- Coastal & marine areas
- Subsistence & commercial fishing (food)
- Medicinal & Cosmetic resources e.g. kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
- Mining (sand and heavy mineral)
- Recreational value (sport and fishing)
- Retail value (market-value of housing) [(e)]

Net Primary production[(e)]: This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations' ability to maintain this

ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production: In more arid areas, many municipalities and towns rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges: Global climate change is undoubtedly a threat in the coming decades. A key action to mitigate its effects is the maintenance of species' ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climactic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

The most notable of these on the site include buffers against natural hazards such as fire and floods, carbon sequestration (storage, being important for reducing the impacts of climate change, regulation of water supply, grazing for wild animals and livestock, natural spaces for recreation & tourism, the air we breathe, natural heritage, food, timber, fibre and medicinal plants, flood attenuation and regulation and enhanced property values.

Implications:

The proposed activity is likely to affect ecosystem services locally, although unlikely to be significant at a regional level.

Ecological Support Areas

The entire site falls within area designated as Ecological Support Area (ESA 1 and 2) (ECBCP, 2019).

Critical/Important Terrestrial Habitats

Special Habitats include areas that are rare within a region, or which support important species, ecosystems, or ecological processes. Species of Special Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal, or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically

Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such red data species.

The Eastern Cape Biodiversity Conservation plan (ECBCP) does not identify specific Important Critical or Important Terrestrial Habitats; however, the following are generally considered to be important habitats, none of which are present within the site.

Rocky Outcrops: Rocky outcrops can provide habitat for geophytic species that often have limited distributions. No rocky outcrops are present within the footprint. Outcrops are present within the site as calcrete outcrops.

Wetland habitat: Wetlands are special habitats as they provide a refuge for birds and other organisms, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. No wetland habitat has been identified within 500 m of the proposed activity, but this aspect is be dealt with in a separate aquatic assessment (Chapter 7).

Priority Estuaries: No Estuaries are affected by the proposed activity.

Forest: No forest is affected**.**

Fynbos: Fynbos and fynbos elements are present in the broader area; however, no fynbos vegetation is directly or indirectly affected as this is a primarily thicket-karroid landscape.

Colonies or Populations of Threatened or Protected Species: Colonies of threatened fauna and flora species are recorded within the site that could potentially be directly affected or likely to be indirectly affected, as a result to changes in connectivity with the surrounding landscape.

Implications:

Critical or important terrestrial habitats, as described above are likely to be affected directly or indirectly by the proposed activity. Populations of Species of Conservation Concern are present. Although seasonal site visits have been undertaken as far as is practically possible there is a residual risk that species may have not been visible at the time, due to erratic rainfall.

Dynamic Processes of Sundays Valley Thicket

There is a distinct guild of spinescent woody plants in the Valley Thicket that develop recurved branches once these plants are more than a meter tall. These woody species, *e.g., Azima tetracantha, Gymnosporia polyacantha, Putterlickia pyracantha, Putterlickia verrucosa, Searsia (Rhus) longispina, Searsia (Rhus) pterota, Searsia (Rhus) refracta, etc*, continue to produce the recurved branches even when mature. This unusual growth pattern results in an impenetrable barricade of thorny branches, because adjacent plants become entwined (take-hands) as they mature. Other features of this guild of woody species are that they are all have bird-dispersed seed that establish best in open (often disturbed) sites. In the absence of bird perches (*e.g.,* open bush cut lines on property boundaries) these early successional species are not able to establish, but they are abundant where perches are available (*e.g.,* unattended road and railway fence lines). Secondary to the initial establishment of the spinescent-recurved branch guild of woody species, is the establishment of many liana's (often poisonous, wind-dispersed species, *e.g. Cynanchum natalitium, Sarcostemma viminale, etc*. or bird-dispersed species *e.g., Asparagus burchellii, Rhoicissus tridentata, etc.)* within these bush clumps. These, often spinescent, lianas further

interwove the individual bush-clumps, to form the impenetrable vegetation so typical of the Valley Thicket. We believe that the guild of species with recurved branches evolved in a scenario where a small-scale disturbance regime was maintained, probably by large herbivores. These herbivores probably maintained a maze of footpaths in the solid Valley Thicket, which created the habitat for species which prefer to grow in semi-shade conditions along the edges of Thicket clumps, rather than in dense shade or in the open, *e.g., Sansevieria hyacinthoides, Plectranthus madagascariensis, etc*. This disturbance regime probably also maintained the establishment sites for *Euphorbia grandidens* and *E. triangularis,* that only seem to establish successfully from seed in open sites. A similar disturbance regime was probably operative in the Thicket, but the early successional species are fast growing and not spiny, *e.g., Plumbago auriculata* and *Tecomaria capensis*. Fire is another important disturbance factor in the Sundays Thicket, especially to maintain the species richness of the Mosaic units where the matrix consists of Grassland, Succulent Karoo, Renosterveld or Fynbos species. Most of these Mosaic Thicket Units seem to have developed where sites with shallow (or nutrient poor) soils are exposed to fires that are driven by north and northeasterly “Bergwind”, that occur annually in late winter and early spring months (July-September). In these units, the often neatly defined Thicket bush clumps are restricted to fire-protected ravines, or sites where the soils are deep and nutrient rich. Once the matrix of shrub, grass and herb species is well established, herbivores may play an important role in maintaining the species richness in the matrix vegetation, but they are probably not the primary determining agents of these units. We have noted a rapid increase of weedy herbs (*e.g., Helichrysum species, Pelargonium species, etc*.) where grazing by herbivores and fire has been excluded in the matrix vegetation. Herbivores are probably particularly important to maintain the dynamics and species richness of the Mosaic within Nama Karoo units along the floodplains of the local rivers. Here species such as *Vachellia (Acacia) karroo* may become dominant in the absence of large herbivores. A delicately balanced sequence of defoliation by herbivores to those by fire is probably periodically required to maintain the species richness of these Mosaic units. Both herbivores and fire thus seem to have played an important part in the evolution of the Sundays Thicket units and the plant species endemic to it. Not all the Sundays River Thicket units are, however, equally resilient against the potential impacts of large herbivores. Especially those of the more arid areas, Sundays Arid Thicket, seem to be very sensitive to the severe grazing impacts. Once the canopy cover of these Thicket units is fragmented, the vegetation is rapidly (and probably irreversibly) altered to a depauperate form of Nama Karoo. Frugivorous birds are not only vital for the seed dispersal of the guild of spinescent pioneer species, but some species (*e.g.,* Hornbill’s) are probably also important seed dispersal agents for the local *Encephalartos* species. Nectivorous birds are also important pollinators of most of the local *Aloe* species and some of the woody trees, e.g., *Schotia afra*. None of the other Thicket species seem to require specialized pollinators.

6.7.17 Species of Conservation Concern

Several Species of Conservation Concern are indicated as potentially being present within the site and broader area using several online databases[4] (Maputaland-Pondoland-Albany Hotspot study, SANParks metadata, 2010; National Environmental Screening Tool, 2021 and Plants of Southern Africa, 2021), as indicated in Table 6. 5 below. These species will be assessed further in the relevant species assessment section of this report.

Table 6. 5: Potential Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS[4, 5]
FLORA		
Asparagus spinescens	Asparagaceae	NEST (M), LC
Drimia elata	Hyacinthaceae	DDT
Duvalia pillansii	Apocynaceae	NEST (M), Rare
Justicia orchioides subsp. orchioides	Acanthaceae	NEST (M), VU [B1ab(i,ii,iii,iv,v)]
Ledebouria coriacea	Hyacinthaceae	CR [B1ab(i,ii,iii,iv,v) +2ab (i,ii,iii,iv,v)]
Selago zeyheri	Scrophulariaceae	NEST (M), VU
Sensitive species 1248	-	NEST (M), VU
Sensitive species 1252	-	NEST (M), VU
Sensitive species 1268	-	NEST (M), EN
Sensitive species 19	-	NEST (M), VU
FAUNA		
Acinonyx jubatus	Felidae (Cheetah)	NEST (M), VU
Aneuryphymus montanus (Yellow-winged Agile Grasshopper)	Acrididae	NEST (M)
Circellium bacchus *(*Cape Flightless or Addo Dung Beetle)	Scarabidae	Endemic
Circus ranivorus (African marsh harrier)	Accipitridae	LC (Intl), EN (SA), NEST (M)
*Neotis denhami (*Denham's bustard)	Otididae	NEST (H), NT (Intl), Protected (SA)
Sensitive species 7	-	NEST (M), LC (Intl), VU (SA)

6.8 DESCRIPTION OF BASELINE TERRESTRIAL BIODIVERSITY ENVIRONMENT

6.8.1 Site Locality

The project applicant, Sun Orange Farms (Pty) Ltd proposes the expansion of existing citrus cultivation on the Remainder of Farm 632, Sundays River Valley Municipality (Figure 6.15), currently a working citrus farm. The proposed development will include additional citrus orchards and associated infrastructure (new farm dam, irrigation infrastructure and internal roads).

[4] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).

[5] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.

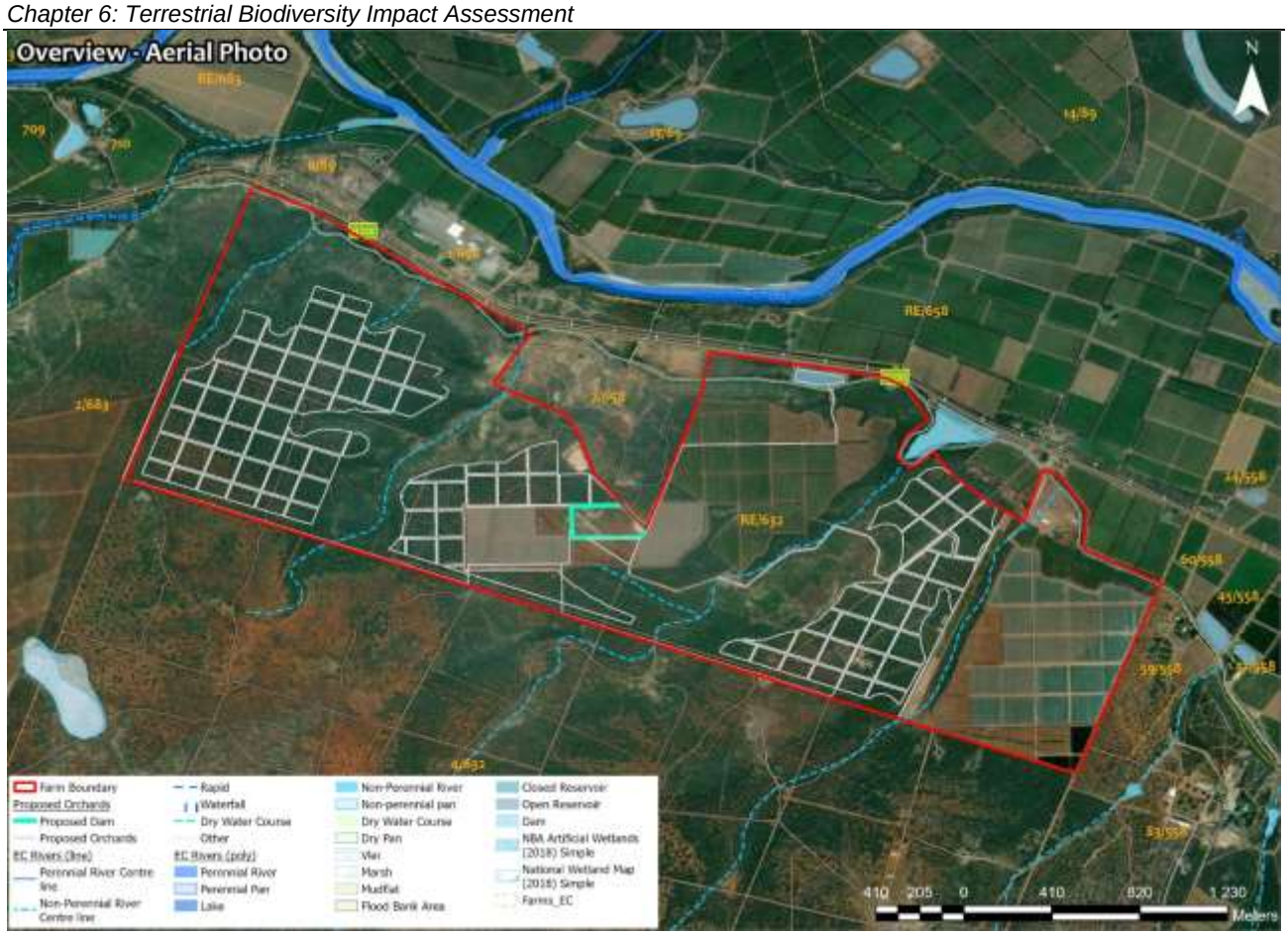

Figure 6.15. Aerial photo of the site and the proposed development footprint.

6.8.2 Topography and Drainage

The site falls within a hilly area of the Sundays River Valley, incised by several non-perennial watercourses, draining northwards into the Sundays River. These drainage lines are cut off from the Sundays River by the LSRWUA irrigation canal, which runs adjacent to the northern boundary of the farm, a surfaced road, as well as citrus and related development between the district road and the Sundays River.

6.8.3 Terrestrial Landscape Features (Habitat)

Overview

The project area is generally characterised by a hilly landscape with elevated plains incised by non-perennial watercourses and moderately steep slopes, with a moderately dense thicket vegetation cover that forms a mozaic of thicket clumps of varying size and a karroid shrubby vegetation (Figure 6.16). Underlying geology and soils are key drivers of vegetation communities. Occasional exposed calcrete is evident, however it does not form distinct outcrops and there is no evidence of communities typically associated with such calcrete outcrops, although some calcrete-typical species are occasionally evident within the shrubby matrix.

While the national vegetation map does not differentiate Sundays Spekboom Thicket, the vegetation on site is comprised of species typical of Sundays Thicket, although it does differ to some extent from the dense tall Sundays Thicket found further north of the site. The woody component is typical of the unit having tree species such as *Pappea capensis, Putterlickia verrucosa, Rhigozum obovatum, Searsia (Rhus) pterota, Searsia (Rhus) longispina* and *Schotia afra* abundant as well as emergent *Cussonia spicata* trees, the emergent tree *Euphorbia triangularis* is absent and *Euphorbia ledienii* is present. Spekboom is also present and common, although not abundant. The woody tree

component is less well developed, sparser and rarely exceed 2 – 3 m in height. It is thus clearly a more arid version of the Sundays Valley Thicket and extends in a band to the south, east and west of the site, likely because of a rainfall gradient and possibly soil influences. The shrubby karroid mozaic is also not typical of the Sundays Thicket found to the north, which tends to be dense and impenetrable. Where disturbed or transformed, secondary vegetation is primarily herbaceous and shrubby species.

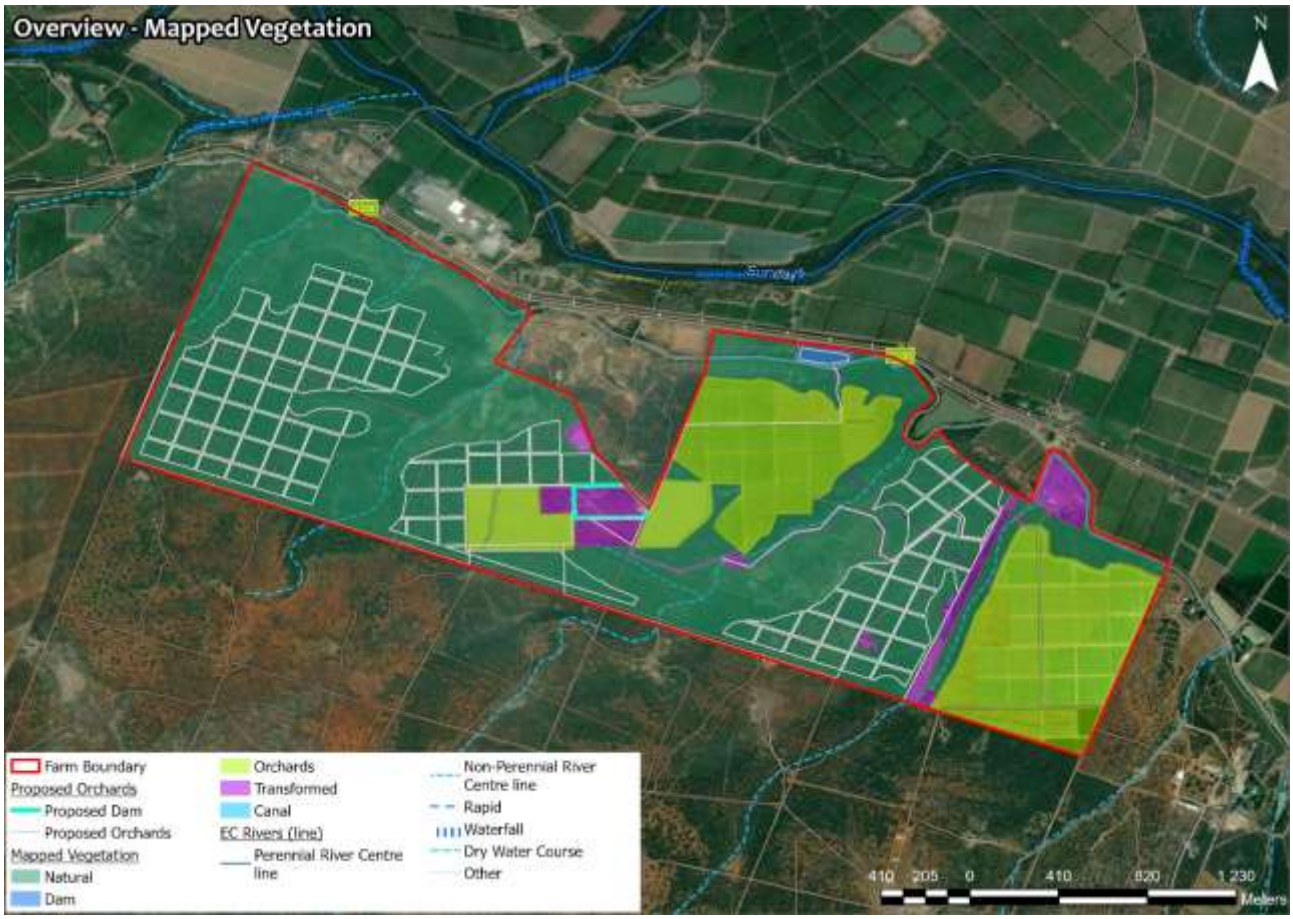

Figure 6.16. Mapped on-site vegetation, with solid thicket and transformed areas being predominant.

The thicket vegetation (*Figure 6.19* to *Figure 6.22*) on site is typically comprised of a dense shrub and small tree cover including *Euclea undulata*, *Pappea capensis, Schotia afra, Ptaeroxylon obliquum, Sideroxylon inerme, Azima tetracantha, Brachylaena ilicifolia, Cadaba aphylla, Capparis sepiaria, Carissa bispinosa, Ehretia rigida, Gymnosporia capitata, Gymnosporia polyacantha, Maerua cafra, Mystroxylon aethiopicum, Plumbago auriculata, Putterlickia pyracantha, Searsia longispina* and *Scutia myrtina. Succulent trees include Euphorbia triangularis, Aloe africana, Aloe ferox* and *Aloe speciosa.*

The understorey is comprised of a mix of succulent and herbaceous species including *Portulacaria afra, Euphorbia caerulescens, Cotyledon orbiculata, Crassula capitella, Crassula ovata, Crassula perfoliata, Delosperma echinatum, Gasteria bicolor* (common), *Pachypodium bispinosum, Pachypodium succulentum, Pelargonium carnosum, Rhigozum obovatum, Sansevieria hyacinthoides, Sansevieria aethiopica, Abutilon sonneratianum, Commelina benghalensis, Gazania krebsiana, Hypoestes aristata, Plectranthus madagascariensis, Asparagus spp.* Grasses include *Cynodon dactylon, Panicum maximum, Panicum deustum* and *Themeda triandra.* Herbaceous climbers *include Pelargonium peltatum, Cynanchum ellipticum, Rhoicissus digitata, Rhoicissus tridentata* and *Cynanchum viminale.*

This vegetation, although reasonably homogenous, offers suitable habitat for a suite of animal species. Topological complexity, including slope and aspect, allow for a greater availability of microhabitats for a diverse range of different species. The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the localised impact on faunal habitat, associated with the development footprint would, in general, be of low significance with implementation of several mitigation measures. The more open mosaic thicket is likely to also provide habitat for a range of small mammal and reptile species that are less common in the dense thicket that occurs to the north of the site.

Figure 6.17. Typical intact Sundays Valley Thicket

Figure 6.18. Typical less dense Sundays Valley Thicket with karroid elements.

Figure 6.19. Typical disturbed vegetation.

Figure 6.20. Typical disturbed vegetation along fenceline access track.

Figure 6.21. Typical transformed and secondary vegetation at proposed dam site.

Figure 6.22. Typical heavily disturbed or transformed vegetation.

The following vegetation communities are differentiated on Sontule (*Figure 6.19* to *Figure 6.22*):

MAPPED VEGETATION	AREA (HA)
Natural Thicket (intact and disturbed)	322.7
Citrus Orchards	111.8

MAPPED VEGETATION	AREA (HA)
Transformed (Cleared areas, landing strip, roads)	22.8
Dams	3.3
Canal	2.9
TOTAL	**463.5**

6.8.4 Present Ecological State

Table 6. 6*:* provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- The vegetation on site is a mix of intact solid thicket with nil to low degradation, moderately to highly degraded thicket, transitional vegetation and karroid vegetation as well as transformed areas (dwellings, roads, cutlines & fence-lines).
- Alien invasion is presently low with occasional Prickly Pear and Jointed Cactus, as well as various ruderal weeds often proliferating in disturbed areas.

Table 6. 6: Summary of Key Biodiversity and Ecological Indicators

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	Hilly with incised watercourse draining to the north.
Substrate	Moderate to shallow soils
Vegetation units	Thicket and karroid mosaic
Total Ground Cover (%)	> 90 % in intact thicket
Tree Height (m) – Median	2 - 4 m
Tree Cover (%) Aerial	> 50 %
Shrub Cover (%)	> 20 %
Herbaceous Cover (%)	
Grass Cover (%)	< 10 % (estimated)
Bare soil/rock (%) and disturbed	< 20 %
TERRESTRIAL LANDSCAPE FEATURES	
Forest	No Forest is present.
Thicket	Dominant vegetation is thicket.
Grassland	No grassland is present.
Fynbos/Grassy Fynbos	No Fynbos elements are present

Riparian	Riparian vegetation is limited to watercourses and man-made dams. Thickets tends to not have distinctive riparian vegetation but can be present as reedbeds in disturbed areas where standing water accumulates, such as in dams and in the vicinity of the canal.
Wetland	Natural and artificial wetlands are present in the vicinity of the site, or within 500 m of the site.
Estuaries	No estuaries are present
Dunes/Coastal	No coastal/dune habitat is present
Rocky Outcrop Habitat	Rocky outcrops (calcrete) are generally absent, although occasional gravel patches do provide outcrop-like habitat. .
Fauna Nesting Sites	No specific sites known.
Fauna Feeding Grounds	The thicket is likely to provide suitable habitat for a range of faunal species and is known to favour frugivorous birds.
Ecotones	Ecotones are present, where thicket and karroid vegetation meet, including most of the transitional areas.
Ecological Corridors	River valleys and watercourses can be important ecological corridors.
Evolutionary Processes	None of significance within terrestrial environment.
Transformed (housing)	Dwellings are present
Transformed (other)	Most of the site, where undeveloped for citrus orchards or other infrastructure, appears to be intact, semi-intact or secondary with some transformed areas, as well as numerous access roads, cutlines, and other infrastructure.
Degraded (modified)	In disturbed areas, vegetation rehabilitation tends to favour shrubs and succulent species.
Secondary vegetation	
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	
Human disturbances	Human disturbance due to agricultural development is locally moderate.
Habitat fragmentation	Fragmentation is moderate locally with some existing orchards, roads and other infrastructure such as pipelines and cut-lines.
Invasive Alien Plants	Scattered throughout the area primarily Jointed Cactus in disturbed areas, such as along roads, cutlines and pathways with Prickly Pear also occurring in dense thicket and occasional dense stands.
Other degradation	Some roads and cutlines present in intact Thicket as well as historically cleared areas and old lands.
Remaining intact habitat:	Intact habitat is extensive in the surrounding landscape and is well connected on the south, west and east but disconnected from any natural habitat to the north.
Grazing (livestock)	Surrounding area is likely to have been used historically for livestock grazing.
Hunting	Adjacent farm portions are currently used for commercial hunting.
Conservation (passive)	General area does contribute significantly to passive conservation, having low population density and large areas of intact vegetation as well as being in proximity to the Addo Elephant National Park.
Recreational (sport)	None
Other	None

PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is moderate to high in thicket and karroid units but tends to be somewhat uniform in composition and relatively widespread, with few species of conservation concern having a localised or restricted distribution.
Fauna	Fauna diversity is moderate.
Species of Special Concern	Several species are present although no endangered, critically endangered and vulnerable species were recorded. Although less dense compared to typical thicket, thicket is generally impenetrable, and it is not feasible to undertake comprehensive sampling within dense contiguous blocks without using destructive techniques to allow access. In addition, seasonal constraints are such that there is uncertainty regarding other species which may be present.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, agricultural lands, game fences are a significant barrier currently as all the farm portions are fenced enclosures which will limit the movement of larger mammals, which will affect natural gene flow. Gene flow to the north of the farm portion will be significantly limited.
Gene dispersal corridors	Extensive south-north drainage line valleys likely provide corridors for movement for a suite of fauna.
Aeolian (dune) processes	None
Climatic gradients	Climatic gradients are minimal but are present due to slopes and different aspects.
Rivers and Drainage Lines (Riparian Vegetation)	Sundays River is a large perennial watercourse in proximity to the site (0.3 to 1.2 km to the north. However, the site is disconnected from the river by development including a road, the LSRWUA irrigation canal and existing orchards. The river is used extensively for irrigation and is part of a greater inter-basin transfer scheme.
Refuges (outcrops/islands)	Rocky and other refuges are uncommon within the site, although gravel patches do provide habitat for succulent elements.
Fire	Thicket vegetation is generally not susceptible to fire.
Ecotones/Tension zones	Ecotones are present between thicket clumps and mosaic karroid vegetation.
Erosion	Erosion is generally low within the site.
ECOLOGICAL SERVICES	
Carbon storage	Thicket is considered a moderate to high carbon accumulator.
Provisioning Services	Livestock grazing: Grazing is likely to have been historically prevalent in the area, but intact thicket generally has a low grazing capacity. Timber (Building materials): Extensive thicket, likely to have been used historically. Fuelwood: Thicket likely a source of fuelwood. Food: None known Fibre: None known

	Medicinal plants: None were recorded within the site. Various species in the surrounding area have medicinal properties and are most likely harvested informally.
Other (ornamentals)	None known
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Sundays Valley Thicket has a widespread regional distribution covering an extensive area outside of the site footprint, with a low conservation status (Least Concern). More than 60 % is still intact.
Red Listed Species and other Species of Special Concern	Several species are known from the surrounding area and vegetation units. Since solid thicket tends to be impenetrable it is not feasible to undertake comprehensive sampling within dense contiguous blocks without using destructive techniques. There is a low to moderate likelihood that species may occur that have not been identified due to seasonal constraints.
Habitat for SSC	Several species of special concern are known from the general area, as well as the vegetation unit that is present. The site does provide viable habitat for any of the mostly mobile faunal species as well as several flora species. Refer to species assessment section.
Relative Conservation importance	The site has a low to moderate overall significance as the vegetation units do have a locally widespread distribution. The wider area is considered to have importance i.t.o ecological processes and connectivity as designated in the respective regional planning frameworks.
OTHER SENSITIVITIES	
Conservation importance	Low to Moderate, for ecological connectivity.
Topography	Slopes are present between the drainage lines and upper plateaus, which can be susceptible to erosion when vegetation cover is removed without adequate measures being implemented. Due to the steepness of these slopes, they are unlikely to be developed for citrus orchards.
Wetlands	None directly affected, several man-made dams (artificial wetlands) in vicinity.
Rehabilitation potential	Rehabilitation potential is low for thicket.
Community structure	Community structure is relatively complex with a range of growth forms being present.

6.8.5 Flora

Sundays Valley Thicket tends to have a relatively high flora diversity and is also quite uniform in terms of species composition in term of dominant and common species, with occasional individuals or clumps of less common species, including those listed as being of conservation concern. Several endemic and range restricted species are known from the surrounding area. **None of the sensitive species listed as per the National Screening Tool have been confirmed to be present within the affected area.** There is a residual possibility that representatives of these species could be present. Sampling has been undertaken as far as possible to investigate species composition but is generally limited to using existing tracks and cutlines and accessing internal areas of solid thicket

where possible. Due to the localised nature of the impact, as well as the level of degradation of the site, the risk of a species suffering any significant loss is low.

The species list provided in Table 6.6 below indicates the floral species that were verified to occur within the proposed development footprints during the site visit (present) as well as those species that may be anticipated to occur on site but whose presence was not verified during the site visit (not recorded). Flora species present represent a wide range of growth forms, including small to large trees, woody and succulent shrubs, herbs, geophytes, semi-parasitic and parasitic species, climbers and creeper and grasses.

Although seasonal site visits have been undertaken as far as is practically possible there is a residual risk that species may have not been visible at the time, due to erratic rainfall.

Table 6. 7: Flora Species list including Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]	LIKELIHOOD OF PRESENCE
Acrolophia micrantha	Orchidaceae	LC, PNCO[8]	Possibly present
Adromischus cristatus var. cristatus	Crassulaceae	LC	SVT[9], Present
Adromischus sphenophyllus	Crassulaceae	LC	SVT
Aloe africana	Asphodelaceae	LC, PNCO	SVT, Present
Aloe ferox	Asphodelaceae	LC, PNCO	SVT, Present
Aloe speciosa	Asphodelaceae	LC, PNCO	SVT, Present
Asparagus asparagoides	Asparagaceae	LC	SVT, Present
Asparagus crassicladus	Asparagaceae	LC	SVT, Present

[6] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).

[7] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.

[8] PNCO: Protected in terms of the Provincial Nature Conservation Ordinance (Act 19 of 1974)

[9] SVT: Sundays Valley Thicket

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]	LIKELIHOOD OF PRESENCE
Asparagus spinescens	Asparagaceae	NEST (M), LC	Not recorded.
Asparagus subulatus	Asparagaceae	LC	SVT
Asparagus volubilis	Asparagaceae	LC	SVT, Present
Asplenium rutifolium	Aspleniaceae	LC	
Azima tetracantha	Salvadoraceae	LC	SVT, Present
Barleria obtusa	Acanthaceae	LC	SVT, Present
Brachylaena ilicifolia	Asteraceae	LC	SVT, Present
Bulbine frutescens	Asphodelaceae	LC, PNCO	SVT, Present
Cadaba aphylla	Capparaceae	LC	SVT, Present
Capparis sepiaria var. citrifolia	Capparaceae	LC	SVT, Present
Carissa bispinosa	Apocynaceae	LC	SVT, Present
Carpobrotus edulis	Aizoaceae	LC, PNCO	SVT, Present
Chrysocoma ciliata	Asteraceae	LC	SVT, Present
Cissampelos capensis	Menispermaceae	LC	SVT
Colpoon compressum	Santalaceae	LC	SVT
Cotyledon orbiculata	Crassulaceae	LC, PNCO	SVT, Present
Cotyledon velutina	Crassulaceae	LC	SVT
Crassula capitella	Crassulaceae	LC	SVT, Present
Crassula cordata	Crassulaceae	LC	SVT
Crassula cultrata	Crassulaceae	LC	SVT
Crassula mesembryanthoides	Crassulaceae	LC	SVT, Present
Crassula ovata	Crassulaceae	LC	SVT, Present
Crassula perfoliata	Crassulaceae	LC	SVT, Present
Crassula rogersii	Crassulaceae	LC	SVT
Crassula spathulata	Crassulaceae	LC	SVT
Curio radicans	Asteraceae	LC	SVT
Cussonia gamtoosensis	Araliaceae	Rare	SVT. Not recorded, outside of known range thus unlikely to occur
Cussonia spicata	Araliaceae	LC	SVT, Present
Cyanella lutea	Tecophilaeaceae	LC	SVT

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]	LIKELIHOOD OF PRESENCE
Cynanchum ellipticum	Apocynaceae	LC	SVT, Present
Cyphostemma quinatum	Vitaceae	LC	SVT
Cyrtanthus loddigesianus	Amaryllidaceae	LC, PNCO	SVT
Delosperma echinatum	Aizoaceae	LC, PNCO	SVT, Present
Delosperma uniflorum	Aizoaceae	LC, PNCO	SVT, Present
Digitaria eriantha	Poaceae	LC	SVT, Present
Drimia altissima	Hyacinthaceae	LC, PNCO	SVT, Present
Drimia anomala	Hyacinthaceae	LC, PNCO	SVT
Drimia intricata	Hyacinthaceae	LC, PNCO	SVT
Duvalia pillansii	Apocynaceae	NEST (M), Rare	Not recorded.
Euphorbia caerulescens	Euphorbiaceae	LC	SVT
Euphorbia ledienii	Euphorbiaceae	LC	Present
Euphorbia grandidens	Euphorbiaceae	LC	SVT, Absent
Euphorbia mauritanica	Euphorbiaceae	LC	SVT
Euphorbia triangularis	Euphorbiaceae	LC	SVT, Absent
Exomis microphylla	Chenopodiaceae	LC	SVT
Felicia filifolia	Asteraceae	LC	SVT, Present
Freesia corymbosa	Iridaceae	LC	SVT
Gasteria bicolor	Asphodelaceae	LC, PNCO	SVT, Present, Common
Gymnosporia polyacantha	Celastraceae	LC	SVT, Present
Hypoxis argentea	Hypoxidaceae	LC, PNCO	SVT, Present
Justicia cuneata	Acanthaceae	LC	SVT, Present
Justicia orchioides	Acanthaceae	LC	SVT
Justicia orchioides subsp. orchioides	Acanthaceae	NEST (M), VU [B1ab(i,ii,iii,iv,v)]	Not recorded.
Kalanchoe rotundifolia	Crassulaceae	LC	SVT, Present
Kedrostis capensis	Cucurbitaceae	LC	SVT
Lampranthus productus	Aizoaceae	LC, PNCO	SVT

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]	LIKELIHOOD OF PRESENCE
Ledebouria coriacea	Hyacinthaceae	CR [B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)], PNCO	Not recorded.
Leonotis pentadentata	Lamiaceae	LC	SVT
Maerua cafra	Capparaceae	LC	SVT, Present
Mystroxylon aethiopicum	Celastraceae	LC	SVT, Present
Nymania capensis	Meliaceae	LC	SVT, Present
Osteospermum imbricatum	Asteraceae	LC	SVT
Pachypodium bispinosum	Apocynaceae	LC	SVT, Present
Pachypodium succulentum	Apocynaceae	LC	SVT, Present
Pappea capensis	Sapindaceae	LC	SVT, Present
Pelargonium carnosum	Geraniaceae	LC	SVT, Present
Plumbago auriculata	Plumbaginaceae	LC	SVT, Present
Portulacaria afra	Portulacaceae	LC	SVT, Present
Psilocaulon articulatum	Aizoaceae	LC	SVT
Ptaeroxylon obliquum	Ptaeroxylaceae	LC	SVT, Present
Pteronia incana	Asteraceae	LC	SVT, Present
Rhigozum obovatum	Bignoniaceae	LC	SVT, Present
Rhoicissus tridentata	Vitaceae	LC	SVT, Present
Roepera foetida	Zygophyllaceae	LC	SVT
Sansevieria aethiopica	Ruscaceae	LC	SVT, Present
Searsia longispina	Anacardiaceae	LC	SVT, Present
Selago zeyheri	Scrophulariaceae	NEST (M), VU	Not recorded.
Senecio linifolius	Asteraceae	LC	SVT

SCIENTIFIC NAME	FAMILY	STATUS[6, 7]	LIKELIHOOD OF PRESENCE
Sensitive species 124810		NEST (M), VU	Not recorded.
Sensitive species 1252		NEST (M), VU	Not recorded.
Sensitive species 1268		NEST (M), EN	Not recorded, may be present. Not possible to confirm with certainty without surveying dense thicket which is inaccessible.
Sensitive species 19		NEST (M), VU	Not recorded, may be present.
Sensitive species 91		NEST (M), EN	Not recorded. Unlikely as mostly occurs in Bontveld but is possible.
Sideroxylon inerme	Sapotaceae	NFA[11]	SVT, Present
Solanum tomentosum	Solanaceae	LC	SVT, Present
Sporobolus fimbriatus	Poaceae	LC	SVT, Present
Strelitzia juncea	Strelitziaceae	VU	SVT, Not recorded
Trachyandra affinis	Asphodelaceae	LC, PNCO	SVT
Tritonia securigera	Iridaceae	LC, PNCO	SVT, Present
Viscum rotundifolium	Viscaceae	LC	SVT, Present

Plant species as identified by the National Screening Tool confirmed to be present:

No Critically Endangered or Endangered floral species were found to be present during the site surveys over multiple site visits.

6.8.6 Fauna

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact on faunal habitat, associated with the proposed footprint, would be of low significance if mitigation measures are adhered to. No sensitive species, as identified by the screening tool, were found on the site and the likelihood of presence is likely also low. A comprehensive list of potential and common faunal species is provided in Table 6. 8.

Table 6. 8: List of potential and common faunal species

[10] Some of these Species of Conservation Concern (SCCs) are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number.

[11] NFA: National Forests Act (Act No. 84 of 1998)

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Sensitive species 7		NEST (M), VU	Unlikely to be any healthy populations present as farm currently fenced off.
MAMMALS			
Acinonyx jubatus	Felidae (Cheetah)	NEST (M), VU	Absent. Unlikely to occur as farm currently fenced off with secure fencing.
Aethomys namaquensis	Namaqua Rock Mouse	LC	May be transient
Alcelaphus buselaphus	Hartebeest	LC	Introduced on game farms
Amblysomus corriae	Fynbos golden mole	NT (Global); PNCO[14]	May be transient
Canis mesomelas	Black-backed Jackal	LC	Likely present
Cercopithecus mitis labiatus	Samango Monkey	EN (SA); LC (Global); VU (ToPS)	May be transient
Connochaetes taurinus	Blue Wildebeest	LC	Introduced on game farms
Cynictis penicillata	Yellow Mongoose	LC	Likely present
Damaliscus lunatus lunatus	(Southern African) Tsessebe	Vulnerable (2016)	Introduced on game farms
Dendrohyrax arboreus	Tree Hyrax	VU (SA); LC (Global); VU (ToPS)	May be transient
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	May be transient
Equus quagga	Plains Zebra	LC	Introduced on game farms
Genetta tigrina	Cape Genet (Cape Large-spotted Genet)	LC	May be transient
Graphiurus murinus	Woodland dormouse	LC (Global); PNCO	May be transient

[12] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).

[13] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.

[14] PNCO: Protected in terms of the Provincial Nature Conservation Ordinance (Act 19 of 1974)

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Graphiurus ocularis	Spectacled dormouse	LC (Global); PNCO	May be transient
Herpestes pulverulentus	Cape Gray Mongoose	LC	May be transient
Hystrix africaeaustralis	Cape Porcupine	LC	Likely present
Ictonyx striatus	Striped Polecat	LC	May be transient
Loxodonta africana	African Bush Elephant	Vulnerable A2a (2008)	Not present
Mastomys natalensis	Natal Mastomys	LC	May be transient
Mellivora capensis	Honey Badger	LC	May be transient
Myosorex varius	Forest Shrew	LC	May be transient
Mystromys albicaudatus	White-tailed rat	EN (SA); EN (Global)	May be transient
Otocyon megalotis	Bat-eared Fox	LC	May be transient
Otomys irroratus	Southern African Vlei Rat (Fynbos type)	LC	May be transient
Otomys saundersiae	Saunders' Vlei Rat	LC	May be transient
Otomys unisulcatus	Karoo Bush Rat	LC	May be transient
Pelea capreolus	Vaal Rhebok	Near Threatened (2016)	Introduced on game farms
Phacochoerus africanus	Common Warthog	LC	Likely present
Potamochoerus porcus	Red River Hog	LC	May be transient
Rattus rattus	Roof Rat	LC	May be transient
Rhabdomys pumilio	Xeric Four-striped Grass Rat	LC	May be transient
Saccostomus campestris	Pouched mouse	LC (Global); PNCO	May be transient
Suncus infinitesimus	Least dwarf shrew	LC (Global); PNCO	May be transient
Suricata suricatta	Meerkat	LC	May be transient
Sylvicapra grimmia	Bush Duiker	LC	Likely present
Sylvicapra sp.	Common Duiker		Likely present
Syncerus caffer	African Buffalo	LC	Introduced on game farms

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Taurotragus oryx	Common Eland	LC	Introduced on game farms
Tragelaphus scriptus	Bushbuck	LC	Likely present
Tragelaphus strepsiceros	Greater Kudu	LC	Likely present
BIRDS			
Afrotis afra	Southern Black Korhaan	VU (SA); VU (Global)	May be transient
Alcedo semitorquata	Half-collared Kingfisher	NT (SA); LC (Global)	May be transient
Alopochen aegyptiacus	Egyptian Goose	LC	May be transient
Amaurornis flavirostris	Black Crake	LC	May be transient
Anthropoides paradiseus	Blue Crane	NT (SA); VU (Global); EN (ToPS)	May be transient
Anthus cinnamomeus	African (Grassveld/Grassland) Pipit	LC	May be transient
Apalis flavida	Yellow-breasted Apalis	LC	May be transient
Apalis thoracica	Bar-throated Apalis	LC	May be transient
Aquila verreauxii	Verreaux's Eagle	VU (SA); LC (Global)	May be transient
Ardea melanocephala	Black-headed Heron	LC	May be transient
Bucorvus leadbeateri	Southern Ground-Hornbill	EN (SA); VU (Global); Protected (ToPS)	May be transient
Calidris ferruginea	Curlew Sandpiper	LC (SA); NT (Global)	May be transient
Calidris minuta	Little Stint	LC	May be transient
Campethera notata	Knysna Woodpecker	NT (Global), NT (SA), NEST (M, H)	Possible present as a transient visitor (foraging)
Charadrius hiaticula	Common Ringed Plover	LC	May be transient
Charadrius pallidus	Chestnut-banded Plover	Global: NT; BLSA: NT	Unlikely

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Charadrius tricollaris	Three-banded Plover	LC	May be transient
Ciconia nigra	Black Stork	VU (SA); LC (Global); VU (ToPS)	May be transient
Circus maurus	Black Harrier	NEST (M), EN (SA); VU (Global)	Possibly present as a transient or occasional visitor (foraging) but site is unlikely to provide critical or important habitat.
Circus ranivorus	African marsh harrier	NEST (M. H),, LC (Global), EN (SA), Protected (ToPS)	Possibly present as a transient visitor (foraging), but no significant natural wetland habitat is present that will be altered.
Cisticola fulvicapillus [fulvicapilla]	Neddicky (Piping Cisticola)	LC	May be transient
Cisticola subruficapillus [subruficapilla]	Grey-backed (Red-headed) Cisticola	LC	May be transient
Coracias garrulus	European Roller	NT (SA); LC (Global)	May be transient
Corvus albicollis	White-necked Raven	LC	May be transient
Corvus albus	Pied Crow	LC	May be transient
Egretta garzetta	Little Egret	LC	May be transient
Euplectes orix	Southern Red Bishop	LC	May be transient
Falco biarmicus	Lanner Falcon	VU (SA); LC (Global)	May be transient
Gallinula chloropus	Common Moorhen	LC	May be transient
Himantopus himantopus	Black-winged Stilt	LC	May be transient
Hippolais languida	Upcher's Warbler	LC	May be transient
Hirundo rustica	Barn (European) Swallow	LC	May be transient
Laniarius ferrugineus	Southern Boubou	LC	May be transient
Merops bullockoides	White-fronted Bee-eater	LC	May be transient
Nectarinia [Cinnyris] famosa	Malachite Sunbird	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Neotis denhami	Denhams bustard	NEST (M), VU (SA); NT (Global); Protected (ToPS)	Possibly present as a transient or occasional visitor (foraging) but site is unlikely to provide critical or important habitat.
Neotis ludwigii	Ludwig's Bustard	EN (SA); EN (Global); VU (ToPS)	May be transient
Oena capensis	Namaqua Dove	LC	May be transient
Oenanthe pileata	Capped Wheatear	LC	May be transient
Phalaropus lobatus	Red-necked Phalarope	LC	May be transient
Philomachus pugnax	Ruff	LC	May be transient
Phoenicopterus minor	Lesser Flamingo	LC	May be transient
Phoenicopterus roseus	Greater Flamingo	NT (SA); LC (Global)	May be transient
Plectropterus gambensis	Spur-winged Goose	LC	May be transient
Ploceus capensis	Cape Weaver	LC	May be transient
Ploceus ocularis	Spectacled Weaver	LC	May be transient
Ploceus velatus	Southern Masked Weaver	LC	May be transient
Podica senegalensis	African Finfoot	VU (SA); LC (Global)	May be transient
Polemaetus bellicosus	Martial Eagle	EN (SA); VU (Global); VU (ToPS)	May be transient
Sagittarius serpentarius	Secretary bird	Global: VU; BLSA: VU	May be transient
Stephanoaetus coronatus	Crowned Eagle	VU (SA); NT (Global)	May be transient
Sterna caspia	Caspian Tern	VU (SA); LC (Global)	May be transient
Struthio camelus	Common Ostrich	LC	May be transient
Sturnus vulgaris	Common (European) Starling	LC	May be transient
Tadorna cana	South African Shelduck	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Tchagra australis	Brown-crowned (headed) Tchagra	LC	May be transient
Telophorus zeylonus	Bokmakierie	LC	May be transient
Tringa stagnatilis	Marsh Sandpiper	LC	May be transient
Vanellus coronatus	Crowned Lapwing (Plover)	LC	May be transient
Vanellus melanopterus	Black-winged Lapwing (Plover)	LC	May be transient
Vidua macroura	Pin-tailed Whydah	LC	May be transient
REPTILES			
Acontias gracilicauda	Thin tailed legless skink	PNCO, LC (Global)	May be transient
Acontias lineicauda	Algoa legless skink	PNCO, NT (Global)	May be transient
Acontias meleagris orientalis	Eastern legless skink	PNCO, LC (Global)	May be transient
Acontias percivali tasmani	Tasman's legless skink	PNCO, LC (Global)	May be transient
Agama atra	Southern rock agama	PNCO, LC (Global)	May be transient
Aspidelapse lubricus	Cape coral snake	PNCO, LC (Global)	May be transient
Bitis arientans	Puff adder	PNCO, LC (Global)	May be transient
Bradypodion ventrale	Southern Dwarf Chameleon	PNCO, LC (Global), CITES 2	May be transient
Causus rhombeatus	Night adder	PNCO, LC (Global)	May be transient
Chersina angulata	Angulate tortoise	PNCO, LC (Global), CITES 2	May be transient
Cordylus cordylus	Cape girdled lizard	PNCO, LC (Global), CITES 2	May be transient
Cordylus tasmani	Tasman's girdled lizard	PNCO, VU (Global), CITES 2	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Crotaphopeltis hotamboeia	Herald snake	PNCO, LC (Global)	May be transient
Dasypeltis scabra	Rhombic egg eater	PNCO, LC (Global)	May be transient
Dispholidus typus	Boomslang	PNCO, LC (Global)	May be transient
Duberria lutrix	Slug eater	PNCO, LC (Global)	May be transient
Gerrhosaurus flavigularis	Yellow throated plated lizard	PNCO, LC (Global)	May be transient
Hemachatus haemachatus	Rinkhals	PNCO, LC (Global)	May be transient
Hemidactylus mabouia	Tropical house gecko	PNCO, LC (Global)	May be transient
Homopus areolatus	Parrot-beaked Padloper	PNCO, LC (Global), CITES 2	May be transient
Homorolapse lacteus	Harlequin snake	PNCO, LC (Global)	May be transient
Lamprophis aurora	Aurora house snake	PNCO, LC (Global)	May be transient
Lamprophis capensis	Brown house snake	PNCO, LC (Global)	May be transient
Lamprophis fuscus	Yellow bellied house snake	PNCO, NT (Global)	May be transient
Lamprophis guttatus	Spotted house snake	PNCO, LC (Global)	May be transient
Lamprophis inornatus	Olive house snake	PNCO, LC (Global)	May be transient
Leptotyphlops nigricans	Black thread snake	PNCO, LC (Global)	May be transient
Lycodonomorphus laevissimus	Dusky bellied water snake	PNCO, LC (Global)	May be transient
Lycodonomorphus rufulus	Brown water snake	PNCO, LC (Global)	May be transient
Lycophidion capense	Cape wolf snake	PNCO, LC (Global)	May be transient
Lygodactylus capensis	Cape dwarf gecko	PNCO, LC (Global)	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Naja nivea	Cape cobra	PNCO, LC (Global)	May be transient
Nucras lalandii	Delalandes sandveld lizard	PNCO, LC (Global)	May be transient
Pachydactylus maculatus	Spotted thick toed gecko	PNCO, LC (Global)	May be transient
Pedioplanis pulchella	Pulchell's sand lizard	PNCO, LC (Global)	May be transient
Pelomedusa subrufa	Marsh terrapin	PNCO, LC (Global)	May be transient
Philothamnus hoplogaster	Green water snake	PNCO, LC (Global)	May be transient
Philothamnus natalensis occidentalus	Natal green snake	PNCO, LC (Global)	May be transient
Philothamnus semivariegatus	Spotted bush snake	PNCO, LC (Global)	May be transient
Prosymna sundevallii	Sundevalle's shovel snout	PNCO, LC (Global)	May be transient
Psammophis crucifer	Crossed –marked sand snake	PNCO, LC (Global)	May be transient
Psammophis notostictus	Karroo whip snake	PNCO, LC (Global)	May be transient
Psammophylax rhombeatus	Rhombic skaapsteker	PNCO, LC (Global)	May be transient
Pseudaspis cana	Mole snake	PNCO, LC (Global)	May be transient
Pseudocordylus m. microlepidotus	Cape crag lizard	PNCO, LC (Global)	May be transient
Rhinotyphlops lalandei	Delalande's beaked blind snake	PNCO, LC (Global)	May be transient
Scelotes anguineus	Algoa dwarf burrowing skink	PNCO, LC (Global), Endemic	May be transient
Scelotes caffer	Cape dwarf burrowing skink	PNCO, LC (Global)	May be transient
Stigmochelys pardalis	Leopard Tortoise	PNCO, LC (Global) CITES 2	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Tetradactylus fitzsimonsi	Fitz Simon's long tailed seps	PNCO, VU (Global)	May be transient
Tetradactylus seps	Short legged seps	PNCO, LC (Global)	May be transient
Trachylepis capensis	Cape skink	PNCO, LC (Global)	May be transient
Trachylepis homalcephala	Red sided skink	PNCO, LC (Global)	May be transient
Trachylepis varia varie	Variable skink	PNCO, LC (Global)	May be transient
Varanus albigularis	Rock Monitor	PNCO, LC (Global) CITES 2	May be transient
Varanus niloticus	Water Monitor	PNCO, LC (Global) CITES 2	May be transient
AMPHIBIANS			
Amietia fuscigula	Cape River Frog	LC	May be transient
Amietophrynus pardalis	Eastern Leopard Toad	PNCO, LC (Global)	May be transient
Amietophrynus rangeri	Raucous Toad	PNCO, LC (Global)	May be transient
Breviceps adspersus pentheri	Penthers Rain Frog	PNCO, LC (Global)	May be transient
Cacosternum boettgeri	Common Caco	PNCO, LC (Global)	May be transient
Cacosternum nanum	Bronze Caco	PNCO, LC (Global)	May be transient
Hyperolius horstockii	Arum lily frog	PNCO, LC (Global)	May be transient
Hyperolius marmoratus	Painted Reed Frog	PNCO, LC (Global)	May be transient
Hyperolius semidiscus	Yellowstriped Reed Frog	LC	May be transient
Kassina senegalensis	Kassina	PNCO, LC (Global)	May be transient
Pyxicephalus adspersus	African giant bullfrog	PNCO, LC (Global), ToPS	May be transient
Sclerophrys capensis	Raucous Toad	LC	May be transient
Sclerophrys pardalis	Eastern Leopard Toad	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Semnodactylus wealii	Rattling Frog	PNCO, LC (Global)	May be transient
Strongylopus fasciatus	Striped Stream Frog	PNCO, LC (Global)	May be transient
Strongylopus grayii	Clicking Stream Frog	PNCO, LC (Global)	May be transient
Tomopterna delalandii	Cape Sand Frog	PNCO, LC (Global)	May be transient
Tomopterna tandyi	Tandy's Sand Frog	LC	May be transient
Vandijkophrynus angusticeps	Cape Sand Toad	PNCO, LC (Global)	May be transient
Xenopus laevis	Common Platanna	PNCO, LC (Global)	May be transient
INVERTEBRATES			
Aneuryphymus montanus	*Yellow-winged Agile Grasshopper*	NEST (M)	Unlikely, suitable habitat is not present (Grassland/Fynbos)
Circellium bacchus	*Cape Flightless (Addo) Dung Beetle*	VU	Likely present (observed and common in proximity)
LEPIDOPTERA			
Actizera lucida	Rayed blue	LC	May be transient
Afrotheora thermodes			May be transient
Alenia sandaster	Karoo dancer	LC	May be transient
Aloeides clarki	Coega russet	EN	Outside of known distribution
Aloeides damarensis damarensis	Damara russet	LC	May be transient
Aloeides depicta	Depicta russet	LC	May be transient
Aloeides pallida pallida	Giant russet	LC	May be transient
Aloeides pierus	Veined russet	LC	May be transient
Aloeides trimeni trimeni	Brown russet	LC	May be transient
Anthene amarah amarah	Black-striped ciliate blue	LC	May be transient
Anthene definita definita	Steel-blue-ciliate blue	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Anthene livida livida	Pale ciliate blue	LC	May be transient
Axiocerses croesus	Dark-banded scarlet	LC	May be transient
Belenois aurota	Pioneer caper white	LC	May be transient
Belenois creona severina	African caper white	LC	May be transient
Belenois gidica abyssinica	African veined white	LC	May be transient
Cacyreus fracta fracta	Water geranium bronze	LC	May be transient
Cacyreus marshalli	Common geranium bronze	LC	May be transient
Catacroptera cloanthe cloanthe	Pirate	LC	May be transient
Charaxes jahlusa jahlusa	Pearl-spotted charaxes	LC	May be transient
Charaxes varanes varanes	Pearl charaxes	LC	May be transient
Chilades trochylus	Grass jewel blue	LC	May be transient
Chrysoritis chrysaor	Burnished opal	LC	May be transient
Colias electo electo	African clouded yellow	LC	May be transient
Colotis antevippe gavisa	Red tip	LC	May be transient
Colotis euippe omphale	Southern round-winged orange tip	LC	May be transient
Colotis evagore antigone	Small orange tip	LC	May be transient
Crudaria leroma	Silver-spotted grey	LC	May be transient
Danaus chrysippus orientis	African plain tiger	LC	May be transient
Deudorix antalus	Brown playboy	LC	May be transient
Dixeia charina charina	African ant-heap white	LC	May be transient
Eicochrysops messapus messapus	Cupreous ash blue	LC	May be transient
Eretis umbra umbra	Small marbled elf	LC	May be transient
Eurema brigitta brigitta	Broad-bordered grass yellow	LC	May be transient
Hypolimnas misippus	Common diadem	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Iolaus mimosae mimosae	Mimosa sapphire	LC	May be transient
Junonia artaxia	African pansy		May be transient
Junonia hierta cebrene	Yellow pansy	LC	May be transient
Junonia oenone oenone	Dark blue pansy	LC	May be transient
Junonia orithya madagascariensis	African blue pansy	LC	May be transient
Kedestes macomo	Macomo ranger	LC	May be transient
Lampides boeticus	Pea blue	LC	May be transient
Lepidochrysops asteris	Brilliant giant cupid	LC	May be transient
Lepidochrysops bacchus	Wineland giant cupid	LC	May be transient
Lepidochrysops ketsi ketsi	Ketsi giant cupid	LC	May be transient
Lepidochrysops patricia	Patrician giant cupid	LC	May be transient
Leptomyrina lara	Cape black-eye	LC	May be transient
Oraidium barberae	Dwarf blue	LC	May be transient
Papilio demodocus demodocus	Citrus swallowtail	LC	May be transient
Papilio nireus lyaeus	Narrow green-banded swallowtail	LC	May be transient
Phasis braueri	Eastern arrowhead	LC	May be transient
Pinacopteryx eriphia eriphia	Zebra white	LC	May be transient
Pontia helice helice	Southern meadow white	LC	May be transient
Pseudonympha magoides	False silver-bottom brown	LC	May be transient
Pseudonympha magus	Silver-bottom brown	LC	May be transient
Sarangesa phidyle	Small elfin	LC	May be transient
Spialia agylla agylla	Grassveld sandman	LC	May be transient
Spialia asterodia	Star sandman	LC	May be transient

SPECIES	Family	STATUS[12, 13]	LIKELIHOOD OF PRESENCE
Spialia ferax	Striped sandman	LC	May be transient
Spialia nanus	Dwarf sandman	LC	May be transient
Spialia sataspes	Boland sandman	LC	May be transient
Spialia spio	Mountain sandman	LC	May be transient
Stugeta bowkeri bowkeri	Bowker's marbled sapphire	LC	May be transient
Teracolus eris eris	Banded gold tip	LC	May be transient
Trimenia argyroplaga argyroplaga	Large silver-spotted copper	LC	May be transient
Trimenia macmasteri macmasteri	Karoo silver-spotted copper	LC	May be transient
Tsitana uitenhaga	Uitenhage sylph	LC	May be transient
Vanessa cardui	Painted lady	LC	May be transient
Zizeeria knysna knysna	African grass blue	LC	May be transient
SCORPIONS AND SPIDERS			
Harpactira spp. – all species	Baboon Spiders	ToPS	May be present
Papio spp. – all species	Baboon Spiders	ToPS	May be present
Opistophthalmus spp – all species	Burrowing Scorpions	ToPS	May be present
Opisthacanthus spp - all species	Creeping Scorpions	ToPS	May be present
Parabuthus spp. – all species	Creeping Scorpions	ToPS	May be present

Mammals

Several mammal species are likely to be found in the wider area and may be transient to the site. The game farms are however independently fenced with game fencing which will restrict movement of larger mammal species. In addition, several extra-limital species are also present on neighbouring farms, for breeding and hunting purposes.

Should they be present, the mammals are likely to move away from disturbance during clearing, and with intact habitat available in the immediate surrounds, including that which is proposed to remain intact on Sontule, they would unlikely be negatively affected by the development. Species such as Kudu, Bushbuck, Common Duiker, Porcupine, Warthog, Springhare are likely to be present and common.

In addition, there is a latent risk that there will be some accidental mortalities. The risk to faunal species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity. As a result, a faunal search and rescue is not deemed to be required for mammal species.

Avifauna and Bats

The overall impacts of the development on birds and bats, other than temporary displacement during site clearing, is likely to be of low to moderate significance, since there is extensive intact habitat available in the wider area.

Reptiles

Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. In dense thicket areas, reptiles tend to favour the margins of thicket rather than being within the solid thicket. It is recommended that a faunal search and rescue be undertaken before clearing commences. Should any reptiles be found during the construction activities, a reptile handler should be called to remove the fauna.

Amphibians

No amphibians are likely to be present that will be significantly affected, as the habitat that will be directly affected is generally not suitable and/or the species that are present in riparian vegetation, are likely to include common species. No riparian vegetation is proposed to be disturbed by the proposed development.

Invertebrates

Invertebrate species noted to have an elevated conservation status are unlikely to be present within the site. Baboon Spiders and Scorpions as well as the Dung Beetle are likely present and should form part of the faunal search and rescue, as they are ToPS protected species.

6.8.7 Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of AIPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface

water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money, and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds are easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Several exotic invasive and other weed species were noted within the site, although they are present in low numbers. Prickly Pear (*Opuntia ficus-indica*) was found scattered within solid Thicket and Jointed Cactus (*Opuntia aurantiaca*) often along pathways and cut-lines, as well as several other ruderal weed species, generally in disturbed areas. A weed management programme, including an after-care period, will be required. A list of alien invasive species identified on the farm and within the wider area, is included in Table 6. 9.

Table 6. 9: Alien (exotic) invasive and other weed species and status.

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS[15]	PRESENCE
Argemone mexicana	*Mexican Poppy*	Asteraceae	NEMBA 1b, CARA 1b	Present in wider area
Cirsium vulgare	Scotch Thistle	Asteraceae	NEMBA 1b, CARA 1b	Present, few individuals
Datura spp.	Thorn Apple	Solanaceae	NEMBA 1b, CARA 1b	Present, few individuals
Grevillea robusta	Silky Oak	Proteaceae	NEMBA 3, CARA 3	Present in wider area
Opuntia ficus-indica	Prickly Pear	Cactaceae	NEMBA 1b, CARA 1b	Present, scattered
Opuntia aurantiaca	Jointed Cactus	Cactaceae	NEMBA 1b, CARA 1b	Present, scattered clumps
Pennisetum clandestinum	Kikuyu	Poaceae	NEMBA 1b, CARA 1b	Present, disturbed areas

[15] NEMBA – NEMBA Alien and Invasive Species Regulations (2020); CARA – Conservation of Agricultural resources Act.

Solanum mauritianum	Bugweed	Solanacea e	NEMBA 1b, CARA 1b	Present, few individuals

Eradication protocol

The act requires the removal of these species, being the responsibility of the landowner, as described in Table 6. 10 below.

Table 6. 10: Legislation regarding invasive alien species.

The National Environmental Management Act: Alien and Invasive Species Act (18 September 2020) stipulates the following:

6. Control measures

(1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.

(2) Such control measures may relate to –

(I) the control of weeds and invader plants.

(3) A control measure may –

(a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).

(5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.

In this regard, Government Notice R. 598 - National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:

CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES

2. Category 1a: Listed Invasive Species

(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.

(2) A person in control of a Category 1a Listed Invasive Species must-

(a) comply with the provisions of section 73(2) of the Act.

(b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and

(c) allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.

If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

3. Category 1b: Listed Invasive Species

(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.

(2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

4. Category 2: Listed Invasive Species

(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.

(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.

(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

5. Category 3: Listed Invasive Species

(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

Specific eradication and management procedures must be stipulated in the EMPr as to the methods to be implemented to remove and control the various alien invasive species, since they tend to require species-specific techniques. A management plan should be incorporated into the EMPr and

a detailed action plan compiled and implemented by the ECO. All removed trees must be removed from site and disposed of at a registered waste disposal facility. Alternatively, the plant material can be mulched using a woodchipper on site. However, seed-bearing material is to be disposed of at a registered landfill.

6.8.8 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial watercourses and wetlands are present in the wider area, however none have been identified on site. Several minor non-perennial watercourses are present in the area surrounding the proposed orchards and will require crossings for the installation of the proposed irrigation water pipelines and internal access roads.

Where the pipelines or other temporary activities will traverse areas that have already been cleared historically (such as along roads or cutlines), post-construction rehabilitation would most likely achieve pre-construction conditions within 2 years as defined by the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity which stipulates '*excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase'.*

Figure 6.23. Position of non-perennial watercourses and wetlands in relation to the site.

6.9 TERRESTRIAL VEGETATION SENSITIVITY ASSESSMENT

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators (summarised in Table 6. 6:) was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area due to loss.

Intactness

Three basic classes are differentiated as follows:

- **Low**: > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate**: 25 - 75 % of original vegetation has been removed/lost; and / or presence of species of special concern but not having high conservation status or high levels of endemicity or highly localised distributions.
- **High**: < 25 % of original vegetation has been removed or lost; and / or presence of species with a high endemicity and or high conservation status (endangered or critically endangered).

Intactness for the site is generally *High* for intact vegetation and *Low* for transformed and degraded areas.

Alien Invasion

Three classes are differentiated as follows:

- **Low**: no or few scattered individuals.
- **Moderate**: individual clumps of invasives present but cover less than 50% of original area.
- **High**: dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is generally *Very Low* to *Low*.

Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

INTACTNESS	INVASION		
	LOW	**MODERATE**	**HIGH**
High	Pristine	Near Pristine	Moderately Degraded
Moderate	Near Pristine	Moderately Degraded	Severely Degraded
Low	Moderately Degraded	Severely Degraded	Transformed

Degradation for the site is *Moderately Degraded* for transformed and disturbed areas and *Pristine* to near-Pristine for intact thicket.

Overall Sensitivity score

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	**VULNERABLE**	**ENDANGERED**	**CRITICALLY ENDANGERED**
Severely degraded/ Transformed	Very Low	Low	Moderate	Moderate - High
Moderately degraded	Low	Moderate	High	High
Ecologically Pristine or near Pristine	Moderate	Moderate - High	High	Very High (No-Go area)

According to the above matrix, the sensitivity of the site ranges between *Moderate* (for intact areas) and *Low* (transformed and disturbed areas).

In summary, site sensitivity (Figure 6.21) is categorized as follows:

- Areas scoring an overall VERY LOW OR LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. **Low sensitivity areas are limited to the transformed areas including existing orchards, the landing strip and other cleared areas, not under citrus.**
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that are mostly intact, but not having specific biodiversity related issues of significance or

where proposed activity will have limited overall impact, and recovery will be good with minimal intervention. **Moderate sensitivity areas include intact Sundays Valley Thicket.**

- Areas scoring an overall HIGH sensitivity include those areas deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are vulnerable. **No *High* sensitivity terrestrial vegetation is identified on the site, however vegetation associated with the slopes and watercourses would be considered to have a higher sensitivity, to be avoided), due to ecological process related sensitivities as well as erosion risk on slopes, which are not ideally suited to citrus orchards.**
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat (refer to Section 0) for any faunal species that is endangered or critically endangered. **No *Very High* sensitivity terrestrial areas are identified on the site.**

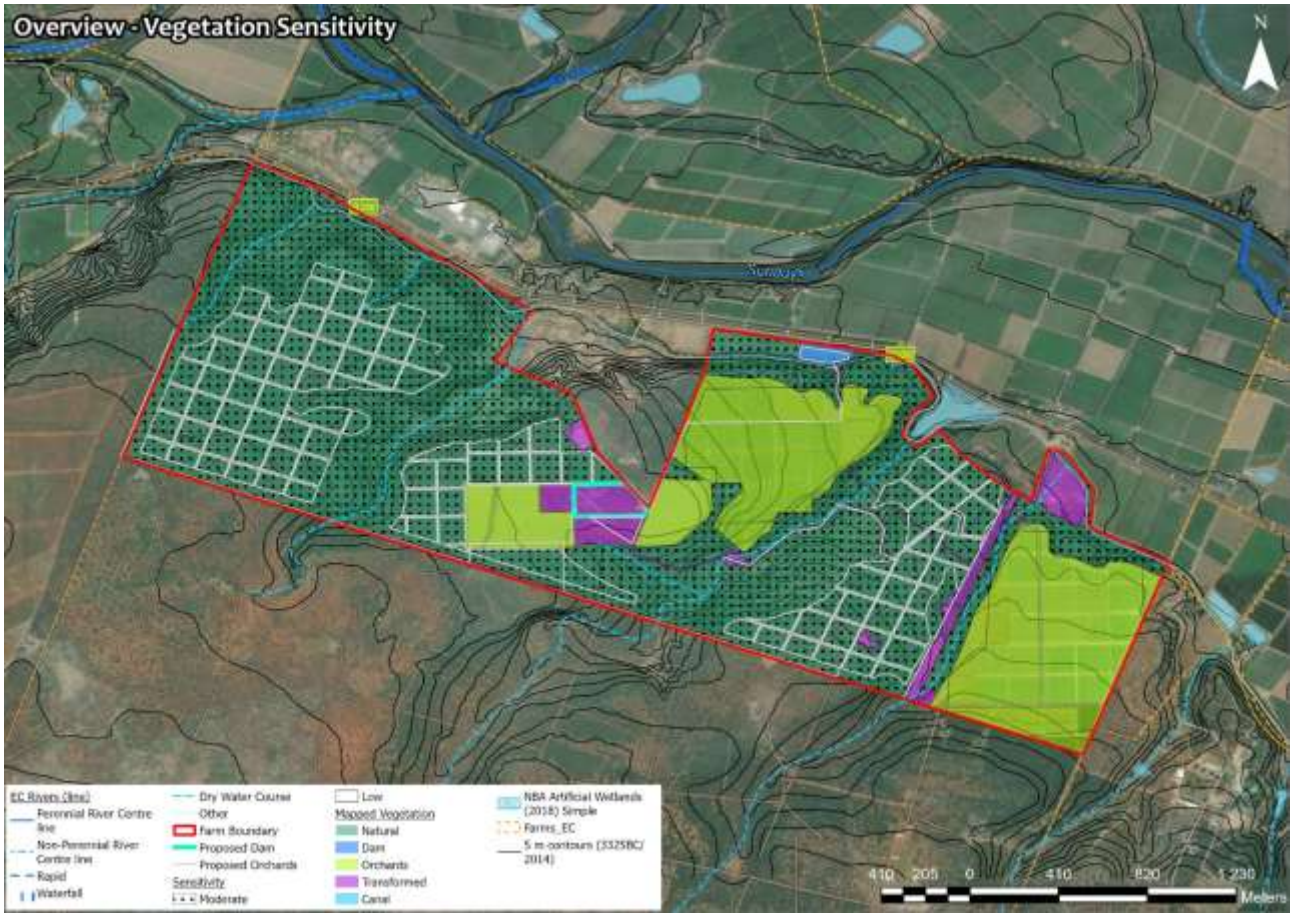

Figure 6.24. Overall Terrestrial Biodiversity Sensitivity.

The areas on the site proposed for citrus orchards are considered to have an overall Moderate sensitivity, primarily because of the presence of intact vegetation with a low conservation status and designated as ESA rather than CBA. The proposed activity can be undertaken without significantly compromising the ecological function and connectivity, which is the primary objective within ESA designated areas, if corridors are retained to maintain connectivity, and respective conservation targets are met for the represented vegetation units (i.e. 19% for Sundays Valley Thicket).

After clearing for the proposed citrus orchards, the remaining intact natural vegetation will be approximately 175 Ha, which equates to 54 % of the currently remaining intact vegetation or 38 % of the original extent of natural vegetation on the farm (see table below for additional statistics).

Category	Area (Ha)	Percentage
Total Farm extent	462.0	100 %
Current extent of natural vegetation	322.7	70 %
Current extent of transformed areas (including orchards)	140.7	30 %
Current extent of orchards	120.4	26 %
Proposed new orchards and infrastructure	147.2	32 %
Potential future extent of transformed	287.0	62 %
Percentage of original extent remaining (remnant natural)	175.0	38 %
Conservation target	88.0	19 %

Based on the above calculations the remaining natural vegetation, on completion of the proposed clearing will be double (38%) the recommended conservation target for the vegetation unit (19%).

6.10 ECOLOGICAL CONNECTIVITY

With reference to Figure 6.26, ecological connectivity is currently maintained to the west, east and south of the farm portion, as indicated (yellow arrows), primarily following drainage lines which are not significantly transformed. The farm is functionally disconnected from intact habitat to the north, and faunal movement is likely limited to a few species. The farm portion is fenced off with security fencing (*Figure 6.25*), thus movement of larger mammals is likely significantly restricted. Birds would be unaffected as well as reptiles and smaller mammals. Larger tortoises would likely be confined by the fencing type and movement would be restricted.

Figure 6.25. Farm perimeter fencing.

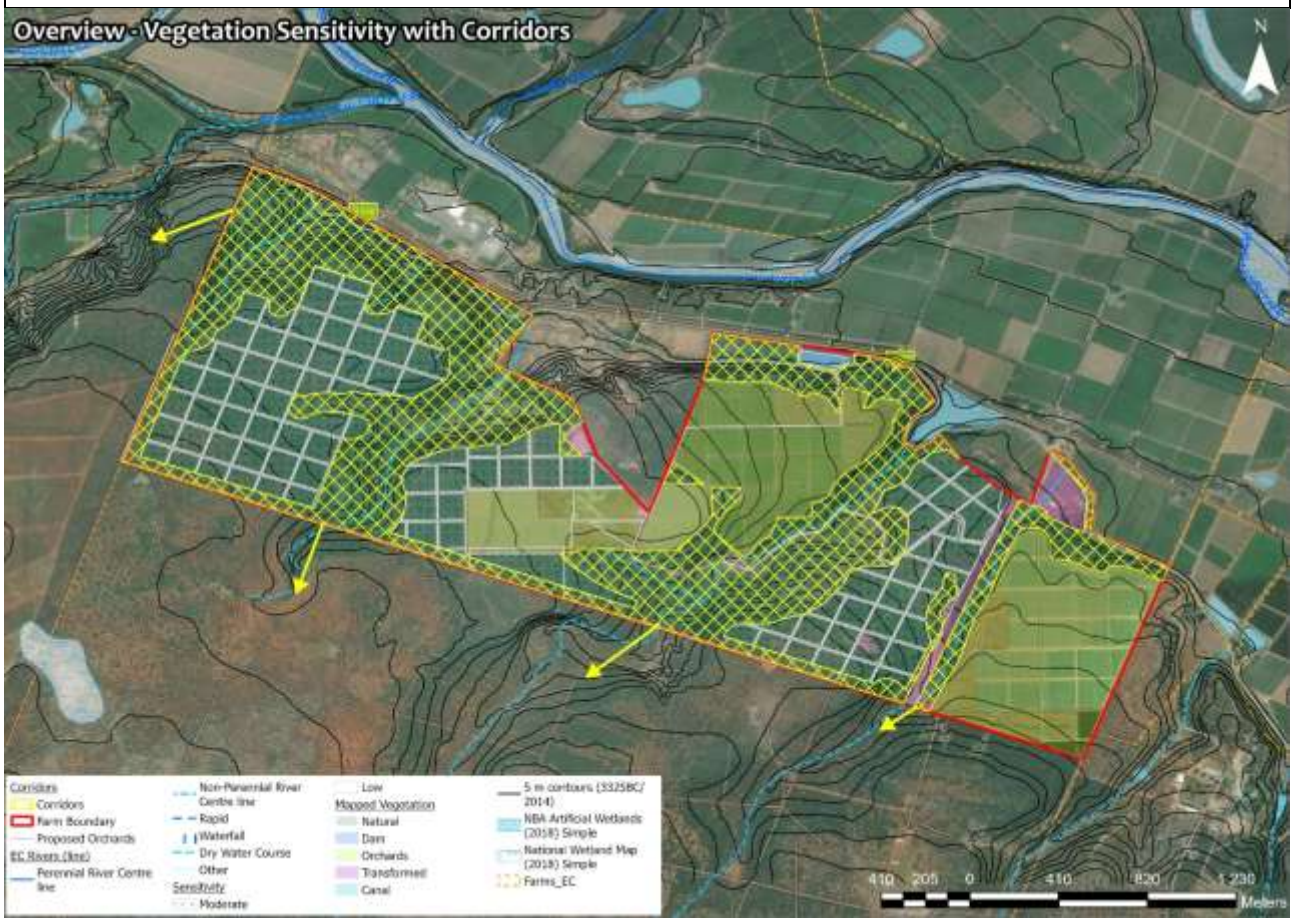

Figure 6.26. Overall Ecological Connectivity and recommended corridors (includes slopes and watercourses).

It is recommended that the areas surrounding watercourses and slopes are retained to ensure connectivity. These areas follow four watercourses that traverse the property (north-south), as indicated in Figure 6.26 (yellow hatch). If these areas are retained, it will effectively conserve approximately 175 Ha of undeveloped Thicket on the farm.

These north-south corridors will be contiguous with surrounding farms; however, the security fencing will pose as barriers to certain faunal elements (larger mammals, excluding Kudu, and tortoises for example), The proposed citrus orchards, together with the existing orchards (which are covered in shade-cloth on top and sides), will also serve as barriers to ecological connectivity to some extent within the farm portion, which will likely impede free movement of certain fauna. This could result in negative impacts to the vegetation as well, because fauna will not be able to freely move around seasonally. In order to mediate this, it is recommended that a corridor (~50 m wide) of vegetation is retained along the southern and western boundary (Figure 6.26, yellow hatch) which will allow free movement (west-east) of fauna and provide connectivity between the north-south watercourse corridors.

6.10.1 Critical Habitat

The following Criteria have been utilised for the identification of Critical Habitat features within the site:

- Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species

No Endangered or Critically Endangered Flora species were recorded as being present during the several site surveys. There is still a low risk that scattered individuals are present, as it is impossible to survey every square meter of the site. Since around 38 % of the site will be retained, this will reduce the risk and should any be found during the search and rescue, most of the possibly occurring species are amenable to relocation.

Potential habitat is present for an Endangered faunal species (Sensitive Animal Species 7) and a Vulnerable species (*Cape Flightless or Addo Dung Beetle)* have been recorded in the nearby area and is potentially present. Sensitive species 7 is currently being bred on the neighbouring property, although there is no evidence to suggest that the species is present on the affected farm. No other Endangered Mammals, Reptiles, Amphibians, or Invertebrates are known to be present on the site or will be directly affected (other than temporary displacement during construction, for possible avifaunal species).

- Criterion 2: Habitat for Endemic or restricted-range species

No range restricted flora species are recorded. Risk of other species occurring is low to moderate and would require additional seasonal assessment. Several species known from the general area, as screened by various tools and databases, were screened to confirm that most likely localities do not overlap with the site.

- Criterion 3: Habitat for Migratory or congregatory species

No such terrestrial habitat will be directly or indirectly affected.

- Criterion 4: Habitat for Highly threatened and/or unique ecosystems

No such terrestrial habitat will be directly or indirectly affected.

- Criterion 5: Habitat for Key evolutionary processes

No such terrestrial habitat will be directly or indirectly affected.

Given the above, no Critical Habitats are identified within the proposed site.

6.10.2 No-Go Areas

Recommended no-go areas include the steep slopes and vegetation around drainage lines, neither of which are suitable for citrus orchards. These should be retained to meet conservation targets for the vegetation unit as well as to maintain ecological connectivity. Linear infrastructure can be sited in these areas, where clearing of vegetation would be limited and kept to linear pipelines or access roads. In addition, it is recommended that a corridor (~50 m wide) of vegetation is retained along the southern and western boundary of the site maintain connectivity within the site.

- **Potential Development Footprints**

The proposed site is developable, where impacts to intact vegetation have been aligned in such a way as to maintain ecological connectivity, this being the primary goal of Ecological Support Area designated areas.

- **Biodiversity Offsets**

No Biodiversity offsets are deemed to be required for the proposed activity in terms of systematic conservation planning requirements.

6.11 IDENTIFICATION AND ASSESSMENT OF IMPACTS

The following impacts to terrestrial biodiversity, fauna, and flora, associated with this application were identified and assessed, namely:

Impact No.	Impact Description	Phase of Development	Direct or Indirect
Impact 1	Loss of vegetation due to clearing	Construction	Direct
Impact 2	Loss of ESA due to clearing	Construction	Direct
Impact 3	Loss of flora and fauna species of special concern during vegetation clearing	Construction	Direct
Impact 4	Fragmentation of natural habitat due to clearing	Construction	Direct
Impact 5	Loss of flora and faunal habitat due to clearing	Construction	Direct
Impact 6	Fragmentation of natural habitat	Operational	Direct
Impact 7	Loss of flora & fauna habitat	Operational	Direct
Impact 8	Loss of flora and fauna SCC due to poaching / illegal harvesting	Operational	Indirect

- **Alternatives Assessed**

A single layout (preferred) has been assessed (see Figure 6.15) in terms of impacts to Terrestrial Biodiversity, inclusive of flora and fauna. Specialist input was obtained prior to determination of the preferred orchard layout so as to minimise loss or fragmentation of solid thicket as much as is technically possible while still achieving the technical requirements. This has further served to address the primary land-use objectives for the respective systematic conservation plans, which indicate that ecological function, ecosystem services and connectivity should be maintained rather than preserving habitat in order to achieve conservation targets.

6.11.1 Construction Phase Direct Impacts

The following section of the report identifies direct impacts that may be associated with the construction phase of the development.

Impact 1: Loss of vegetation due to clearing

Nature of the Impact	Approximately 147.2 Ha of indigenous vegetation of the 462 Ha farm portion will need to be cleared for construction of the orchards and storage dam. The 147.2 Ha loss of vegetation represents 32 % of the remaining natural vegetation on the farm portion and the percentage of the represented vegetation unts is nominal, less than 0.1 % of remaining intact Sundays Valley Thicket. Conservation targets for this vegetation type will thus not be at risk and the remaining vegetation on the farm portion, after completion, will be double (38%) the conservation target for Sundays Valley Thicket (19%).
Extent	**Site**
Duration	**Permanent**
Consequence/ Intensity/ Severity	**Low**
Probability	**Definite**
Reversibility	**Irreversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Clearing of vegetation should be limited to the required and approved footprint.
Significance and Status (with mitigation)	**Low Negative (-)**

Impact 2: Loss of ESA due to clearing

Nature of the Impact	The proposed orchards are situated outside of designated CBA but within ESA 1 areas. The proposed orchards have a footprint of 147.2 Ha and 38% of the site will be retained in a natural state in a layout that will preserve ecological connectivity and function.
Extent	**Site**
Duration	**Permanent**

Consequence / Intensity / Severity	**Low**
Probability	**Definite**
Reversibility	**Irreversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Clearing of vegetation should be limited to the approved footprint. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Use flora relocation as a tool to rehabilitate degraded and transformed areas by using relocated species of conservation concern and indigenous vegetation collected during clearing (Spekboom, *Aloe* and other succulent species) within areas to be retained (open space areas) and eroded areas on slopes. • Control and management of alien invasive plants, such as *Opuntia ficus-indica* and *O. aurantiaca* and other weed species that may proliferate after clearing along the pipeline routes and other disturbed areas.
Significance and Status (with mitigation)	**Low Negative (-)**

Impact 3: Loss of flora and fauna species of special concern due to clearing

Nature of the Impact	Several faunal species are present, however none having an elevated status are likely to be affected by the proposed activity. Several flora species protected ito the PNCO are present, however no species having an elevated status were confirmed present. All such species are suitable for relocation. Adequate open space area is proposed to be retained that will provide alternative habitat. Because of the low status, the severity score is not considered high and successful relocation of the species is likely, should such be required. The retention of 38 % of the farm portion as natural areas, as well as implementation of a pre-commencement flora and fauna search and rescue will further reduce the severity.
Extent	**Site**
Duration	**Medium term**

Consequence / Intensity / Severity	**Low**
Probability	**Definite**
Reversibility	**Partially Reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Licence application to the Department of Forestry (Department of Agriculture, Forestry & Fisheries) for the removal of *Sideroxylon inerme* trees. • Permits to be obtained from DEDEAT for the relocation of PNCO protected species as well as Threatened or Protected Species (ToPS) before commencement. • A flora and fauna search and rescue to be implemented before clearing commences with follow-up during clearing into dense thicket areas. • Rehabilitation of disturbed areas with these species, especially cutlines and eroded areas on slopes.
Significance and Status (with mitigation)	**Low Negative (-)**

Impact 4: Fragmentation of natural habitat due to clearing

Nature of the Impact	The clearing of vegetation for the orchards and storage dam will result in the minimal fragmentation of natural habitat, which supports species movement and other ecological processes (e.g., pollination, hydrological processes, nutrient recycling etc.), because an appropriate corridor network has been considered and implemented in the layout plan. The farm portion is already fenced, which limits movement of larger species. The solid thicket in the surrounding area is already fragmented by fence lines, cut-lines, access tracks, other pipelines and powerlines and thus any additional fragmentation will not exceed current baseline levels if the recommended natural areas are retained.
Extent	**Site**
Duration	**Medium term**
Consequence / Intensity / Severity	**Low**
Probability	**Definite**
Reversibility	**Partially Reversible**

Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Clearing of vegetation should be limited to the approved footprint. • Optimise use of existing cutlines, roads and transformed areas as far as possible. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Use flora relocation as a tool to rehabilitate degraded and transformed areas by using relocated species of conservation concern and indigenous vegetation collected during clearing (Spekboom, *Aloe* and other succulent species) within areas to be retained (open space areas), eroded areas on slopes and unused cut-lines.
Significance and Status (with mitigation)	**Low Negative (-)**

Impact 5: Loss of flora and faunal habitat due to clearing

Nature of the Impact	Several faunal species are present, however none having an elevated status are likely to be affected by the proposed activity. Several flora species protected ito the PNCO are present, however no species having an elevated status were confirmed present. All such species are suitable for relocation. Adequate open space area is proposed to be retained that will provide alternative habitat. Because of the low status, the severity score is not considered high and successful relocation of the species is likely, should such be required. The retention of 38 % of the farm portion as natural areas, as well as implementation of a pre-commencement flora search and rescue will further reduce the severity. No species with a limited distribution were confirmed or likely to be affected.
Extent	**Site**
Duration	**Medium term**
Intensity	**Low**
Probability	**Definite**
Degree of Confidence	**Partially Reversible**
Reversibility	**High**
Irreplaceable Loss of Resources	**Partially Replaceable**

Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Clearing of vegetation should be limited to the approved footprint. • Rehabilitation of disturbed areas, especially cutlines. • A fauna relocation before commencement must ensure that any less mobile faunal species can be moved to a safe area.
Status and Significance (after mitigation)	**Low Negative (-)**

- **Construction Phase Indirect Impacts**

None considered to be of significance due to the limited footprint in proportion to the activity relative to the baseline levels of transformation as well as available intact habitat present.

- **Construction Phase Cumulative Impacts**

The cumulative loss of vegetation due to the proposed activities is negligible due to the limited footprint in proportion to available habitat as well as baseline levels of transformation already present.

6.11.2 Operational Phase Direct Impacts

The following section of the report identifies direct impacts that may be associated with the operational phase of the development.

Impact 6: Fragmentation of natural habitat

Nature of the Impact	The clearing of vegetation for the orchards and storage dam will result in the minimal fragmentation of natural habitat, which supports species movement and other ecological processes (e.g., pollination, hydrological processes, nutrient recycling etc.), because an appropriate corridor network has been considered and implemented in the layout plan. The farm portion is already fenced, which limits movement of larger species. The solid thicket in the surrounding area is already fragmented by fence lines, cut-lines, access tracks, other pipelines and powerlines and thus any additional fragmentation will not exceed current baseline levels, if the recommended natural areas are retained.
Extent	**Site**
Duration	**Long-Term**
Consequence / Intensity / Severity	**Low**
Probability	**Highly probable**
Reversibility	**Reversible**
Degree of Confidence	**High**

Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Clearing of vegetation should be limited to the approved footprint. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Optimise use of existing cutlines, roads and transformed areas as far as possible. • Use flora relocation as a tool to rehabilitate degraded areas and to re-instate an unfenced corridor. • Control and management of regrowth of alien invasive plants and ephemeral weeds that may proliferate after clearing along the pipeline routes and around the other infrastructure.
Significance and Status (with mitigation)	**Low Negative (-)**

Impact 7: Loss of flora & fauna habitat

Nature of the Impact	Several faunal species are present, however none having an elevated status are likely to be affected by the proposed activity. Several flora species protected ito the PNCO are present, however no species having an elevated status were confirmed present. All such species are suitable for relocation. Adequate open space area is proposed to be retained that will provide alternative habitat. Because of the low status, the severity score is not considered high and successful relocation of the species is likely, should such be required. The retention of 38 % of the farm portion as natural areas, as well as implementation of a pre-commencement flora search and rescue will further reduce the severity.
Extent	Site
Duration	Medium term
Intensity	Low
Probability	Definite
Degree of Confidence	Partially Reversible
Reversibility	High
Irreplaceable Loss of Resources	Partially Replaceable
Status and Significance (without mitigation)	**Medium Negative (-)**

Mitigation	• Licence application to the Department of Forestry (Department of Agriculture, Forestry & Fisheries) for the removal of *Sideroxylon inerme* trees. • Permits to be obtained from DEDEAT for the relocation of PNCO protected species before commencement.
Status and Significance (after mitigation)	**Low Negative (-)**

- **Operational Phase Indirect Impacts**

None considered to be of significance due to the limited footprint in proportion to the activity relative to the baseline levels of transformation as well as available intact habitat present.

Impact 8: Loss of flora and fauna SCC due to poaching / illegal harvesting

Nature of the Impact	Illegal harvesting of flora and illegal poaching of fauna could occur during the operational phases. This impact risk is unlikely to exceed current levels.
Extent	**Site**
Duration	**Long term**
Consequence / Intensity / Severity	**Low**
Probability	**Unlikely**
Reversibility	**Reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Ongoing monitoring of poaching should be undertaken by the landowner periodically.
Significance and Status (with mitigation)	**Low Negative (-)**

- **Operational Phase Cumulative Impacts**

The cumulative loss of vegetation because of the proposed activities is negligible due to the limited footprint in proportion to available habitat as well as baseline levels of transformation already present.

ENVIRONMENTAL MONITORING PROGRAMME RECOMMENDATIONS

A summary of the project specific mitigation measures recommended above is provided in the table below, which can be incorporated into the Environmental Monitoring Programme and implemented/ monitored by the Environmental Control Officer. A general Biodiversity Management Plan is included as Appendix B.

Compile an Environmental Monitoring Programme which provides the following specifications for implementation by the Environmental Control Officer:
IMPACT 1: LOSS OF VEGETATION DUE TO CLEARING
• Clearing of vegetation should be limited to the approved footprint. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Control and management of alien invasive plants, such as *Opuntia ficus-indica* and *O. aurantiaca* and other weed species that may proliferate after clearing along the pipeline route and other disturbed areas.
IMPACT 2: LOSS OF ESA DUE TO CLEARING
• Clearing of vegetation should be limited to the approved footprint. • Optimise use of existing cutlines, roads and transformed areas as far as possible. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Control and management of alien invasive plants, such as *Opuntia ficus-indica* and *O. aurantiaca* and other weed species that may proliferate after clearing along the pipeline route and other disturbed areas. • Use flora relocation as a tool to rehabilitate degraded and transformed areas.
IMPACT 3: LOSS OF FLORA AND FAUNA SPECIES OF SPECIAL CONCERN DUE TO CLEARING
• Licence application to the Department of Forestry (of Department of Agriculture, Forestry & Fisheries) for the removal of *Sideroxylon inerme* trees. • Permits from DEDEAT for the relocation of PNCO protected species as well as Threatened or Protected Species (ToPS) to be obtained before commencement. • A flora and fauna search and rescue to be implemented before clearing commences with follow up during clearing into dense thicket areas. • Rehabilitation of disturbed areas with these species, especially cutlines.
IMPACT 4: FRAGMENTATION OF NATURAL HABITAT DUE TO CLEARING
• Clearing of vegetation should be limited to the approved footprint. • Optimise use of existing cutlines, roads and transformed areas as far as possible for pipeline. • Use flora relocation as a tool to rehabilitate degraded areas.
IMPACT 5: LOSS OF FAUNAL HABITAT DUE TO CLEARING
• Clearing of vegetation should be limited to the approved footprint. • Rehabilitation of disturbed areas, especially cutlines. • A fauna relocation before commencement must ensure that any less mobile faunal species can be moved to a safe area.
IMPACT 6: FRAGMENTATION OF NATURAL HABITAT

• Clearing of vegetation should be limited to the approved footprint. • Maintain the proposed 50m buffer adjacent to the western and southern boundaries to ensure connectivity between the ecological corridors on the farm. • Optimise use of existing cutlines, roads and transformed areas as far as possible. • Use flora relocation as a tool to rehabilitate degraded areas.
IMPACT 7: LOSS OF FAUNAL HABITAT
• Clearing of vegetation should be limited to the required footprint. • Rehabilitation of disturbed areas, especially cutlines, eroded slopes and other disturbed areas. • A fauna relocation before commencement must ensure that any less mobile faunal species can be moved to a safe area outside of the development footprint.
IMPACT 8: LOSS OF FLORA AND FAUNA SCC DUE TO POACHING / ILLEGAL HARVESTING
• Ongoing monitoring by the landowner should be undertaken periodically to prevent poaching and/or illegal harvesting.

6.12 FINDINGS, OUTCOMES AND RECOMMENDATIONS

6.12.1. Summary of Findings

- Very Low sensitivity areas include areas transformed by historical agriculture or hardened surfaces.
- Low sensitivity areas include all disturbed or secondary vegetation that may have been cleared but where there has been regeneration. This accounts for most of the pipeline route.
- Moderate sensitivity areas include intact vegetation not having an elevated conservation status, being significant habitat for high-risk species of conservation concern, or within areas required to meet conservation targets (i.e., CBA areas), which includes the intact thicket at the proposed new dam and a short section of pipeline to the west of this dam.
- High sensitivity areas include intact habitat having a high conservation status, providing critical habitat for species of conservation concern and or within important Critical Biodiversity Areas. **No such areas were identified**.
- Very High sensitivity areas include critical habitat and ecological process areas that are irreplaceable. **No such areas were identified**.
- No-go areas – no specific no-go areas have been identified that would be affected by the proposed layout. A 50m buffer area is recommended adjacent to the western and southern boundaries so as to maintain connectivity between the corridor areas proposed within the site.
- Cumulative impacts due to the limited footprint of the proposed activity, providing recommendation and mitigation measures are adhered to, cumulative impacts are deemed to be negligible.

6.12.2 Impact Statement

The proposed activities are not deemed to have any fatal flaws and the development is deemed to be feasible within acceptable impact limits, on condition that the recommended mitigation measures are implemented.

All impacts are Medium Negative and can be mitigated to Low with the implementation of the recommendations as well as the Biodiversity Management Plan provided in Appendix B.

6.12.3 Recommendations

Connectivity must be maintained along the watercourses and adjacent slopes, neither of which are suited to citrus orchards.

Ecological connectivity will be partly retained between the recommended ecological corridors and the surrounding undeveloped farms to the east, west and south; however, perimeter security fencing will restrict free movement of certain faunal groups (larger mammals and tortoises). Faunal movement between corridors on the east and west side of the farm portion will also be impeded by citrus orchards (existing and proposed). Recommended solutions would be to retain a vegetated strip (± 50 m wide) along the western and southern boundary.

No species of conservation concern having an Endangered, Critically Endangered or Vulnerable status were recorded during the preliminary site visit.

Faunal sensitive species 7, although potentially a transient visitor is unlikely to be present, as the fencing around the site would likely exclude free movement of this species.

Several flora species are present that are generally more widespread and not under threat but are protected in terms of the Provincial Nature Conservation Ordinance. Similarly, several protected faunal species are also likely present including tortoises and other reptiles. A flora and fauna search and rescue will enable these species to be identified and relocated before any vegetation clearing commences.

It is the conclusion of this terrestrial biodiversity assessment that the proposed clearing of vegetation for citrus orchards is unlikely to have any significant terrestrial biodiversity impact as long as connectivity issues are mitigated by retaining the natural vegetation as indicated in the proposed layout plans.

6.12.4 Management Programs

Table 6. 11 lists specific mitigation measures that must be implemented and adhered to. These must be conditions of authorisation and are a list of the minimum requirements that are provided for in the attached Biodiversity Management Plan.

Table 6. 11: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	• Blanket clearing of vegetation must be limited to the required footprint. No clearing outside of footprint to take place. • Topsoil generated during any trench construction must be stripped and stockpiled separately during site preparation and replaced on completion where revegetation will take place, if required. • Any topsoil generated during dam preparation that will not be required for the actual dam should be used in other areas where topsoil may be beneficial.

	• Vegetation that is removed during site preparation can potentially either be chipped or mulched or can also be used as a cover in degraded areas. Such stripped vegetation must not be dumped over adjacent intact vegetation. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas and away from watercourses.
Flora Species	• A pre-commencement flora search and rescue will be required. • PNCO protected species are present, and permits will be required for their removal and / or relocation. • A National Forests Act licence will be required for the Milkwood trees that are present (*Sideroxylon inerme*).
Alien Invasive Species	• Alien and weed species must be removed from the site as per CARA/ NEMBA requirements. • A suitable weed management strategy including aftercare to be implemented in construction and operation phases. • After clearing and construction is completed, an appropriate cover may be required in some areas, should natural re-establishment of grasses or other indigenous species not take place in a timely manner. This will also minimise dust and erosion.
Erosion	• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be revegetated, and a suitable cover crop planted once construction is completed. Dam walls can either be vegetated or compacted to prevent erosion from taking place. • Topsoil must be stripped and stockpiled separately and replaced on completion. Any surplus topsoil from other areas can be used on slopes, preferably using cleared vegetation as a cover to reduce erosion. • If natural vegetation re-establishment does not occur, a suitable grass must be applied.
Ecological Processes	• Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.
Aquatic and Riparian processes	• None are specific to Terrestrial Biodiversity. Refer to Aquatic Assessment (chapter seven).
Faunal Habitat	• Blanket clearing of vegetation must be limited to the required footprint. • It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
Faunal Processes	• The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. • Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area.

	They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species as a result of the activity. • Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on-call for such circumstances. • Should any amphibian migrations occur during construction, appropriate measures (including suspending works temporarily in the affected area) should be implemented.
Faunal Species	• A faunal search and rescue will be required including reptile species (such as tortoises). • PNCO and ToPS permits will be required for their removal and / or relocation. • No animals are to be intentionally harmed or killed during operations. • Workers are NOT allowed to snare any faunal species. • Implement a fine system.

6.12.5 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- Once the final layout has been determined the ECO/botanist will be consulted to finalise the flora relocation and vegetation clearing plan.
- Areas to be cleared of vegetation will be clearly demarcated before clearing commences.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Plants to be rescued should include both Species of Conservation Concern requiring removal for relocation as well as species that would be suitable for use in rehabilitation and that are amenable to transplanting.
- Areas should only be stripped of vegetation as and when required and once Species of Conservation Concern have been relocated from that area.
- Once site boundaries are demarcated, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- Depending on growth form this material should be appropriately removed from its locality and immediately relocated where it may be required elsewhere or into adjacent areas of similar habitat that will not be disturbed by construction.
- Small trees and shrubs (<1 m in height), where possible will be rescued and planted temporarily in potting bags for later use.

- Wherever possible, any seed-bearing material will be collected immediately and stored for later use, particularly species that occur in low numbers or those that will be well-suited for rehabilitation.
- Protected plant species will be removed from the site prior to development taking place. A suitable timeframe must be allowed before construction commences (1 month) to undertake the plant rescue and relocation operation. Search and Rescue is best undertaken during Spring/Summer.
- Should site construction occur in a phased manner, then clearing activities should take place also in a phased manner, ahead of construction work.
- Rescued plants will be replanted directly into a suitable adjacent area and will include some non-protected succulent species that will help support the protected species.
- Succulent and geophytic species can be temporarily stored for at least 2 weeks in a suitable shaded area before replanting. The contractor will be responsible for periodic watering of the replanted flora until they become acclimatised, and/or some rain occurs.

The following fauna relocation plan is recommended for inclusion in the EMP and Fauna removal permit applications:

- An on-foot search, conducted by a professional reptile handler/team, is to be carried out to search for reptiles within every possible habitat.
- Once caught, each reptile will be placed into transport containers suited for that individual reptile.
- The transport containers must be kept cool to decrease stress for the reptiles.
- The reptiles will be relocated as soon as possible after they have been caught.
- Professional equipment will be used to ensure limited harm to the reptiles and to prevent the team members from being bitten by venomous snakes.
- Nooses should not be used as they cause injury to lizards.
- Safety procedures will be in place for the release of the reptiles.
- Amphibians should be caught by hand and net.
- Amphibians must be placed into transport containers with damp substrates to avoid dehydration.
- Tadpoles may be collected, placed into water containers, and released as soon as possible, where required.
- During release, the tadpoles will be allowed to acclimatize to the new water in terms of temperature, pH etc.
- Small mammals will be caught with nets and by hand. They will then be transported in carry cages and released as soon as possible.
- No immobilizers or tranquilizers will be used on the mammals.

6.12.6 Rehabilitation Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- Along pipeline corridors, separately stockpiled topsoil and vegetation matter should be replaced once work is completed. It is likely that vegetation will rehabilitate without additional input within 2 years.

- If patches are found to not be rehabilitating on their own, the disturbed areas can be seeded with suitable grasses and/or local indigenous seed mix, if deemed to be required, however, vegetation is likely to re-establish itself without input if topsoil is replaced timeously.
- Excavations and trenches may not be used for the dumping of construction or other waste.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Final rehabilitation ***must*** comply with the requirements outlined in the Rehabilitation Plan.

6.12.7 Permitting and Licensing Requirements

The following permitting and/ or licensing requirements have been identified:

- A permit from the Department of Economic Development, Environmental Affairs and Tourism for the protected species in terms of the Provincial Nature Conservation Ordinance (PNCO, 19 of 1974) will be require before commencement.
- A protected Tree Licence from the Department of Forestry (of Department of Agriculture, Forestry & Fisheries) will be required for the destruction of *Sideroxylon inerme* trees.

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6.14 APPENDICES

6.14.1 Appendix A: Consultant Professional Registration, Profile and Declarations

Province of the EASTERN CAPE
ECONOMIC DEVELOPMENT, ENVIRONMENTAL AFFAIRS & TOURISM

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

Terrestrial Biodiversity Assessment for proposed Sontule Citrus expansion:

SPECIALIST	Mr Jamie Pote		
Contact person:	Mr Jamie Pote		
Postal address:	Postnet Suite 57, Private Bag X13130, Humewood		
Postal code:	6013	Cell:	
Telephone:		Fax:	-
E-mail:	jamiepote@live.co.za		
Professional affiliation(s) (if any)	SACNASP (115233), IAIAsa (5045)		

Project Consultant:	Public Process Consultants		
Contact person:	Ms Sandy Wren		
Postal address:	PO Box 27688, Greenacres		
Postal code:	6057	Cell:	
Telephone:	041 374 8426	Fax:	
E-mail:	sandy@publicprocess.co.za		

Version 2 January 15 2021

4.2 THE SPECIALIST

I, **Mr Jamie Pote** , declare that –

General declaration:

- I act as the independent Specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist assessment, including knowledge of the applicable Acts, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation **8** of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of **Vested Interest** **(delete whichever is not applicable)**

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended my appointment.
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~

____

____

Signature of the specialist:

N/A

Name of company:

31/05/2022

Date:

C8
E. Ifect
7215350-7

Signature of the Commissioner of Oaths:

2022-05-31

Date:

Humewood SAPS- 1-4 69-Place South End

Designation:

Official stamp (below).

SUID-AFRIKAANSE POLISIEDIENS
2022 -05- 31
SOUTH AFRICAN POLICE SERVICE

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Jamie Robert Claude Pote

Registration Number: 115233

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **20 July 2016** Expires **31 March 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

Jamie Pote

BIODIVERSITY ADVISOR, ECOLOGIST AND ENVIRONMENTAL SCIENTIST

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Bluesky-SA

ABOUT ME

18 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 250 projects in southern, western and central Africa. Environmental Assessment Practitioner on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. Advanced GIS mapping tools and Analysis.

EDUCATION

Bachelor of Science
Rhodes University
2002 (Botany & Environmental Science)

Bachelor of Science (Honours)
Rhodes University
2003 (Botany)

Professional Natural Scientist
SACNASP: 2016 (Ecological Science)

SERVICES

Terrestrial Biodiversity Specialist Assessments
IFC PS6 Biodiversity & Critical Habitat Assessments
Terrestrial Biodiversity Compliance Statements
Geographic Information Systems
Environmental Management Plans & Programmes
Environmental Compliance & Monitoring
Independent Environmental & Ecological reviews
Bioremediation, Restoration & Rehabilitation Plans
Permit and License applications (Flora & Fauna)
Flora Search & Rescue Plans & Relocations
Invasive Alien Plant Control & Management Plans
Environmental & Mining Applications

EXPERIENCE AND CLIENTS

Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

Key Projects

- *Over 250 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Basic Assessments, Mining applications and compliance monitoring on over 50 projects for various clients including the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape, including over 300 individual borrow pits.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Pre-Construction compliance.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing clients.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*

24/03/2021

Name	JAMIE ROBERT CLAUDE POTE
ID Number	740515 5152 089
Profession	Registered Ecological Scientist
Nationality	South African
Membership to Professional Societies	The South African Council for Natural Scientific Professions (SACNASP): Pr. Sci. Nat.: 115233 International Association for Impact Assessment South Africa (IAIAsa Member Number 5045)

KEY QUALIFICATIONS

Jamie Pote has a Bachelors Degree in (Honours) in Botany and Environmental Science and a Bachelors Degree with Honours in Botany and is a registered Ecological Scientist and Environmental Scientist (Pr.Sci.Nat.). He has 16 years extensive professional experience in a wide range of Botanical and Ecological Specialist Assessments in South Africa (Eastern, Western & Northern Cape, Gauteng and Limpopo), Sub-Saharan and Central Africa (Namibia, Mozambique, Democratic Republic of Congo, Republic of Congo and Ghana) in the Infrastructure (including Wind Energy Facilities), Mining and Development Sectors. He also has experience in conducting Environmental Impact Assessment, Section 24 G, and Mining Permit (Borrow Pit) EMP applications, as well as developing GIS and other tools for Environmental related work. Jamie is furthermore familiar with and has been part of professional teams conducting Environmental Impact Assessment (EIA) and Environmental and Social Impacts Assessment (ESIA) in Sub-Saharan Africa, as well as being familiar with the International Finance Corporation's Performance Standards on Social & Environmental Sustainability including but not limited to IFC PS 6 (Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management).

He has broad ecological experience in a wide range of habitats and ecosystems in Southern, West and Central Africa and has been involved in all stages of project development from inception, through planning and environmental application and authorization (BAR and EMP) to implementation and compliance monitoring (ECO auditing) as an ecologist and as an Environmental Assessment Practitioner. Jamie has a well-deserved reputation for providing quality professional services. His strategy incorporates using proven methodologies with a highly responsive approach to sound environmental management, including developing adaptive methodologies and approaches with available technologies. He is highly capable of working within a team of qualified professionals or in an individual capacity.

EDUCATION

BSc	Rhodes University (Botany and Environmental Science)	2001
BSc (Hons)	Rhodes University (Botany)	2002

EMPLOYMENT RECORD

2003 – 2014	Self Employed Consultant	Specialist Environmental Consultant (Ecology)
2014 -2020 (May)	Engineering Advice & Services	Environmental Unit Manager
2020 – Present	Self Employed Consultant	Biodiversity Consultant

LANGUAGES

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Afrikaans	Good	Excellent	Excellent

PROJECT EXPERIENCE

INFRASTRUCTURE DEVELOPMENT PROJECTS

- Botanical Assessment for PE Airport Extention in NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant in BCM, Eastern Cape 2006
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course in

WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE PROJECTS

- Botanical Assessment for Electrawinds Windfarm Coega in NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream Windfarm Phase 2 in Eastern Cape 2010
- Ecological Assessment for Inca Energy Windfarm in Northern Cape 2011
- Ecological Assessment for Universal Windfarm in NMB 2011
- Ecological Assessment for Broadlands Photovoltaic Farm in the Eastern Cape 2011
- Ecological Assessment for Windcurrent Wind Farm in Eastern Cape 2012

MINING PROJECTS

- Biophysical Assessment for Humansdorp Quarry in Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East in Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry in NMB 2006
- GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers in Eastern Cape 2006
- Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter in Limpopo 2006
- Application for Mining Permit for Bruce Howarth Quarry in Eastern Cape 2006
- Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine in Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay in Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT in Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit – Jeffreys Bay in Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms river/Kareedouw in Eastern Cape 2007
- Botanical Assessment for Zwartenbosch Quarry in Eastern Cape 2008
- Botanical description & map production for Quarry - Rudman Quarry in Eastern Cape 2008
- Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie in Eastern Cape 2008
- Botanical Assessment & Maps for Sandman Sand Gravel Mine in Eastern Cape 2008
- Botanical Assessment & GIS maps for Shamwari Borrow Pit in Eastern Cape 2008
- Detailed Botanical Assessment, EMP and Rehab Plan for Kalakundi Copper/Cobalt Mine in Democratic Republic of Congo 2008
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Cala in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe in Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route in Eastern Cape 2008
- Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart in Eastern Cape 2008
- Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting in Eastern Cape 2008
- Regional Botanical Map for mining prospecting permit for Welkom Regional mapping in 2008
- Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining in Ghana 2010
- Ecological Assessment for Bochum Borrow Pits in Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project in Limpopo (3 proposed Mines) 2013
- Ecological Assessment for Thulwe Road Borrow Pits in Limpopo 2013

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014

	BCM, Eastern Cape	2007
▪	Botanical Assessment for Radar Mast construction for SAWS - BCM and NMB	2008
▪	Botanical Assessment for Jansenville Cemetery in Eastern Cape	2009
▪	Botanical Assessment for Kouga Dam wall upgrade in Eastern Cape	2012
▪	Botanical Assessment for Zachtevlei Dam (Lady Grey)	2017
▪	Botanical Assessment for Gcebula River bridge (Peddie)	2017
▪	Ecological Assessment for Amalinda crossing, Buffalo City	2019
▪	Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation	2019
▪	Ecological Assessment for Nelson Mandela University Access Road, NMB	2019
▪	Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

▪	Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
▪	Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
▪	Basic Assessment Application for Hankey Housing, Kouga District Municipality	2015
▪	Basic Assessment Application for Erf 14 Kabega, NMBM	2017
▪	Basic Assessment Application for Hankey Housing, Kouga District Municipality	2017
▪	Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay	2017
▪	Basic Assessment Application for South-End Precinct Mixed Use Development, NMB 2018	
▪	Basic Assessment Application for Nelson Mandela University Access Road, NMB	2019
▪	Basic Assessment Application for Erf 599 Walmer Mixed Use Development, NMB	2019
▪	Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation	2019
▪	Basic Assessment Application for Parsonsvlei Erf 984 & 1134 Parsonsvlei	2020
▪	Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020
▪	Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development	2020
▪	Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10	2020

ENVIRONMENTAL SCREENING PROJECTS

▪	Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)	2015
▪	Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth	2015
▪	Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe	2015
▪	Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth	2015
▪	Environmental Screening Report for Housing Scheme Development of Erf 8709, Wells Estate	2015
▪	Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB	2015
▪	Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB	2016
▪	Environmental Screening Report for Development of Little Chelsea No 25, NMB	2016
▪	Environmental Screening Report for Housing Development of Erf 8700, Kabega Park, NMB	2017
▪	Environmental Screening Report for Housing Development of Erf 14, Kabega Park, NMB	2017
▪	Environmental Screening Report for proposed Khayalethu School, Buffalo City	2018
▪	Environmental Screening Report for Proposed Life Hospital parking expansion, NMB	2019
▪	Environmental Screening Report for Erf 984 & 1134 development, Parsonsvlei, NMB	2019

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

▪	Ecological Assessment for Road Layout for Whiskey Creek- Kenton in Eastern Cape	2006
▪	Botanical Assessment for Manganese Conveyor Screening Report in NMB	2008
▪	Botanical Basic Assessment for Bholani Village Rd, Port St Johns in Eastern Cape	2009
▪	Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade in NMB	2009
▪	Botanical Assessment for Chelsea RD - Walker Drive Ext. in NMB	2010
▪	Botanical Assessment for Motherwell - Blue Water Bay Road in NMB	2010
▪	Ecological Assessment for Port St John Road in Eastern Cape	2010
▪	Ecological Assessment Review for Penhoek Road widening in Eastern Cape	2012
▪	Ecological Assessment for R61 road widening in Eastern Cape	2012
▪	Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line	2013

Farm (km 42.2) to N10 (km 85.0) (SANRAL)	2016
▪ Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour	2016
▪ ECO for SANRAL RRP Road Maintenance projects in Mbashe LM	2016
▪ ECO for SANRAL RRP Road Maintenance projects in Nkonkobe LM	2016
▪ ECO for SANRAL RRP Road Maintenance projects in Mbizana LM	2016
▪ ECO for SANRAL RRP Road Maintenance projects in Senqu LM	2016
▪ ECO for SANRAL RRP Road Maintenance projects in Elundini LM	2016
▪ ECO and Environmental Management for closure of Bushmans River Landfill site	2016
▪ ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2017
▪ ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
▪ DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts	2017
▪ ECO for SANRAL RRP Road Maintenance projects in Mbizana LM	2017
▪ ECO for DRPW IRM Road Maintenance projects in Raymond Mahlaba LM	2018
▪ ECO for DRPW IRM Road Maintenance projects in Inkwanca (Enoch Mgijima) LM	2018
▪ ECO for DRPW IRM Road Maintenance projects in Baviaans LM	2019
▪ ECO for DRPW IRM Road Maintenance projects in Senqu LM	2019
▪ ECO for DRPW IRM Road Maintenance projects in Kouga/Koukamma LM	2019
▪ ECO for DRPW IRM Road Maintenance projects in Sakhisizwe/Engcobo LM	2019
▪ ECO for DRPW IRM Road Maintenance projects in Elundini LM	2019
▪ ECO for DRPW IRM Road Maintenance projects in Emalahleni/Intsika Yethu LM	2019
▪ ECO for Construction of Fairwest Village Housing Project	2019
▪ ECO for Construction of Utopia Estate	2019
▪ ECO for Construction of NMU West End Student Residences Phases 1 & 3	2019

SPECIALISED ECOLOGICAL REPORTS

▪ Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif in Northern Cape	2006
▪ Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER in Eastern Cape	2003
▪ Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation in Eastern Cape	2007
▪ Botanical Sensitivity Analysis for LSDP, Greenbushes-Hunters Retreat in NMB	2008
▪ Representative for landowner group for Seaview burial Park in NMB	2010
▪ Mapping of pipeline for Kenton Water Board in Eastern Cape	2010
▪ Rehabilitation Plan for N2 Upgrade - Coega to Colchester in NMB	2010
▪ Rehabilitation Plan for Nieu Bethesda in Eastern Cape	2011
▪ Mapping and Ecological services for Congo Agriculture in Republic of Congo	2013
▪ Section 24G Assessment and Rehabilitation Plan for Bingo Farm in Eastern Cape	2014
▪ Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM	2015
▪ Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

▪ Flora Relocation for Disco Poultry Farm in NMB	2010
▪ Flora Relocation for Mainstream Windfarm in Eastern Cape	2010
▪ Flora Search and Rescue Plan for Red Cap Wind Farm in Eastern Cape	2012
▪ Flora and Fauna Search and Rescue for Mainstream Windfarm in Eastern Cape	2013
▪ Flora Search and Rescue for Steytlerville Bulk Water Supply in Eastern Cape (Phase 1, 2 & 3)	2013
▪ Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ in NMB	2013
▪ Flora and Fauna Search and Rescue for Jeffreys Bay School in Eastern Cape	2013
▪ Flora and Fauna Search and Rescue for Riversbend Citrus Farm in NMB	2014
▪ Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW in Eastern Cape (Phase 4)	2015
▪ Flora Search and Rescue for Steytlerville Bulk Water Supply in Eastern Cape (Phase 5)	2016
▪ Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2016
▪ Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
▪ Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape	

▪ Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW)	2014
▪ Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW)	2014
▪ Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW)	2014
▪ Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 – Matatiele (DRPW)	
▪ Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW)	2015
▪ Mining BAR/EMP's for Chris Hani DM Borrow Pits – Intsika Yethu and Emalahleni (DRPW)	2015
▪ Mining BAR/EMP's for Joe Gqabi DM Borrow Pits – Senqu (DRPW)	2015
▪ Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits – Sarah Baartman (DRPW)	2015
▪ Mining BAR/EMP's for Amahlathi LM Borrow Pits – Amatole (DRPW)	2015
▪ Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits – Amatole (DRPW)	2015
▪ Mining BAR/EMP's for Sundays River Valley LM Borrow Pits – Sarah Baartman (DRPW)	2015
▪ Mining BAR/EMP's for Kouga LM Borrow Pits – Sarah Baartman (DRPW)	2015
▪ Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)	2016
▪ Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)	2016
▪ Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW)	2016
▪ Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)	2017
▪ Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)	2017
▪ Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL)	2018
▪ Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)	2019

SECTION 24G APPLICATIONS

▪ 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)	2015
▪ Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape	2015

ENVIRONMENTAL MANAGEMENT, ENVIRONMENTAL CONTROL OFFICER, AUDITING AND MONITORING PROJECTS

▪ Flora Relocation Plan and Permit application for Wildemans Plaas, in NMB	2006
▪ EMP submission and ECO for Seaview Garden Estate in NMB	2010
▪ EMP and ECO for Sinati Golf Estate EMP in BCM, Eastern Cape	2009
▪ ECO audits for NMB Road surfacing in NMB (multiple contacts)	2011
▪ ECO for Mainstream Windfarm wind monitoring mast installation in Eastern Cape	2010
▪ Final EMP submission for Seaview Garden Estate in NMB	2012
▪ EMP and ECO for Utopia Estate in NMB	2013
▪ ECO for Riversbend Citrus Farm in NMB	2014
▪ ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073 in Eastern Cape - MSBA	2014
▪ ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba	2014
▪ ECO for DRPW IRM Road Maintenance projects in Amahlathi Municipality	2015
▪ ECO for DRPW IRM Road Maintenance projects in Makana/Ndlambe Municipality	2015
▪ ECO for DRPW IRM Road Maintenance projects in Mbashe/Mqume Municipality	2015
▪ ECO for DRPW IRM Road Maintenance projects in Port St Johns, Mbizana, Ingquza Hill LMs	2015
▪ ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus	

2018

- Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape 2018
- Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape 2019

ENVIRONMENTAL MANAGEMENT PLANS

- Floral Survey for Mbotyi Conservation Assessment in Eastern Cape 2005
- Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve in Eastern Cape 2005
- Biodiversity & Ecological Processes for Bathurst-Commonage in Eastern Cape 2006
- EMP for Kromensee EMP (Jeffries Bay) in Eastern Cape 2006
- Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA in Western Cape 2009
- Basic Botanical Assessment for Kromensee EMP (Jeffries Bay) in Eastern Cape 2010
- Wetland Management Plan for NMB Portnet in NMB 2010

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Botanical Assessment for Kenton Petrol Station in Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester - Petrol Station in NMB 2005
- Ecological Assessment for Bay West City 2007
- Botanical Assessment for Bluewater Bay Erf 805 in NMB 2009
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ in NMB 2010
- Ecological Assessment for OTGC Tank Farm in NMB 2012
- Ecological Assessment for Green Star grading for SANRAL in NMB 2014
- Ecological Assessment for Bay West City ENGEN Service Station 2015
- Ecological Assessment for Parsonsvlei Erf 984 & 1134 Parsonsvlei 2020
- Ecological Assessment for Walmer Erf 11667 Bidfood Warehousing Development 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10 2020

HOUSING DEVELOPMENT PROJECTS

- Botanical Assessment for Bridgemead – Malabar PE in NMB 2004
- Botanical Basic Assessment for Trailees Wetland Assessment in Eastern Cape 2005
- Botanical Assessment and Rehab Plan for Arlington Racecourse - PE in NMB 2005
- Botanical Assessment for Smart Stone in NMB 2005
- Botanical Assessment for Peninsular Farm (Port Alfred) in Eastern Cape 2005
- Botanical Assessment for Mount Pleasant - Bathurst in Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside) in NMB 2005
- Basic Botanical Assessment for Parsonsvlei 3/4 in Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/9 in BCM, Eastern Cape 2006
- Botanical Assessment for Glengariff Farm 723 in BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/10 in BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/4 & 5 in BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg bay - Ladywood 438/1&3 in Western Cape 2006
- Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant in BCM 2006
- Botanical Assessment for Bosch Hoogte in NMB 2006
- Botanical Assessment for Plettenberg bay Farm 444/38 in Western Cape 2006
- Botanical Assessment for Plettenberg Bay - 444/27 in Western Cape 2006
- Botanical Assessment for Leisure Homes in BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg Bay - 438/24 in Western Cape 2007
- Botanical Assessment for Plettenberg Bay - Olive Hills 438/7 in Western Cape 2007
- Vegetation Assessment for Kwanokuthula RDP housing project in Western Cape 2008
- Site screening assessment for Greenbushes Site screening in NMB 2008
- Botanical Assessment for Fairfax development in Eastern Cape 2008
- Botanical Assessment for Plettenberg Bay Brakkloof 50&51 in Western Cape 2008

- Botanical Assessment, GIS mapping for Theescombe Erf 325 in NMB 2008
- Site Screening for Mount Road in NMB 2008
- Botanical Assessment for Greenbushes Farm 40 Swinburne 404 in NMB 2008
- Botanical Assessment for Greenbushes 130 in NMB 2008
- Botanical Assessment for Greenbushes Kuyga no. 10 in NMB 2008
- Botanical Assessment for Kouga RDP Housing in Eastern Cape 2009
- Botanical Assessment for Fairview Erf 1226 (Wonderwonings) in NMB 2009
- Species List Compilation for Zeeloeirivier Humansdorp in Eastern Cape 2009
- Botanical Assessment for Woodlands Golf Estate (Farm 858) in BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay - 438/4 in Western Cape 2009
- Botanical Assessment for The Crags 288/03 in Western Cape 2010
- Revision of Ecological Assessment for Fairview Housing - revision in NMB 2010
- Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development in Western Cape 2010
- Botanical Assessment for Little Ladywood in Western Cape 2010
- Botanical Assessment and Open Space Management Plan for Motherwell NU31 in NMB 2010
- Botanical Assessment and Open Space Management Plan for Plett 443/07 in Western Cape 2010
- Botanical Assessment for Willow Tree Farm in NMB 2010
- Flora Search and Rescue Plan for Kwanobuhle Housing in Western Cape 2011
- Ecological Assessment for Ethembeni Housing in NMB 2012
- Ecological Assessment for Pelana Housing in Limpopo 2012
- Ecological Assessment for Lebowakgoma Housing in Limpopo 2013
- Ecological Assessment for Giyani Development in Limpopo 2013
- Ecological Assessment for Palmietfontein Development in Limpopo 2013
- Ecological Assessment for Seshego Development in Limpopo 2013
- Botanical Assessment for Sheerness Road in BCM, Eastern Cape 2013
- Ecological Assessment for Hankey Housing, Kouga District Municipality 2015
- Ecological Assessment for erf 14, Kabega, Port Elizabeth 2017
- Ecological Assessment for Fairwest Rental Housing, Port Elizabeth 2017
- Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019

POWERLINE INFRASTRUCTURE PROJECTS

- Botanical Assessment for Steynsburg - Teebus 132 kV powerline in Eastern Cape 2004
- Botanical Assessment for Eskom132kV Dedisa Grassridge Power line-Coega in NMB 2006
- Botanical Assessment for Eskom Power line – Tyalara-Wilo in Eastern Cape 2006
- Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline in NMB 2009
- Botanical Assessment for Eskom Powerline - Albany-Kowie in Eastern Cape 2009
- Botanical Assessment for Dedisa-Grassridge Powerline in Eastern Cape 2010
- Ecological Assessment for Grahamstown-Kowie Powerline in Eastern Cape 2010
- Ecological Assessment for Dieprivier Karreedouw 132kV Powerline in Eastern Cape 2012
- Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline in NMB 2012
- Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab in Eastern Cape 2013
- Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline 2015
- Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment in Kouga LM 2016
- Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline in Kouga LM 2016

PIPELINE INFRASTRUCTURE PROJECTS

- Detailed Botanical Assessment for Port Alfred water pipeline in Eastern Cape 2004
- Botanical & Floristic Report for Hankey pipeline in Eastern Cape 2006
- Environmental Risk Assessment for Elands River pipeline in Eastern Cape 2007
- Detailed Botanical Assessment for Motherwell Pipeline in NMB 2007
- Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline in Eastern Cape 2007
- Map Production for Russell Rd Stormwater in NMB 2008
- Basic Botanical Assessment for Albany Pipeline in Eastern Cape 2008
- Species of Special Concern Mapping for Seaview Pipeline in NMB 2009

- Botanical Assessment - Housing development for Coega Ridge in NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate in NMB, 2008
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills in Western Cape 2010
- Botanical Assessment and EMP for Zwartenbosch Road in Eastern Cape 2010
- Botanical Re-Assessment of Swanlake Eco Estate in Aston Bay, Eastern Cape 2018

GIS AND IT DEVELOPMENT

- Development of GIS databases and mapping tools for Manifold GIS software 2008
- Landsat Image classification and analysis (Congo Agriculture) 2010
- Development of *iAuditor* Environmental Audit templates (DRPW audits) 2014

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. Fuelwood harvesting and selection in Valley Thicket, South Africa. Journal of Arid Environments, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. The homegarden cultivation of indigenous medicinal plants in the Eastern Cape. Indigenous Plant Use Forum, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch, South Africa.

RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr. C. Geldenhuis & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

- Species of Special Concern Mapping for Chelsea Bulk Water Pipeline in NMB 2009
- Basic Botanical Assessment for Wanhoop farm pipeline in Eastern Cape 2010
- Basic Botanical Assessment for Chatty Sewer in NMB 2010
- Detailed Ecological Assessment for Suikerbos Pipeline in Gauteng 2012
- Ecological Assessment for Steytlerville Bulk Water Supply in Eastern Cape (Phase 4) 2013
- Ecological Assessment for Steytlerville Bulk Water Supply in Eastern Cape (Phase 5) 2013
- Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply in Eastern Cape 2016
- Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme 2017
- Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey) 2017
- Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3) 2018

AGRICULTURAL PROJECTS

- Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, in NMB 2006
- Botanical Assessment and Open Space Management Plan for Kudukloof in NMB 2010
- Botanical Assessment and Open Space Management Plan for Landros Veeplaats in NMB 2010
- Ecological Assessment for Tzaneen Chicken Farm in Limpopo 2013
- Ecological Assessment for Doornkraal Pivot (Hankey) in Eastern Cape 2014
- Ecological Assessment for Citrus expansion on Farm 960, Patensie 2014
- Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

- Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort in Eastern Cape 2006
- Botanical Assessment for Rockcliff Resort Development in BCM, Eastern Cape 2007
- Botanical Assessment for Rockcliff Golf Course in BCM, Eastern Cape 2008
- Species List& Comments Report for Kidds Beach Golf Course in BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay -Farm 288/03 in Western Cape 2009

MIXED USE DEVELOPMENT PROJECTS

- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park in NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park in NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage in NMB 2007
- Botanical Assessment and GIS maps for Utopia Estate PE in NMB 2008
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082 in NMB 2009
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City in NMB 2010
- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Assessment for Rosehill Farm in Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm in Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11 in BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075 in BCM, Eastern Cape 2005
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate in NMB 2006
- Botanical Assessment for Kidd's Beach portion 1076 in BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London in BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082 in BCM, Eastern Cape 2006
- Botanical Assessment for Roydon Game farm, Queenstown in Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008) in BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820 in BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma in Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development in Eastern Cape 2007
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191 in NMB 2008

6.14.2 Appendix B: Biodiversity Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Biodiversity Management Plan contains guidelines, operating procedures, and rehabilitation control requirements, which are specific to managing Biodiversity related impacts and should be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in the report will be managed / controlled as set out under mitigating measures and as detailed in this section for the more significant impacts during the operational phase.

Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern ***must*** be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved must be left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation ***should*** be temporarily stored during operations and can be used later to stabilise slopes, if necessary. This excludes exotic invasive species.
- No animals are to be harmed or killed during operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and ***must*** not be disturbed, upset, or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heating as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operational phase may be felled or cleared but only by the expressed written permission of the ECO and in the case of protected trees with an applicable license from DFFE.
- Rehabilitation of vegetation of the site ***must*** be done as described in the Rehabilitation Plans.

Flora Search and Rescue

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of special concern have been relocated for that area.
- Prior to site clearing, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a nearby protected area.

Fauna Search and Rescue

The following fauna relocation plan is recommended for inclusion in the EMP and Fauna removal permit applications:

- An on-foot search, conducted by a professional reptile handler/team, is to be carried out to search for reptiles within every possible habitat.
- Once caught, each reptile will be placed into transport containers suited for that individual reptile.
- The transport containers must be kept cool to decrease stress for the reptiles.
- The reptiles will be relocated as soon as possible after they have been caught.
- Professional equipment will be used to ensure limited harm to the reptiles and to prevent the team members from being bitten by venomous snakes.
- Nooses should not be used as they cause injury to lizards.
- Safety procedures will be in place for the release of the reptiles.
- Amphibians should be caught by hand and net.
- Amphibians must be placed into transport containers with damp substrates to avoid dehydration.
- Tadpoles may be collected, placed into water containers, and released as soon as possible, where required.
- During release, the tadpoles will be allowed to acclimatize to the new water in terms of temperature, pH etc.
- Small mammals will be caught with nets and by hand. They will then be transported in carry cages and released as soon as possible.
- No immobilizers or tranquilizers will be used on the mammals.

Alien and Invasive Plan Management Plan

The following mitigation measures have been identified to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species ***must*** be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.

- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses or indigenous ground cover not take place in a timely manner.

Fires

- The Contractor must ensure that an emergency preparedness plan is in place to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers *should* also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor *must* strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making *must* be strictly prohibited.
- The Contractor *should* take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor *must* ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor *must* supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores, and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and "hot work" *must* be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area *must* be away from flammable stores. All events must be under management's supervision and a fire extinguisher *will* be immediately available. "Low-smoke" fuels must be used (e.g., charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor *must* take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested, and approved fire extinguisher immediately at hand and the use of welding curtains.

Soil Aspects

- Topsoil shall be removed from the dam and pipeline areas where physical disturbance of the surface will occur
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

Dust

- To manage complaints relation to impacts on the nearby communities, a complaints register *will* be developed.
- If required, water spray vehicles *will* be used to control dust caused by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens *should* be used to reduce wind and dust in open areas.

Infrastructural Requirements

Topsoil

- Topsoil shall be removed from the dam and pipeline areas where physical disturbance of the surface will occur.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

Stormwater and Erosion Control

Stormwater Management Plans ***must*** be developed for the site and should include the following:

- The management of stormwater during construction.
- The installation of stormwater and erosion control infrastructure.
- The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater ***must*** be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes ***should*** be profiled at a maximum 1:3 gradient.
- Diversion channels ***should*** be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation ***must*** be retained as far as possible to minimise erosion problems.
- It is important that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections ***will*** be done on a regular basis about the stability of water control structure, erosion, and siltation.
- Sediment-laden runoff from cleared areas ***must*** be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

Construction Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.

- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity.

Excavations

- Whenever any excavation is undertaken, the following procedures shall be adhered to:
- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area may serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix to propagate the locally occurring flora.

Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This ***shall*** be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This ***must*** be done in conjunction with the ECO.
- Final rehabilitation ***must*** comply with the requirements mentioned in the Rehabilitation Plan.

Rehabilitation Plan

Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and

environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant, and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble, and tyres, will be removed entirely from the site, and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contract to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable, however it can be modified using locally available seed, in consultation with the ECO.

BOTANICAL NAME	COMMON NAME	APPROX SEED MIXTURE /HA
Cynodon dactylon	Kweek	12 kg/ Ha
Eragrostis curvula	Weeping Love Grass	6 kg/ Ha
Eragrostis tef	Teff	2 kg/ Ha
Digitaria eriantha	Smuts Grass	4 kg/ Ha
Other indigenous veld grasses can be added to the seed mix		± 4 kg/Ha

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site.
- Stabilise disturbed soil and rock faces.
- Minimize surface erosion and consequent siltation of natural water course located on site.
- Control wind-blown dust problems
- Enhance the physical properties of the soil.

- Re-establish nutrient cycling.
- Re-establish a stable ecological system.
- Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e., conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation.
- Existing vegetation will be retained as far as possible to minimize erosion problems.

Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas.

Monitoring and Reporting

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

Extent of alignment to pre-construction environment

Rehabilitation of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling, and rehabilitating all prepared surfaces.

6.14.3 Appendix C: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

SCOPE

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation* (GN 320, 20 March 2020)) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation16.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (https://screening.environment.gov.za/screeningtool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute17.

SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- a desk top analysis, using satellite imagery,
- a preliminary on-site inspection; and
- any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

[16] The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

[17] The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on ther screening tool).

- confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
- contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and
- is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	**REPORT**
1	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "*very high sensitivity*" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being ***'low sensitivity'*** for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.	X
1.3	However, where the information gathered from the site sensitivity verification differs from the designation of ***'very high'*** terrestrial biodiversity sensitivity on the screening tool and it is found to be of a '***low***' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.	✓
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a ***'low'*** terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.	X
1.5	If any part of the proposed development footprint falls within an area of ***'very high'*** sensitivity, the assessment and reporting requirements prescribed for the ***'very high'*** sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any are that will be disturbed.	✓
	VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features	

2	**Terrestrial Biodiversity Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	✓
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	✓
2.3.1	a description of the ecological drivers or processes of the system and how the proposed development with impact these;	✓
2.3.2	ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	✓
2.3.3	the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	✓
2.3.4	the description of any significant terrestrial landscape features (*including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);*	✓
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	✓
(a)	main vegetation types;	✓
(b)	threatened ecosystems, including nested ecosystems as well as locally important habitat types identified;	✓
(c)	ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and	✓
(d)	species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	✓
2.3.6	the assessment must identify any alternative development footprints within the preferred site which would be of '*low*' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	✓
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
2.3.7.1	**terrestrial critical biodiversity areas** (CBAs), including:	✓
(a)	the reasons why an area has been identified as a CBA;	✓
(b)	an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;	✓

(c)	the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);	✓
(d)	the impact on ecosystem threat status;	✓
(e)	the impact on explicit subtypes in the vegetation;	✓
(f)	the impact on overall species and ecosystem diversity of the site; and	✓
(g)	the impact on any changes to threat status of populations of species of conservation concern in the CBA;	✓
2.3.7.2	**terrestrial ecological support areas** (ESAs), including:	✓
(a)	the impact on the ecological processes that operate within or across the site;	✓
(b)	the extent the proposed development will impact on the functionality of the ESA; and	✓
(c)	loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration | and movement of flora and fauna;	✓
2.3.7.3	**protected areas** as defined by the National Environmental Management: Protected Areas Act, 2004 including	✓
(a)	an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	✓
2.3.7.4	**priority areas for protected area expansion**, including-	✓
(a)	the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network;	✓
2.3.7.5	***Strategic Water Source Areas (SWSAs)*** including:	✓
(a)	the impact(s) on the terrestrial habitat of SWSA; and	✓
(b)	the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses),	✓
2.3.7.6	**FEPA sub catchments**, including-	✓
(a)	the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;	✓
2.3.7.7	**indigenous forests**, including:	✓
(a)	impact on the ecological integrity of the forest and	✓

(b)	percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	✓
2.4	The findings of the assessment must be written up in a **Terrestrial Biodiversity Specialist Assessment Report**	✓
3	**Terrestrial Biodiversity Specialist Assessment Report**	✓
3.1	The **Terrestrial Biodiversity Specialist Assessment Report** must contain, as a minimum, the following information:	✓
3.1.1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	✓
3.1.2	a signed statement of independence by the specialist;	✓
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,	✓
3.1.4	description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;	✓
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	✓
3.1.6	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	✓
3.1.7	additional environmental impacts expected from the proposed development;	✓
3.1.8	any direct, indirect, and cumulative impacts of the proposed development;	✓
3.1.9	the degree to which impacts, and risks can be mitigated;	✓
3.1.10	the degree to which the impacts and risks can be reversed;	✓
3.1.11	the degree to which the impacts and risks can cause loss of irreplaceable resources;	✓
3.1.12	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),	✓
3.1.13	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate,	✓
3.1.14	a substantiated statement based on the findings of the specialist assessment, regarding the acceptability, or not. of the proposed development if it should receive approval a not; and	✓

3.1.15	any conditions to which this statement is subjected.	✓
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	✓

ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

	ASSESSMENT AND REPORTING OF IMPACTS ON ANIMAL SPECIES	**REPORT REFERENCE**
1	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "*very high*" or "*high*" sensitivity for terrestrial animal species must submit a **Terrestrial Animal Species Specialist Assessment Report**.	
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "*medium sensitivity*" for terrestrial animal species must submit **either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "*low*" sensitivity for terrestrial animal species must submit a **Terrestrial Animal Species Compliance Statement.**	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of "*very high*" or "*high*", for terrestrial animal species sensitivity and it is found to be of a "*low*" sensitivity, then a **Terrestrial Animal Species Compliance Statement** must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of "*low*" terrestrial animal species sensitivity and it is found to be of a "*very high*" or "*high*" terrestrial animal species sensitivity, a **Terrestrial Animal Species Specialist Assessment** must be conducted.	X
1.6	If any part of the development falls within an area of confirmed "*very high*" or "*high*" sensitivity, the assessment and reporting requirements prescribed for the "*very high*" or "*high*" sensitivity, apply to the entire development footprint. Development footprint in the context of this	X

	protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	
1.7	The **Terrestrial Animal Species Specialist Assessment** and the **Terrestrial Animal Species Compliance Statement** must be undertaken within the *study area*.	✓
1.8	Where the nature of the activity **is not** expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity **is** expected to have an impact on SCC beyond the boundary of the preferred site, the *project areas of influence* (PAOI) must be determined by the specialist in accordance with *Species Environmental Assessment Guideline18*, and the study area must include the PAOI, as determined.	✓
	MEDIUM SENSITIVITY RATING – for terrestrial animal species: • Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species19. • SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the *Species Environmental Assessment Guidelines.*	✓
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as "*medium*" sensitivity by the screening tool.	✓

[18] Available at https://bgis.sanbi.org/

[19] The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

4.6	Where SCC are found on site or have been confirmed to be likely present, a **Terrestrial Animal Species Specialist Assessment** must be submitted in accordance with the requirements specified for "*very high*" and "*high*" sensitivity in this protocol.	X
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a **Terrestrial Animal Species Compliance Statement** must be submitted.	✓
5	**LOW SENSITIVITY RATING – for terrestrial animal species**	
	Terrestrial Animal Species Compliance Statement • Areas where no natural habitat remains. • Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of "*low*" sensitivity for terrestrial animal species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement20 must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓
5.3.5	the mean density of observations/ number of samples sites per unit area[15].	✓

[20] An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

5.3.6	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.7	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the **Terrestrial Animal Species Compliance Statement** must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

	ASSESSMENT AND REPORTING OF IMPACTS ON PLANT SPECIES	REPORT REFERENCE
1	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "*very high*" or "*high*" sensitivity for terrestrial plant species must submit a **Terrestrial Plant Species Specialist Assessment Report**.	✓
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "*medium sensitivity*" for terrestrial plant species must submit **either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	✓
1.3	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "*low*" sensitivity for terrestrial plant species must submit a **Terrestrial Plant Species Compliance Statement.**	✓
1.4	Where the information gathered from the site sensitivity verification differs from the screening tool designation of "*very high*" or "*high*", for terrestrial plant species sensitivity and it is found to be of a "*low*" sensitivity, then a **Terrestrial Plant Species Compliance Statement** must be submitted.	✓
1.5	Where the information gathered from the site sensitivity verification differs from the screening tool designation of "*low*" terrestrial plant species sensitivity and it is found to be of a "*very high*" or "*high*" terrestrial plant species sensitivity, a **Terrestrial Plant Species Specialist Assessment** must be conducted.	X
1.6	If any part of the development falls within an area of confirmed "*very high*" or "*high*" sensitivity, the assessment and reporting requirements prescribed for the "*very high*" or "*high*" sensitivity, apply to the entire	✓

	development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted.	
1.7	The **Terrestrial Plant Species Specialist Assessment** and the **Terrestrial Plant Species Compliance Statement** must be undertaken within the *study area*.	✓
1.8	Where the nature of the activity **is not** expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.	✓
1.9	Where the nature of the activity **is** expected to have an impact on SCC beyond the boundary of the preferred site, the *project areas of influence* (PAOI) must be determined by the specialist in accordance with *Species Environmental Assessment Guideline*[21], and the study area must include the PAOI, as determined.	✓
4	**MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION**	
	MEDIUM SENSITIVITY RATING – for terrestrial plant species: • Suspected habitat for SCC based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model[22]. • SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.	✓
4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	✓
4.2	The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	✓
4.3	The assessment must be undertaken within the study area.	✓
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the *Species Environmental Assessment Guidelines.*	✓

[21] Available at https://bgis.sanbi.org/

[22] The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as "*medium*" sensitivity by the screening tool.	✓
4.6	Where SCC are found on site or have been confirmed to be likely present, a **Terrestrial Plant Species Specialist Assessment** must be submitted in accordance with the requirements specified for "*very high*" and "*high*" sensitivity in this protocol.	X
4.7	Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a **Terrestrial Plant Species Compliance Statement** must be submitted.	✓
5	**LOW SENSITIVITY RATING – for terrestrial plant species**	
	Terrestrial Plant Species Compliance Statement • Areas where no natural habitat remains. • Natural areas where there is no suspected occurrence of SCC.	✓
5.1	The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).	✓
5.2	The compliance statement must:	✓
5.2.1	be applicable to the study area;	✓
5.2.2	confirm that the study area, is of "*low*" sensitivity for terrestrial plant species; and	✓
5.2.3	indicate whether or not the proposed development will have any impact on SCC.	✓
5.3	The compliance statement[23] must contain, as a minimum, the following information:	✓
5.3.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	✓
5.3.2	a signed statement of independence by the specialist;	✓
5.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	✓
5.3.4	a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	✓

[23] An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline.

5.3.5	where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	✓
5.3.6	a description of the assumptions made and any uncertainties or gaps in knowledge or data;	✓
5.3.7	the mean density of observations/ number of samples sites per unit area[24]; and	✓
5.3.8	any conditions to which the compliance statement is subjected.	✓
6	A signed copy of the **Terrestrial Plant Species Compliance Statement** must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.	✓

[24] Refer to the Species Environmental Assessment Guideline.

6.14.4 Appendix D: Site Sensitivity Verification Report

Purpose of Report

The "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation", as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

- The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
- The site sensitivity verification must be undertaken through the use of:
  1. a desk top analysis, using satellite imagery.
  2. a preliminary on -site inspection; and
  3. any other available and relevant information.
- The outcome of the site sensitivity verification must be recorded in the form of a report that:
  1. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
  2. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
  3. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)

- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
- Namakwa District Biodiversity Sector Plan (2008) – Bioregional Plan.
- Succulent Karoo Ecosystem Planning (SKEP, 2002).
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data - Chief Surveyor General (http://csg.dla.gov.za).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

Site visit

An initial site visit was conducted on 01 November 2021, during mid Spring and was shortly after some rainfall was received followed by a site visit in June 2022, in mid-winter after good rainfall in the preceding summer and early winter months. Importantly an assessment of a site should include optimum (i.e., wet) and suboptimum (i.e., dry) conditions to allow for a more well represented assessment of the ecology of the area, as well as during different seasons in order to evaluate species, which tend to vary across the seasons in Thicket rather than having a single preferred season (i.e. spring/summer).

Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report and have been undertaken by an aquatic specialist.
- No specific avifaunal assessment has been undertaken, but birds have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements and are not deemed to be at risk.
- Any flora and fauna surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

National Environmental Screening Tool

The National web-based Environmental Screening Tool allows for the generating of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation. The National Environmental Screening Tool indicates the following, which have relevance to this report:

- Terrestrial Biodiversity Sensitivity - Very High (*Figure 6.2*).
- Plant Species sensitivity – Low and Medium (*Figure 6.3*).
- Animal Species sensitivity - Medium and High (*Figure 6.4*).
- Aquatic Sensitivity - Low and Very High (*Figure 6.5*).

Figure 6.27. Terrestrial Biodiversity Sensitivity.

Figure 6.28. Plant Species Sensitivity.

Figure 6.29. Animal Species Sensitivity.

Figure 6.30. Aquatic Sensitivity.

The key biodiversity features that are indicative of this sensitivity, which will be assessed further in this report, include the following:

Terrestrial Sensitivity	Feature(s) in proximity
Very High	Ecological Support Area 1 & 2, FEPA Sub-catchments, Endangered ecosystem
High	None

Medium	None
Low	Present
Plant Sensitivity	**Feature(s) in proximity**
Very High	None
High	None
Medium	Sensitive Species 1268,1248, 1252, 91, 19, *Selago zeyheri, Duvalia pillansii, Justicia orchioides subsp. Orchioides & Asparagus spinescens*
Low	Present
Animal Sensitivity	**Feature(s) in proximity**
Very High	None
High	*Circus maurus* (bird)
Medium	*Aneuryphymus montanus (*insect*), Neotis denhami (*bird*), Acinonyx jubatus (*mammal*) & Sensitive species 7.*
Low	Present
Aquatic Sensitivity	**Feature(s) in proximity**
Very High	Wetlands, FEPA quinary catchments
High	None
Medium	None
Low	Present

The following is deduced from the DFFE National Environmental Screening Tool:

- As apparent from the National Environmental Screening Tool, the terrestrial biodiversity theme for the proposed site is Very-High associated with Ecological Support Area 1 & 2, FEPA Sub-catchments, Endangered ecosystem designation.
- Several flora (plant) species regarded as being of concern are flagged and will be assessed in the report.
- Several fauna (animal) species regarded as being of concern are flagged and will be assessed in the report.
- The designated high aquatic sensitivity is associated with the site being within a quinary catchment. Aquatic process assessment is addressed in a separate specialist report.
- The terrestrial flora and fauna impacts are assessed further in the relevant report sections for flora and fauna in the accompanying report.

The site assessment has physically screened for the presence of any species as listed in the National Environmental Screening Tool, as well as other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

Findings, Outcomes and Recommendations: Terrestrial Biodiversity

The site proposed for the proposed facility is not within any CBA but is within an ESA designated area and is deemed to have a Very High Terrestrial Biodiversity Sensitivity. The associated designation is deemed to be appropriate.

Findings, Outcomes and Recommendations: Plant Species (Flora)

National Environmental Screening Tool flagged several flora species. Further screening of species on the site failed to identify any individuals or populations of the flagged species. Several widespread and common species protected in terms of the Provincial Nature Conservation Ordinance are also present (such as *Aloe ferox*), for which PNCO permits would be required should they require

removal. The respective assessments of these species is addressed in the species assessment section of the attached report.

Findings, Outcomes and Recommendations: Animal Species (Fauna)

Several mammals, bird, and invertebrate species are flagged in the screening tool. However, the proposed activity is not anticipated to pose any significant risk to these species, however the terrestrial biodiversity assessment will address the respective species in further detail.

Findings, Outcomes and Recommendations: Aquatic

Wetland and River features are confirmed to be present within the site, however all efforts have been made to include appropriate buffers. Aquatic process assessment is addressed in a separate specialist report.

Conclusions

The site verification thus confirms that the site falls within the terrestrial biodiversity screening tool designated Ecological Support Area, and a full terrestrial biodiversity assessment its required.

Chapter 7: Aquatic and Wetland Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

Aquatic and Wetland Specialist
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Public Process Consultants

AQUATIC AND WETLAND IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF 144 HA OF CITRUS ORCHARDS AND ASSOCIATED INFRASTRUCTURE AS WELL AS THE CONSTRUCTION OF A DAM ON THE REMAINDER OF FARM 632 NEAR SUNLANDS, SUNDAYS RIVER VALLEY MUNICIPALITY, EASTERN CAPE PROVINCE

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Date: August 2022

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1. INTRODUCTION

1.1 PROJECT INFORMATION

The project proposals entail the expansion of citrus on the remainder of Farm 632, Sundays River Valley Municipality including the following associated infrastructure (Figure 1.1):

- New dam (storage capacity ~49 000m³).
- Water transfer pipeline (315mm diameter uPVC) from an existing dam (supplied by the Lower Sundays River Water Users Association, LSRWUA, canal system) to the new dam.
- Internal water supply pipelines varying internal diameters between 250mm to 315mm uPVC pipes.
- Underground internal water supply pipeline reticulation within the orchards with varying internal diameters of 60mm to 160mm PVC pipes.
- Access to the site and proposed orchards will be from existing gravel roads and internal roads will vary between 4m and 9m in width.

The approximate extent of the proposals are as follows:

- Effective Irrigation Area (Trees): 126.69Ha
- Internal roads and laydown areas: 17.31 Ha (Total Area less the Irrigated Area. Including the Dam) *Note some of this area falls within the already cleared area.*
- Total area to be cleared: 147 ha *Note some of this area falls within the already cleared area.*
- Dam footprint in square metres: 31 800 m²
- Max dam wall height: 5 metres
- Proposed road widths: 4 - 9 metres

Figure 1.1 Locality and layout of the project proposal.

2. SPECIALIST TERMS OF REFERENCE

The Scope of Work for this assessment is as follows:

- Background information gathering in the form of a desktop assessment;
- Site assessment in order to determine the freshwater characteristics of the study area;
- Identification and delineation of wetlands and riparian areas within 500m of the study area;
- WET-Health Assessment (for wetlands likely to be impacted by development proposals);
- WET-Ecoservices Assessment (for wetlands likely to be impacted by development proposals);
- Include the identification and evaluation of Aquatic Critical Biodiversity Areas, as identified in the Eastern Cape Biodiversity Conservation Plan and the Sundays River Valley Municipality Biodiversity Sector Plan, mapped on the site, if any;
- Sensitivity assessment;
- Recommendations on appropriate buffers and No-Go areas;
- Outline any legislative requirements (i.e. licences and permits) that need to be met for the proposed development to proceed;
- Impact Assessment; and
- Recommendations and mitigation measures.

It should be noted that the above provides a summary of the scope of work for this assessment. The specialist report has been prepared to meet the requirements of NEMA and NWA. This report has been undertaken in accordance with the procedures to be followed for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the National Environmental Management Act (1998) when Applying for Environmental Authorisation. The report has also been undertaken in accordance with the procedures outlined in the Section 6 of Annexure D of the Regulations regarding the Procedural Requirements for Water Use Licence Applications and Appeals in Government Notice R.267 of the National Water Act, 1998.

3. APPROACH AND METHODOLOGY

The approach followed for this assessment was as follows:

- Conduct a desktop assessment using following sources.
    - Quaternary Catchments and Water Management Areas (DWS, 2016);
    - Ecoregions (DWS, 2007);
    - NFEPAs (National Freshwater Ecosystem Priority Areas) rivers and wetlands 2011;
    - NBA (National Biodiversity Assessment) Artificial Wetlands 2018;
    - NBA NWM5 (National Wetland Map 5) 2018;
    - NBA 2018 Rivers Threat Status;
    - Topo Rivers Line from the CD: NGI (Chief Directorate: National Geo-Spatial Information) dataset 2006;
    - Topo Rivers line from CD: NGI (Chief Directorate: National Geo-Spatial Information) dataset 2015;
    - Historical aerial imagery from CD: NGI (Chief Directorate: National Geo-Spatial Information); and
    - Eastern Cape Biodiversity Conservation Plan (2019) Freshwater Critical Biodiversity Areas.
    - Addo Biodiversity Sector Plan for the Sundays River Valley Municipality (2012).
- Conduct a site investigation.
- Prepare report in terms of desktop and site investigation findings.

4. ASSUMPTIONS AND LIMITATIONS

The following constraints may have affected the assessments:

- Site visits were conducted in spring on 22 and 23 November 2021 and in winter on 23 June 2022.
- Identification of potential rivers and wetland areas was undertaken based on available desktop data and limited site investigations.
- Accessibility to certain points of interest, especially entire drainage line pathways was limited by accessibility.
- The region is currently experiencing a drought.
- The aerial imagery (Bing Aerial Imagery) used in QGIS to compose the maps is not recent and may not reflect actual site conditions. This has been combated by showing existing developed and transformed areas within the site footprint as far as possible.

5. INFORMATION SOURCES

The information sources used are discussed throughout the chapter, with the following being particularly relevant to this assessment.

5.1 NATIONAL PLANNING TOOLS

5.1.1 Department of Environmental Affairs (DEA) National Web-Based Environmental Screening Tool

The DEA National Web-based Environmental Screening Tool is a geographically based web-enabled application which allows a proponent intending to submit an application for environmental authorisation in terms of Environmental Impact Assessment (EIA) Regulations (2014, as amended), to screen their proposed site for any environmental sensitivity.

The Screening Tool provides site specific EIA process and review information, whereby minimum information requirements, Environmental Management Framework or bio-regional plans are specific to an area. The Screening Tool identifies specific requirements including specialist studies applicable to a site and potential environmental sensitivity of the site.

The screening tool is used as a preliminary indication of site sensitivity and is subject to a site verification exercise to ground-truth the sensitivity of a site.

5.1.2 Ecoregions

The Department of Water Affairs and Forestry Resource Quality Services (2007) (currently referred to as the Department of Water and Sanitation) provides a Level 2 Ecoregional Classification System for South Africa, Lesotho and Swaziland. The river ecoregional classification groups rivers according to similarities based on a top-down nested hierarchy. There are 31 Level 1 Ecoregions which were identified based on attributes such as climate, rainfall, physiography, geology and natural vegetation. The level 2 Ecoregions classification uses the same attributes but, in more detail, and provides details regarding stream channel characteristics.

5.1.3 National Freshwater Ecosystem Priority Areas (NFEPA), 2011

NFEPA provides maps and supporting information of strategic spatial priorities for conserving South Africa's freshwater ecosystem and sustainable use of water resources. These strategic spatial priorities are termed Freshwater Ecosystem Priority Areas (FEPA's) which were developed through the collaboration of over 100 freshwater researchers and practitioners and through a process of systematic biodiversity planning. FEPA's were identified based on criteria dealing with conservation of ecosystem types, species associated with rivers, wetlands and estuaries as well as maintenance of key ecological processes. The NFEPA project has developed FEPA maps which show different management implications/objectives for various different categories including:

- River FEPA's and associated sub-quaternary catchments;
- Wetland FEPA's;
- Wetland clusters;
- Fish Support Areas and associated sub-quaternary catchments;
- Fish sanctuaries;
- Phase 2 FEPA's and associated sub-quaternary catchments; and
- Upstream Management Areas.

The NFEPA project provides a set of ecosystem management guidelines and objectives on how to manage FEPA's and their sub-quaternary catchments appropriately. These guidelines provide detail focusing on:

- Particular land-use practices and activities compatible with the overall management objectives for FEPA's; and
- Minimising the risk of impacting negatively on the condition of FEPA's when undertaking a particular land-use practice or activity.

5.1.4 DWS Resource Quality Information Services (RQIS)

The DWS RQIS provides quaternary catchment data and PES EIS data of rivers in South Africa. The aim of the DWS PESEIS Assessment is to provide desktop information on ecological issues as it relates to the management and protection of sub-quaternary reaches. The DWS PES EIS Assessment provides data on the PES and ecological sustainability of sub-quaternary reaches.

Table 5.1 Description of A-F Ecological categories based on Kleynhans et al. (2005).

Ecological Category	Ecological description	Management perspective
A	Unmodified, natural.	Protected systems; relatively untouched by human hands; no discharges or impoundments allowed
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	Some human-related disturbance, but mostly of low impact potential
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	Multiple disturbances associated with need for socio-economic development, e.g. impoundment, habitat

Ecological Category	Ecological description	Management perspective
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	modification and water quality degradation
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	Often characterised by high human densities or extensive resource exploitation. Management intervention is needed to improve health, e.g. to restore flow patterns, river habitats or water quality
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	

5.1.5 National Biodiversity Assessment (NBA), 2018

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established as part of the NBA (2018) and provides a collection of data layers of ecosystem types and pressures for both rivers and inland wetlands. The aim of the SAIIAE is to provide scientifically defensible and robust data for inland aquatic freshwater ecosystems to inform planning, policy, monitoring, rehabilitation, conservation and management of freshwater ecosystems. SAIIAE provides:

- River ecosystem status and protection level; and
- The new National Wetland Map 5 and NBA 2018 artificial wetlands.

The NBA (2018) is an update to the NFEPA (2011) NWM4 project.

5.2 REGIONAL BIODIVERSITY AND SPATIAL PLANNING FRAMEWORKS AND TOOLS

The following **biodiversity planning** documents are relevant to the area under assessment:

- Eastern Cape Biodiversity Conservation Plan (ECBCP) (Berliner and Desmet 2007).
- Eastern Cape Biodiversity Conservation Plan (ECBCP) (Hawley *et al*., 2019).
- Addo Biodiversity Sector Plan for the Sundays River Valley Municipality (2012).

5.3 MODELLING, ANALYSIS AND FIELDWORK UNDERTAKEN

This step involves undertaking a site investigation to ground-truth the baseline desktop data and provide information of actual site conditions and state of the water resources within the study area. This process involves the following:

5.3.1 Wetland and riparian delineation and mapping

<u>Wetland delineation and mapping</u>

Delineation of wetlands and riparian areas is undertaken as per the following DWAF (2005) guidelines: “A practical field procedure for the identification and delineation of wetlands and riparian areas”. This guideline provides a suite of wetland and riparian indicators and detailed field-based methods to determine boundaries of wetlands and riparian areas.

Wetlands are described according to NWA as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.”

The following indicators have been developed to assist with the identification and delineation of wetlands:

- **Position in the landscape**: this shows parts of the landscape where wetlands are most likely to occur.
- **Soil forms, wetness and presence of redoximorphic features**: Anaerobic and aerobic conditions in soil during periods of saturation affect the ability of some minerals and metals to be absorbed. This results in a mottling effect in soils of rich colours of red, yellow and orange and noticeable ‘gleying’ of soil. Noticeable rotten-egg smell is also occurrent in soils which low oxygen levels and therefore reduce rates of organic matter decomposition. This helps to determining different zoning of a wetland area which may be present from the temporary, seasonal or permanent areas of saturation or flooding. These features are generally evident within the recommended sampling area at a depth of 50cm of soil.
- **Temporary zones** of a wetland show some grey matrix and mottles from occasional flooding/saturation of a wetland area;
- **Seasonal zones** of a wetland have a grey matrix and many mottles from seasonal flooding and saturation of a wetland area; and
- **Permanent zones** of a wetland have grey matrix with few to no mottles present.

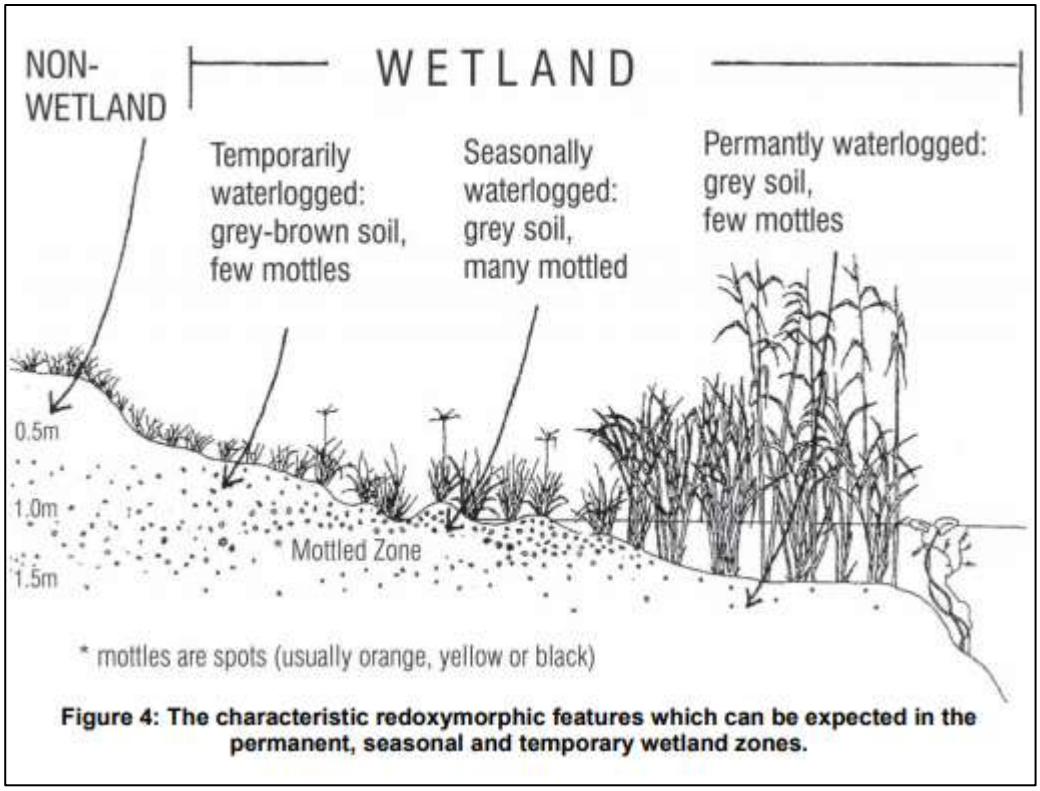

Figure 4: The characteristic redoxymorphic features which can be expected in the permanent, seasonal and temporary wetland zones.

Figure 5.1 Characteristic features of wetland zones.

- **Vegetation:** Vegetation is a key component in identifying and delineating wetlands as wetlands often contain specific plant species that are adapted to life in saturated soils. Certain wetland plant species are attracted to different areas of saturation (wetness) within the

wetland. Temporary and seasonally saturated wetland zones are typically dominated by facultative wetland plant species which are species that usually occur in saturated soils but are occasionally found in non-wetland areas. Seasonally and permanently saturated wetland zones are typically dominated by obligate wetland plant species which are species that can only occur in saturated soils.

5.3.2 Riparian identification and delineation

Riparian areas are often associated with the physical structure of a river or stream and have a distinctive structure and composition of vegetation compared to terrestrial areas.

The following indicators are used to identify and delineate riparian areas:

- **Landscape position and topography**: Typical landscapes are divided into 5 main units including crest (hilltop); scarp (cliff); Midslope (often a convex slope); footslope (often a concave slope); and valley bottom. Riparian areas typically develop along valley bottom landscape units adjacent to rivers or streams.
- **Alluvial soils and recently deposited material**: Riparian areas may often show the presence of alluvial soils which are derived from material deposited by flowing water and is a good indicator of riparian areas. Recently deposited material adjacent to an active channel is also a good indicator of riparian areas.
- **Vegetation**: Identification and delineation of riparian areas is primarily indicated by the presence of vegetation. A distinctive change in species composition and structure between the riparian area and adjacent terrestrial area can often define the outer boundary of the riparian area. The presence of obligate riparian plant species predominantly occur within a riparian zone and facultative riparian plant species may occur in riparian areas or are known to occur in riparian zones of certain regions.

5.3.3 Wetland functional assessment

The WET-Ecoservices technique for rapidly assessing ecosystem services (Table 5.2) supplied by wetlands (Kotze et al., 2008) is used to assess the goods and services (functions of the wetlands) that individual wetlands provide. Table 5.2 provides a preliminary list of ecosystem services that The process begins with classification of the wetland according to its HGM unit followed by determination of 15 benefits based on a list of characteristics (such as slope of wetland, flow through the wetland etc.). Benefits assessed include regulatory and supporting benefits such as toxicant removal, erosion control and flood attenuation as well as cultural and provisional benefits such as education, tourism and recreation. There are two levels of assessment of ecoservices. The level 1 assessment involves the identification of the HGM unit/type and then the assignment of particular ecosystem service typically assigned to that HGM wetland unit. A Level 2 assessment involves both a desktop analysis of the wetland and field verification.

Table 5.2 Description of ecosystem services provided wetlands (Kotze et al., 2008).

Ecosystem services supplied by wetlands	Indirect benefits	Regulating and supporting benefits	Flood attenuation		The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream
			Streamflow regulation		Sustaining streamflow during low flow periods
			Water quality enhancement benefits	Sediment trapping	The trapping and retention in the wetland of sediment carried by runoff waters
				Phosphate assimilation	Removal by the wetland of phosphates carried by runoff waters
				Nitrate assimilation	Removal by the wetland of nitrates carried by runoff waters
				Toxicant assimilation	Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff waters
				Erosion control	Controlling of erosion at the wetland site, principally through the protection provided by vegetation.
			Carbon storage		The trapping of carbon by the wetland, principally as soil organic matter
	Direct benefits	**Biodiversity maintenance[2]**			Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity
		Provisioning benefits	Provision of water for human use		The provision of water extracted directly from the wetland for domestic, agriculture or other purposes
			Provision of harvestable resources		The provision of natural resources from the wetland, including livestock grazing, craft plants, fish, etc.
			Provision of cultivated foods		The provision of areas in the wetland favourable for the cultivation of foods
		Cultural benefits	Cultural heritage		Places of special cultural significance in the wetland, e.g. for baptisms or gathering of culturally significant plants
			Tourism and recreation		Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife
			Education and research		Sites of value in the wetland for education or research

Table 5.3 Regulatory benefits usually provided by wetlands according the HGM type (Kotze et al., 2008)

WETLAND HYDRO-GEO-MORPHIC TYPE	REGULATORY BENEFITS POTENTIALLY PROVIDED BY WETLAND							
	Flood attenuation		Stream flow regulation	Enhancement of water quality				
	Early wet season	Late wet season		Erosion control	Sediment trapping	Phos-phates	Nitrates	Toxicants[2]
1. Floodplain	++	+	0	++	++	++	+	+
2. Valley-bottom - channelled	+	0	0	++	+	+	+	+
3. Valley-bottom - unchannelled	+	+	+?	++	++	+	+	++
4. Hillslope seepage connected to a stream channel	+	0	+	++	0	0	++	++
5. Isolated hillslope seepage	+	0	0	++	0	0	++	+
6. Pan/ Depression	+	+	0	0	0	0	+	+

Notes: [1] The rationale for the rating of benefits is given in Section 3.6
[2] Toxicants are taken to include heavy metals and biocides.

Rating: 0 Benefit unlikely to be provided to any significant extent
+ Benefit likely to be present at least to some degree
++ Benefit very likely to be present (and often supplied to a high level)

5.3.4 Determining the Present Ecological State of Wetlands and Ecological Integrity

The condition, health and integrity of wetlands are assessed through the WET-Health technique for rapidly assessing wetland Health (MacFarlane, 2008). The WET-health assessment tool assists with the assessment of health of wetlands using indicators such as hydrology, geomorphology and vegetation. The WET-Health assessment determines the PES of a wetland and has two levels of complexity. A Level 1 assessment is a simplified procedure and more rapid approach to determining wetland health and impacts. A Level 2 assessment is a more detailed assessment and involves the measuring of a number of descriptors in the field in order to assess the health of the wetland.

Table 5.4 Present Ecological State Scores

PES Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	**A**
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	1-1.9	**B**
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	**C**

Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	**D**
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	**E**
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	**F**

5.3.5 Ecological classification and description

Classification of wetlands and rivers is undertaken as per the Classification System for Wetlands and other Aquatic Ecosystems in South Africa prepared for SANBI by Ollis et al. (2013). This classification system has 6 levels or descriptors. This system's structure and flow is indicated in Figure 5.2 below. The inland component of the classification system is only shown for the purpose of this assessment.

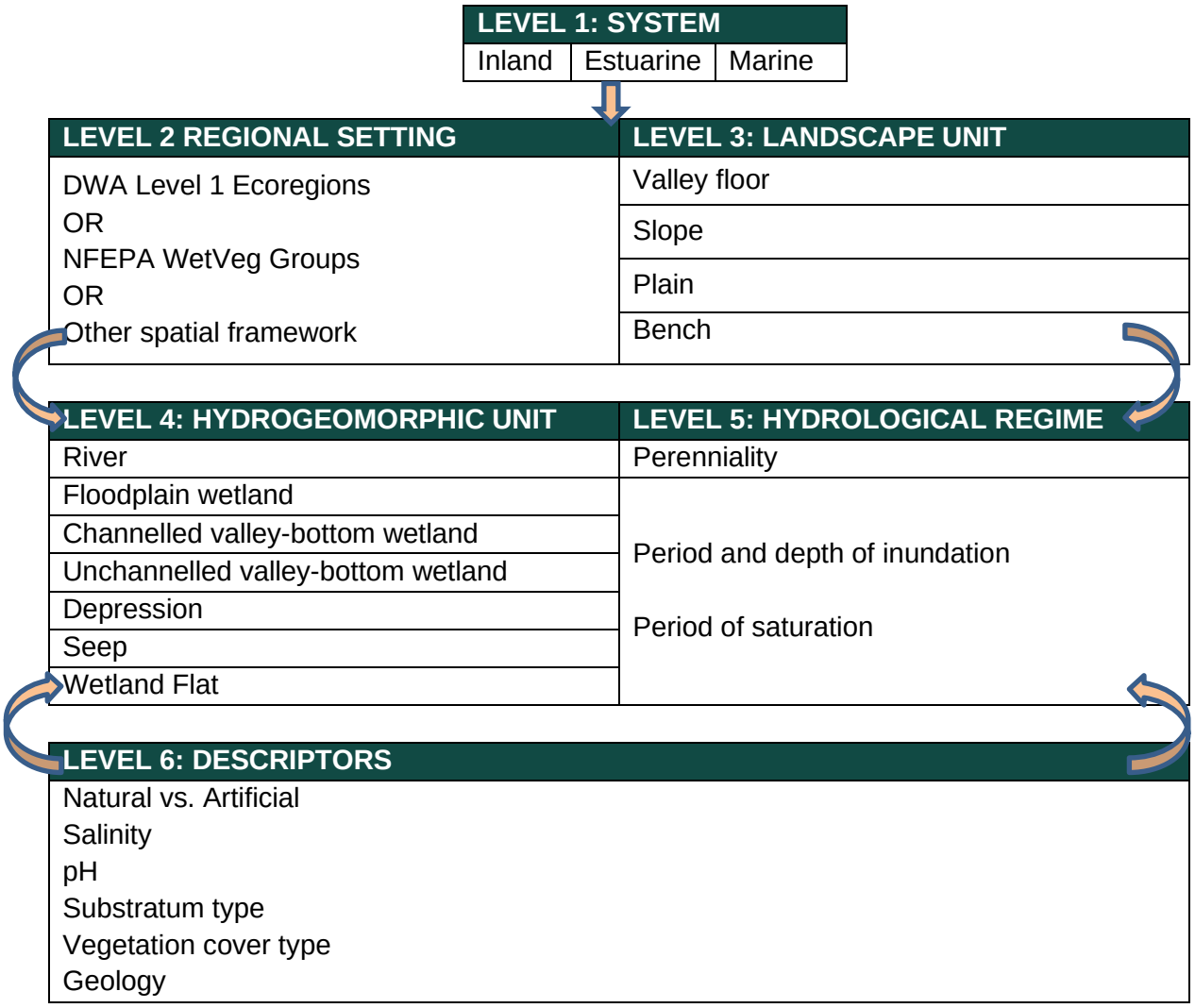

Figure 5.2 Classification System for Wetlands and other Aquatic Ecosystems (Ollis et al., 2013)

5.4 LEGISLATIVE REQUIREMENTS

The following legislation (Acts and Regulations) was consulted and is relevant to this assessment:

Table 5.5 List of legislation relevant to the project.

Legislation	Description and relevance
National Environmental Management Act (NEMA) (107 of 1998)	NEMA provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for such matters. This Act requires that prior Environmental Authorisation is obtained before the undertaking of certain activities.
Environmental Impact Assessment (EIA) Regulations (2014, as amended)	The EIA Regulations (2014, as amended) stipulate the process that must be followed when applying for Environmental Authorisation and provides a list of activities (in the form of the 3 Listing Notices) that require prior Environmental Authorisation. All EIA's in support of the application for Environmental Authorisation have to be undertaken in accordance with the procedures outlined in the EIA Regulations.
National Water Act (NWA) (36 of 1998)	NWA allows for governance and management of water resources to ensure that the nation's water resources are conserved and protected as well as used and developed in a sustainable manner. NWA requires that all water use activities are in line with the provisions in the Act and the necessary authorisations/licences are obtained for certain water use activities. NWA includes the provision of procedures and requirements for **General Authorisations** and **Water Use Licences** which permit the use of water.
National Environmental Management: Biodiversity Act (NEMBA) (Act 10 of 2004),	NEMBA provides for the management and conservation of South Africa's biodiversity within the framework of NEMBA; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute. NEMBA provides details regarding the protection of threatened ecosystems, threated or protected species as well as management of alien and invasive species.

6. RESULTS

6.1 DESKTOP ASSESSMENT

It should be noted that the basemap used in the GIS mapping programme (Quantum GIS) is Bing aerial maps as this is most compatible with the GIS programme. Bing aerial maps are outdated compared to the latest Google Earth© imagery, which cannot be brought into the GIS programme. Bing aerial imagery does not show the extent of the existing developed, cleared and cultivated areas. These areas have been digitised as far as possible and shown as existing cultivated, developed and cleared areas in the maps.

6.1.1 Quaternary Catchment and Water Management Areas

The proposed development footprint falls within quaternary catchment N40E of the Mzimvubu - Tsitsikamma Water Management Area.

6.1.2 Ecoregions

The study area falls within Level 2 Ecoregion 20.01 of Level 1 Ecoregion 20: South Eastern Coastal Belt.

6.1.2.1 Level 1 Ecoregion

Level 1 Ecoregion 20: South Eastern Coastal Belt is characterised by a region with closed hills and mountains of moderate to high relief. Fynbos, Renosterveld, Grassland and Thicket vegetation types occur within this region. The Gamtoos, Swartkops and Keurbooms Rivers flow in this region. This Level 1 Ecoregion has the following attributes:

- Mean annual precipitation: Moderate to high.
- Coefficient of variation of annual precipitation: Low to moderate.
- Drainage density: Low to medium.
- Stream frequency: Low/medium to medium/high in limited areas.
- Slopes <5%: >80% but significant areas <20%.
- Median annual simulated runoff: Moderate to very high.
- Mean annual temperature: Moderate to moderately hot.

6.1.2.2 Level 2 Ecoregion

The Level 2 Ecoregion: South Eastern Coastal Belt 20.01 is characterised by the following main attributes:

Table 6.1 Main attributes of Level 2 Ecoregion: South Eastern Coastal Belt 20.01.

Main Attributes	South Eastern Coastal Belt 20.01
Terrain Morphology: Broad division	Plains; moderate relief, Closed hills, mountains; moderate and high relief, Plains; low relief

Terrain Morphology	Strongly Undulating Plains, Undulating Hills, Moderately Undulating Plains, Slightly Undulating Plains, Hills, Low Mountains.
Vegetation types (dominant types in bold) (Primary)	Mesic Succulent Thicket, Xeric Succulent Thicket, Eastern Thorn Bushveld, Coastal Grassland, Coastal Forest, Valley Thicket, Grassy Fynbos, Dune Thicket, South and South-west Coast Renosterveld, Afromontane Forest.
Altitude (m.a.m.s.l.)	0 - 300
MAP (mm).	300 - 700
Coefficient of variation (% of annual precipitation).	20 - 35
Rainfall concentration index.	<15 - 30
Rainfall seasonality.	All year, Very late Summer.
Mean annual temp (°C).	16 - 20
Mean daily max temp (°C) February.	24 - 30
Mean daily max temp (°C) July.	18 - 22
Mean daily min temp (°C) February.	14 - 18
Mean daily min temp (°C) July.	6 - 10
Median annual simulated runoff (mm) for quaternary catchment.	10 - 200

6.1.3 Rivers within and surrounding the study area.

There are a number of non-perennial tributaries falling within the study site. These likely historically drained into the Sundays River, however, they have been disconnected through the construction of the LSRWUA canal bordering the northern portion of the farm boundary, the R336, instream dam and citrus developments further north of the site (Figure 6.1).

Table 6.2 Classification of the rivers in the study area in terms of NFEPA, NBA and DWS PES EIS data.

Tool	Description	Land use recommendations/ implications
NFEPA (2011-2014)	The site predominantly falls within a sub-quaternary catchment associated with a reach of the Sundays River that has not been classified according to NFEPA (Figure 6.1). A small section of the north-western portion of the site falls within a sub-quaternary catchment of a **FEPA** River (Figure 6.1).	No land use recommendation is provided in terms of NFEPA for the sub-quaternary catchments falling within the reaches that have not been classified according to NFEPA. River FEPA's achieve biodiversity targets for river ecosystems and fish species, and were identified in rivers that are currently in good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to the biodiversity goals of the country. The FEPA status applies to the river itself, however, the site footprint does fall within the sub-quaternary catchment associated with the FEPA River. This indicates that the surrounding land and smaller stream network (within the sub-quaternary catchment) need

<table>
<tr><th>Tool</th><th colspan="5">Description</th><th>Land use recommendations/ implications</th></tr>
<tr><td></td><td colspan="5"></td><td>to be managed in a way that maintains the good condition (A or B ecological category) of the river reach.</td></tr>
<tr><td>NBA (2018)</td><td colspan="5">NBA (2018) classifies the reaches of the Sundays River surrounding the development footprint as Endangered. The non-perennial tributaries of the Sundays River have not been classified according to NBA (2018) (Figure 6.2).</td><td>Endangered ecosystems are ecosystem types that are close to becoming Critically Endangered. Any further loss of natural habitat or deterioration of condition in these ecosystem types should be avoided, and the remaining healthy examples should be the focus of conservation action.

Although the reaches of the Sundays River have been classified as Endangered, the proposed development is unlikely to affect the Sundays River considering the distance from the site and the developments between the site and the Sundays River.</td></tr>
<tr><td rowspan="5">DWS PES EIS data (2014)</td><td colspan="6">There is no PES/EI/ES data for the unnamed non-perennial tributaries falling within the study area. However, the PES/EI/ES of the reaches of the Sundays River falling within the sub-quaternary have been classified below.</td></tr>
<tr><td>River name</td><td>SQR Reach (Figure 6.2)</td><td>PES</td><td>EI</td><td>ES</td><td>Discussion</td></tr>
<tr><td>Sundays River</td><td>N40E-08613</td><td>D – largely modified</td><td>Moderate</td><td>Moderate</td><td rowspan="2">Reaches of Sundays River and catchment has been affected by Orange-Fish-Sundays Inter Basin Transfer Scheme, lower Sundays Irrigation Scheme, large scale citrus farming and intensive cultivation.</td></tr>
<tr><td>Sundays River</td><td>N40E-08640</td><td>D – largely modified</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>Bezuiden-houts River</td><td>N40E-8678</td><td>B - Largely natural with few modifications</td><td>High</td><td>Moderate</td><td>Non-perennial first order stream within relatively undisturbed catchments. Hiking trails, paths, tracks and extensive cultivation within the lower catchment have affected habitat to some degree.</td></tr>
</table>

Figure 6.1 NFEPA Map of the rivers within and surrounding the study area, showing the NFEPA classification of sub-quaternary catchments associated with major rivers classified according to NFEPA.

Figure 6.2 NBA (2018) Rivers classification map.

6.1.4 Wetlands

6.1.4.1 7. NBA Classification of wetlands within the study area.

No natural wetlands occur within and immediately surrounding the majority of the site. According to the NBA (2018) one natural riverine wetland associated with the Sundays River occurs within 500m of the 315mm water transfer pipeline (which follows already transformed and existing development footprints). It is worth noting that this riverine wetland is in fact riparian in nature (see figure 6.3).

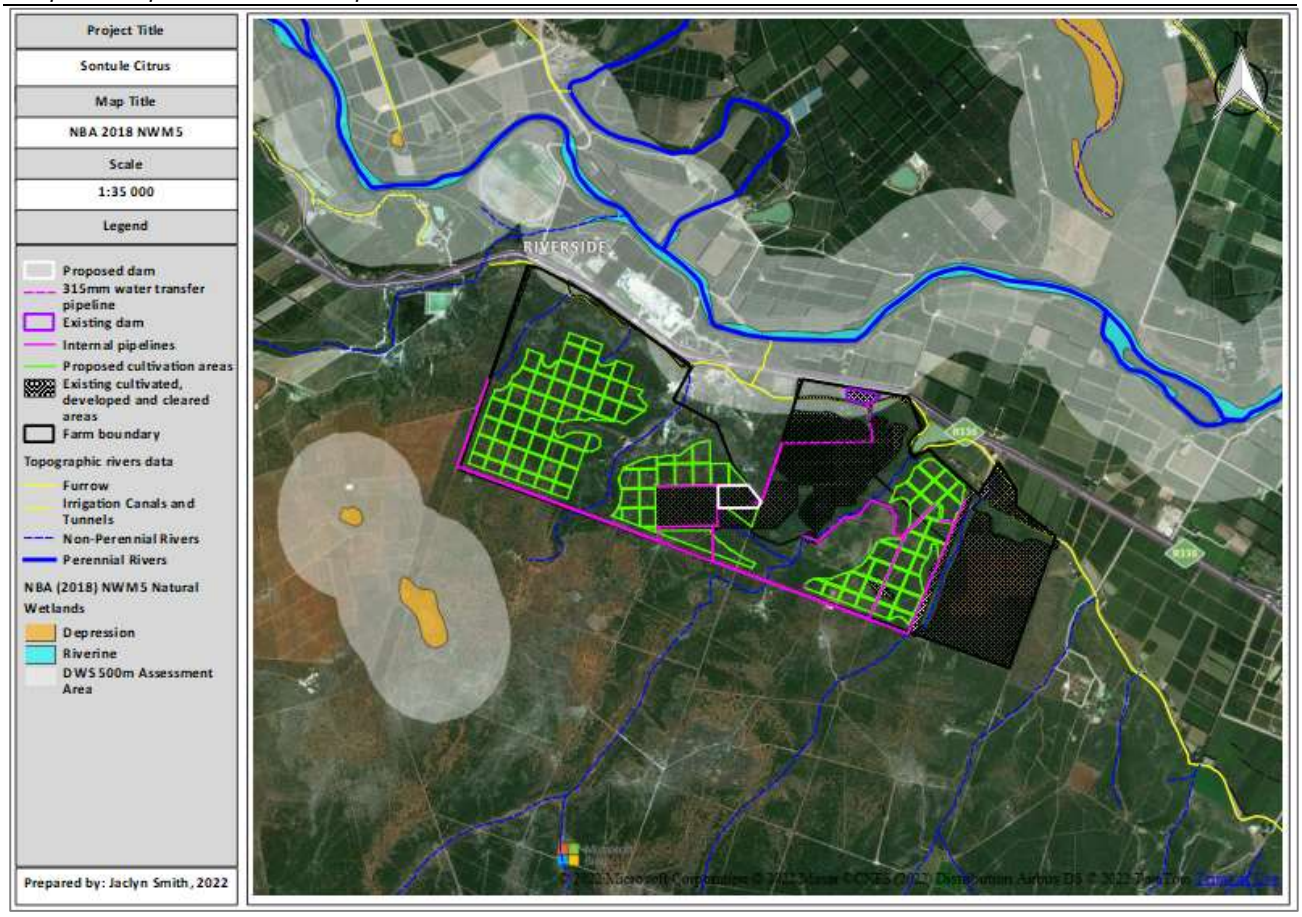

Figure 6.3 NBA (2018) Map of natural wetlands surrounding the development footprint.

<u>Land use recommendation in terms of NBA Wetlands</u>

No land use recommendation has been provided in terms of NBA (2018).

6.1.5 Water storage/stock dams

According to NBA (2018), there are a number of water storage/stock dams falling within and surrounding the development footprint (see figure 6.4).

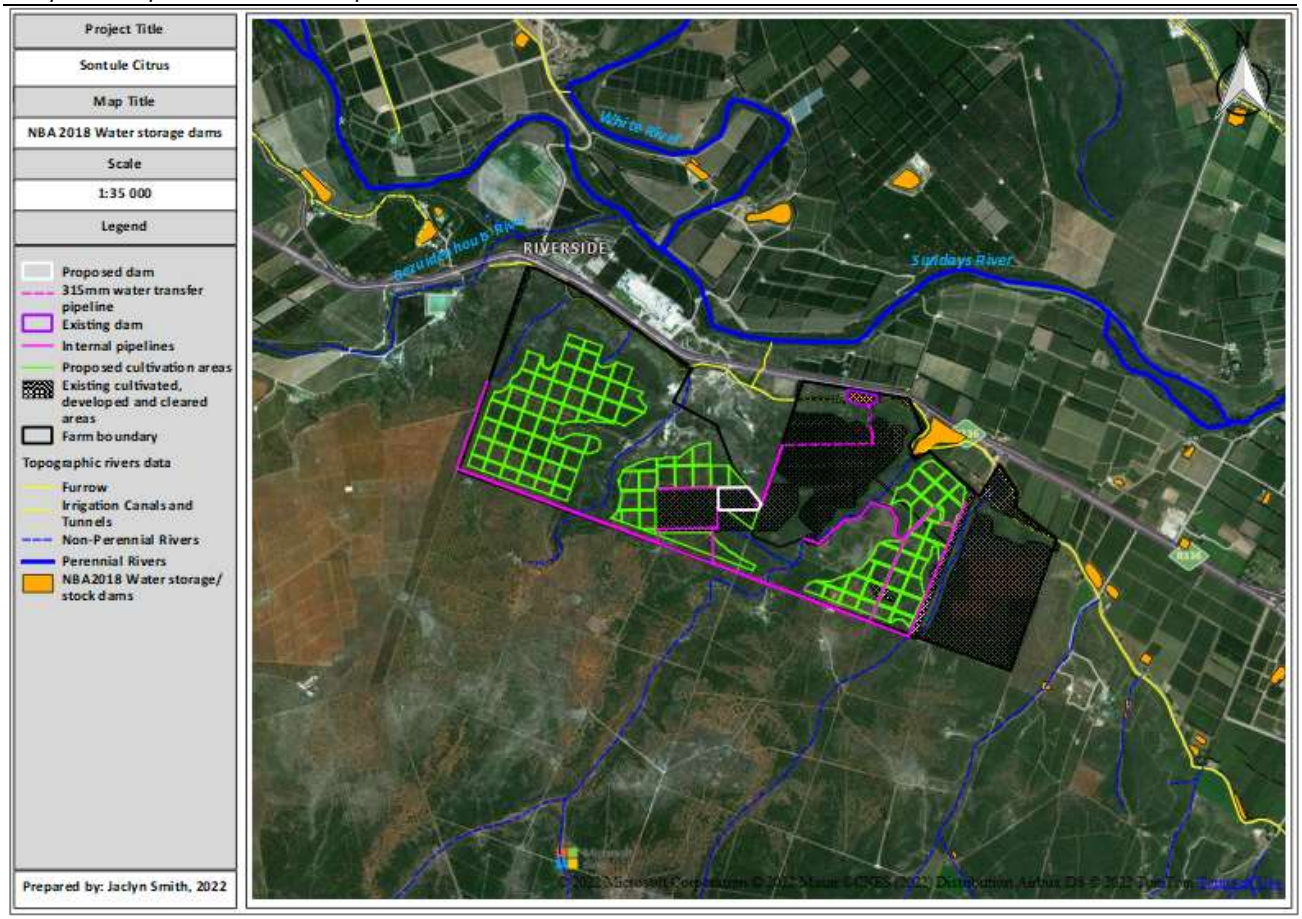

Figure 6.4 NBA (2018) Water storage/stock dams within and surrounding the site.

6.1.6 Riparian and wetland vegetation

According to SANBI (2019), the study area falls predominantly within the Sundays Valley Thicket of the Albany Thicket Biome. The Sundays Valley Thicket is characterised by medium-sized to tall dense thicket where the woody tree, shrub, and succulent component are well developed. *Euphorbia* species, *Cussonia* species, *Portulacaria afra* and other succulent shrubs occur within this area. This vegetation type occurs along undulating plains, low foothills and mountain slopes in the Eastern Cape Province.

A very small portion of the site falls within the Albany Alluvial Vegetation of the Inland Azonal Vegetation Biome. Two major types of vegetation patterns occur within this area namely riverine thicket and thornveld (*Acacia natalitia*). The riverine thicket tends to occur in the narrow floodplain zones in regions close to the coast or further inland, whereas the thornveld occurs on the wide floodplains further inland. This vegetation is considered to be Endangered and falls within a threatened ecosystem.

It should be noted that this section is desktop only and relates predominantly to terrestrial vegetation (refer to Chapter 6 of the EIA report for a detailed description of the terrestrial vegetation on site). Riparian and wetland vegetation observed on site is discussed in Section 6.2 of this chapter.

6.1.7 Topographical data

Figure 6.5 provides a map of the extent of non-perennial rivers based on topographical data from 1:50 000 topographical map of the area in 1990 (yellow line) compared to topographic data of non-

perennial rivers from 2015 (blue line). The non-perennial rivers, shown in 1990, in the study area have a lesser extent to those updated in 2015.

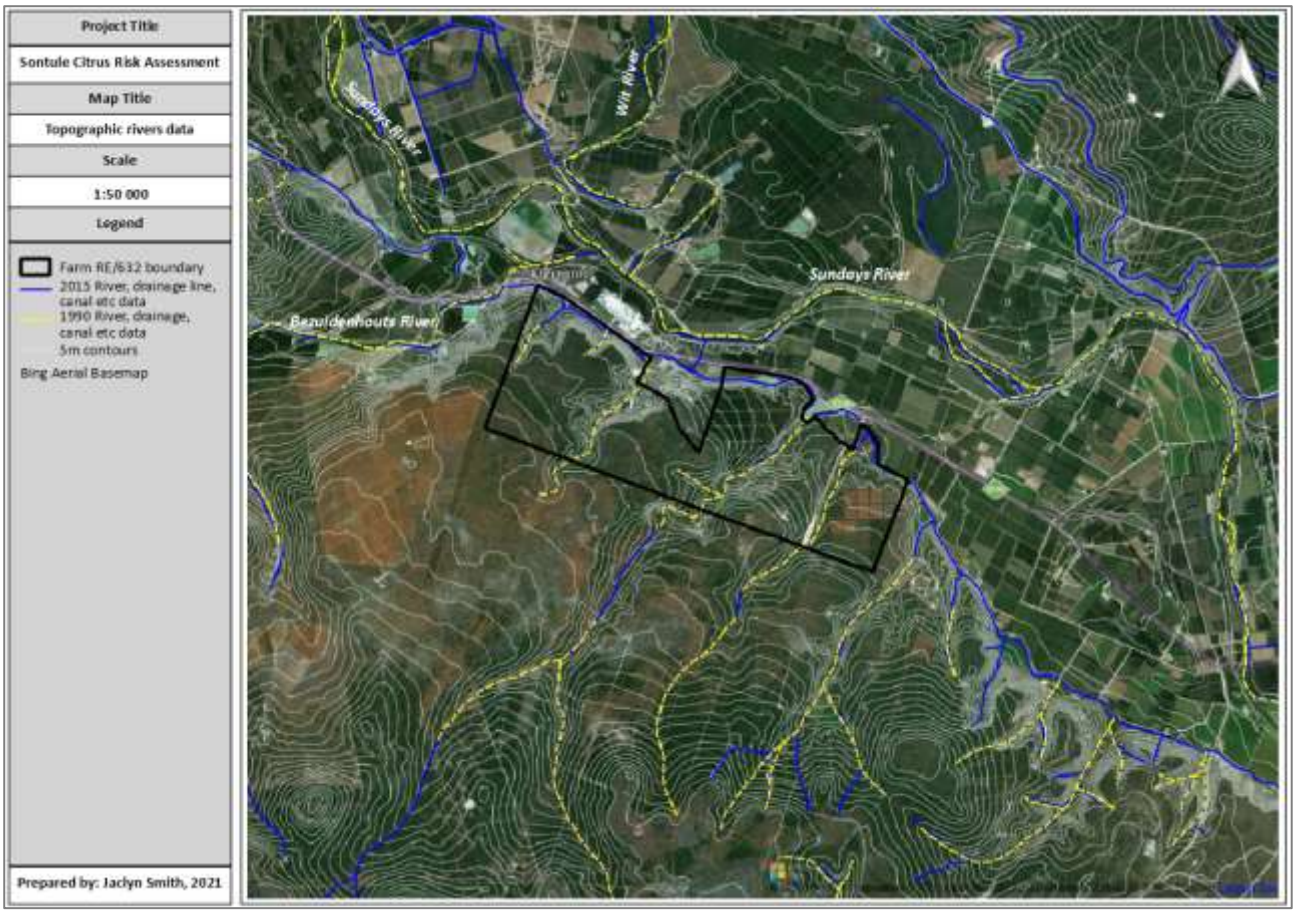

Figure 6.5 Topographical data non-perennial rivers comparison.

6.1.8 Regional biodiversity and spatial planning frameworks and other tools

6.1.8.1 Eastern Cape Biodiversity Conservation Plan 2019

According to ECBCP (2019) there are a number of Freshwater ESA 1 areas falling within the project area (Figure 6.6). These ESA 1 areas are associated with the non-perennial tributaries and modelled wetland areas (areas that are based on modelled stream channel and valley bottoms plus a 32m buffer) falling within and surrounding the project area. The ESA 1 area along the north-western portion of the property is associated with the sub-quaternary catchment of the CBA 2 area (Bezuidenhouts River) running north of the farm property.

The study site and general surrounding areas has been historically transformed for cultivation purposes and associated infrastructure (roads, canals etc). The modelled ESA 1 areas associated with stream channels and valley bottoms only coincide with the non-perennial tributaries delineated within the project area, however, they appear to continue north towards the Sundays River. This is not the case based on on-site observations and aerial imagery as historical flow paths of the non-perennial tributaries between the site and the Sundays River have been completely altered due to establishment of orchards on adjacent farms as well as construction of the LSRWUA canal and the road (R336).

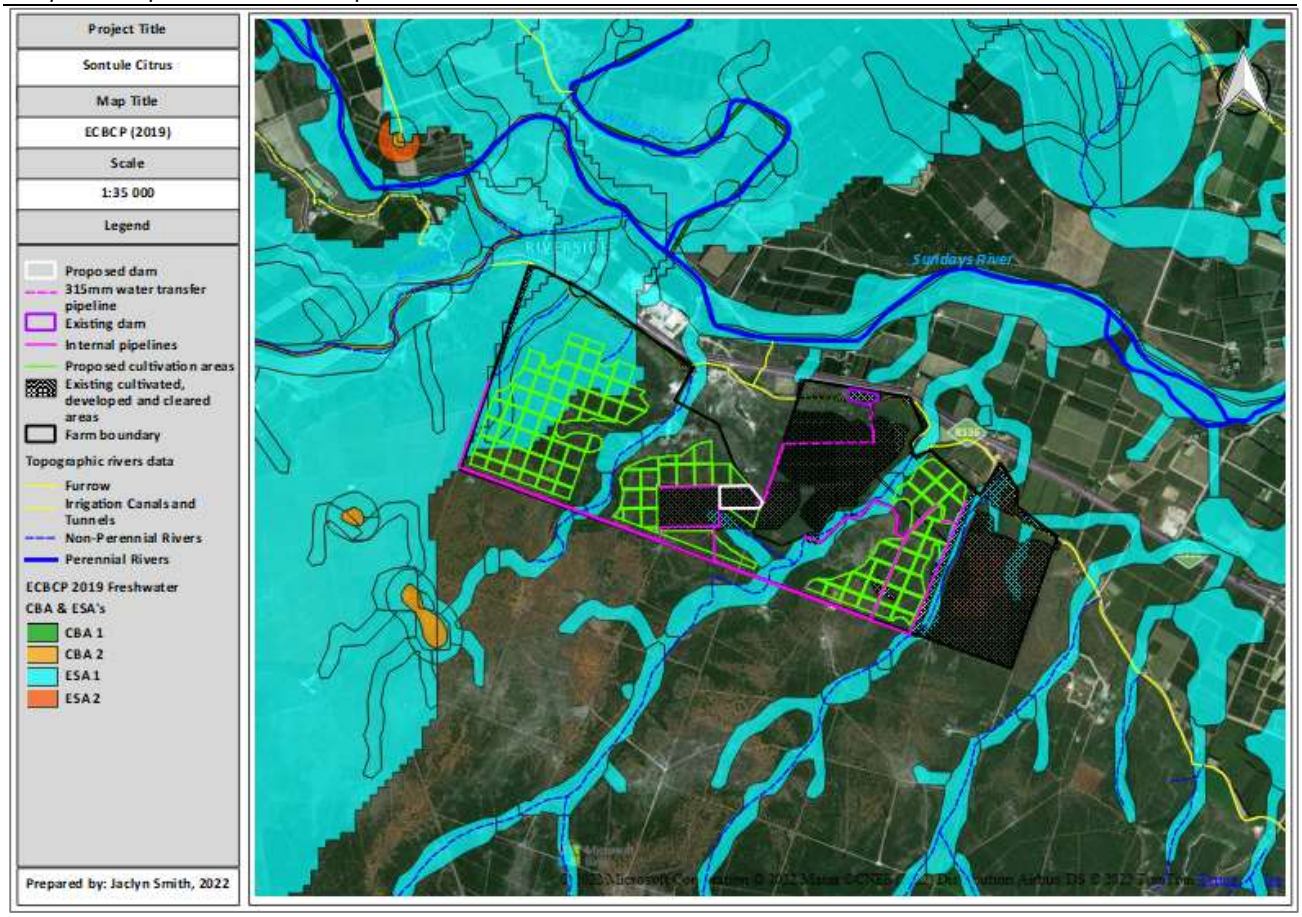

Figure 6.6 ECBCP (2019) Freshwater CBA Map.

<u>Land use recommendation in terms of ECBCP (2019).</u>

The desired state of ESA 1 areas is functional and the land management objective is to maintain ecological function within the localised and broader landscape. These areas should be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. Agricultural activities are not recommended in ESA 1 areas.

6.1.8.2 Eastern Cape Biodiversity Conservation Plan (2007)

According to ECBCP (2007), the project area falls within Aquatic Biodiversity Land Management Class ABLMC 2b indicating that it has a transformation threshold of between 15% to 20% (Figure 6.7).

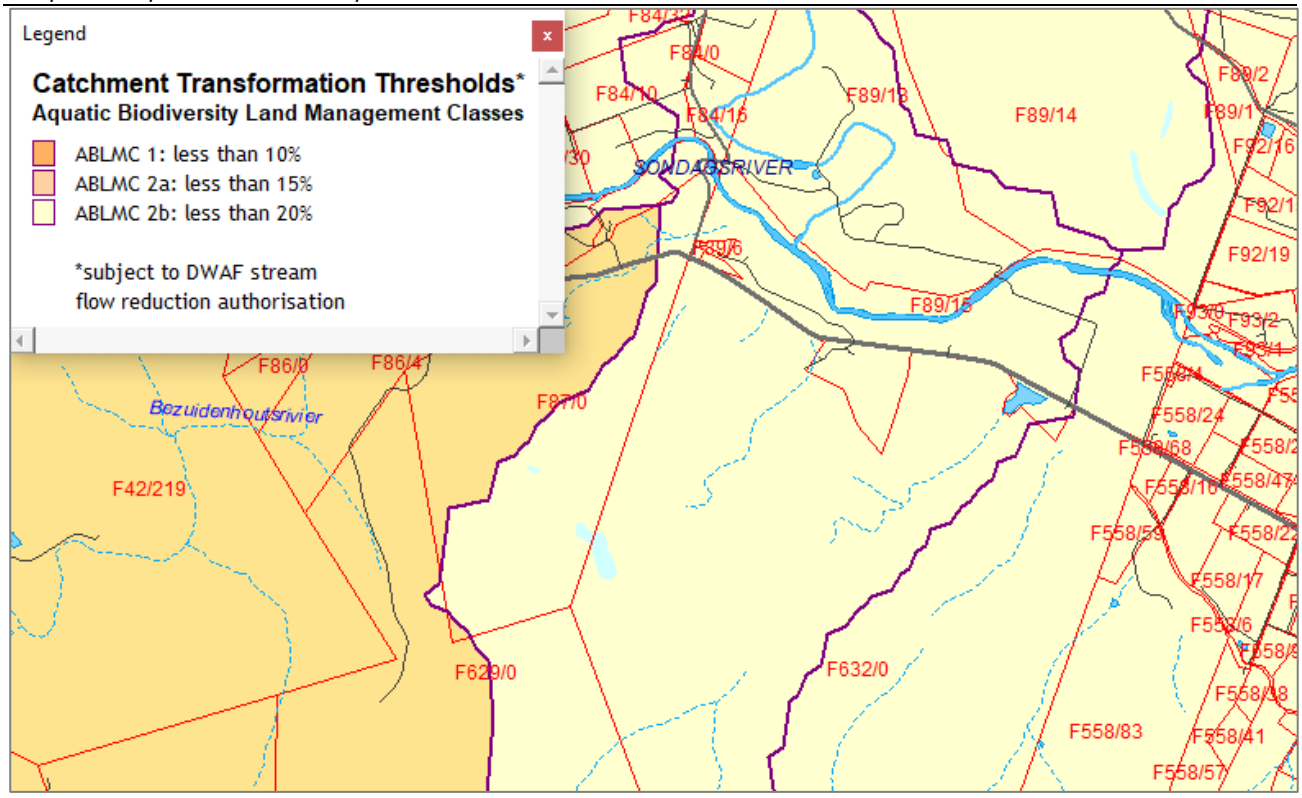

Figure 6.7 ECBCP (2007) Aquatic CBA and BLMC Map.

Land use recommendation in terms of ECBCP (2007)

ECBCP (2007) recommends that CBA 2 (ABLMC 2b) areas should have a transformation threshold of less than 20% in which case the extent of land transformation that should be allowed is less than 20% (ABLMC 2b) of the total area of the sub-quaternary catchment.

6.1.8.3 Addo Biodiversity Sector Plan (BSP) for the Sundays River Valley Municipality (2012).

According to the Addo BSP (2012), the project area falls predominantly within areas classified as Other Natural Areas (both natural and degraded) and portions of the site are classified as No Natural Areas Remaining. A portion of the farm adjacent to the north-western and northern boundary fall within Ecological Support Areas and a Critical Biodiversity Area. The CBA areas will be unaffected by the development proposal (Figure 6.8).

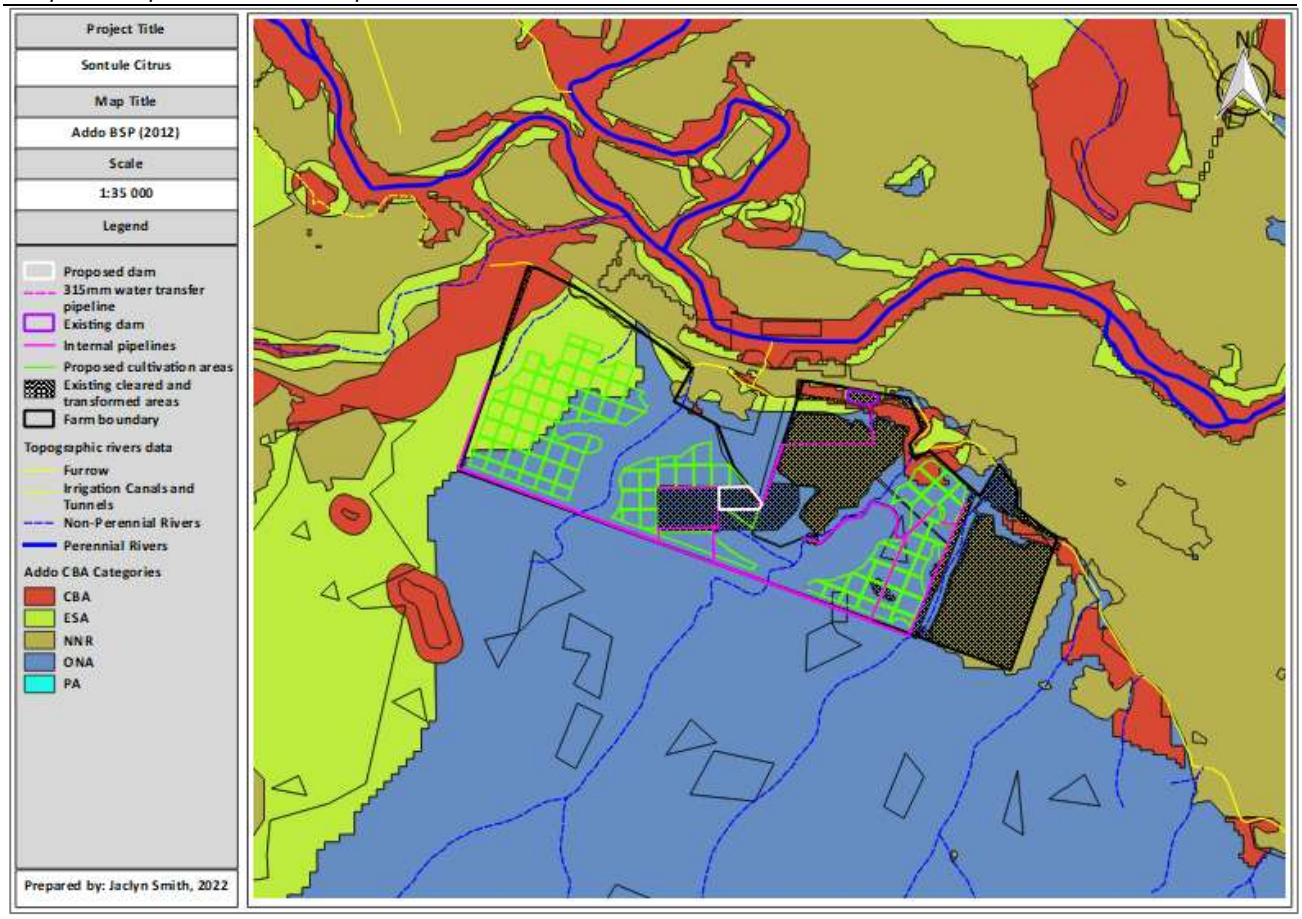

Figure 6.8 Addo BSP (2012) CBA Map of the study area.

Land use recommendation in terms of Addo BSP (2012)

The desired management objective for other natural areas (ONA) is sustainable management within general rural land-use principles and does not encourage agricultural activities to take place within these areas[1].

The desired management objective for no natural areas remaining (NNR) is sustainable management within general rural land-use principles and recommends agriculture developments as appropriate for these areas[2].

The Ecological Support Areas are considered supporting zones required to prevent degradation of the Critical Biodiversity Areas and Protected areas. The desired management objective is to maintain ecological processes and intensive agriculture is not encouraged within these areas.

The desired management objective for critical biodiversity areas is to maintain natural land. Rehabilitate degraded to natural or near-natural and manage for no further degradation and intensive agriculture is not encouraged within these areas.

[1] Use of Western Cape Provincial Rural Land-use Planning and Management Guidelines as recommended by Addo BSP(2012).
[2] Use of Western Cape Provincial Rural Land-use Planning and Management Guidelines as recommended by Addo BSP(2012).

It should be noted that the Addo BSP (2012) serves to provide guidelines to biodiversity management in the Sundays River Valley Municipal area and is subject to actual site observations.

6.1.8.4 DEA National Web-Based Environmental Screening Tool

In terms of Aquatic Biodiversity Themes, the Screening Tool classifies the north-western portion of the site as high sensitivity and the remainder of the site as low sensitivity (Figure 6.9). The high sensitivity rating is based on the sub-quaternary catchment associated with a FEPA River.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Freshwater ecosystem priority area quinary catchments

Figure 6.9 DEA National web-based Environmental Screening Tool – Aquatic Biodiversity Themes sensitivity.

6.2 FIELD SURVEY

6.2.1 Rivers within and surrounding the study area

The site assessment confirmed that there are a number of non-perennial tributaries falling with the project area. These non-perennial tributaries likely historically drained into the perennial Sundays River system, however, there has been complete alteration/disconnection of the non-perennial tributaries falling within the project footprint and the Sundays River.

These rivers would be termed non-perennial with intermittent flow in terms of SANBI Classification guidelines (2013). However, given the nature of this assessment and requirement for delineation and recommendation of buffer zones of the rivers within the study area, they have been described as follows:

- Perennial rivers

The perennial Sundays River occurs north of the proposed development footprint. This river is considered perennial in nature and has a well-developed active channel with prominent reed beds within the river bed and along the banks of the river.

- Non-perennial rivers

The non-perennial streams have no clear or well-defined active channel but rather vegetated channels with more pronounced drainage pathways compared to the drainage lines. These non-perennial rivers would likely rarely see any flows, only during rainfall or flood events. A large majority of these non-perennial rivers are in a modified state from existing activities on the farm portions (gravel roads, tracks, animal pathways, historical and current cultivation).

These non-perennial rivers appear completely disconnected from the Sundays River system and are considered to be of relatively low ecological importance.

		
Description	North-eastern downstream view of non-perennial river (R1) showing pronounced valley bottom area.	Western view of non-perennial river (R1) downstream and along the northern boundary of the property where it is directed under the LSRWUA irrigation water canal.
Location	33°28'38.54"S; 25°32'9.86"E	33°28'19.24"S; 25°32'27.84"E

		
Description	South-western upstream view of non-perennial river (R2), affected by road and fence construction.	North-eastern downstream view of non-perennial river (R2).
Location	33°29'6.53"S; 25°32'30.61"E	33°29'6.53"S; 25°32'30.61"E

		
Description	South-western upstream view of non-perennial river (R3).	North-eastern downstream view of non-perennial river (R3).
Location	33°29'12.76"S; 25°33'28.99"E	33°29'13.52"S; 25°33'35.14"E

- Drainage lines

The drainage lines are mostly inconsistent, with no exact flow path and location. No well-developed channels or riparian zone is evident. These drainage lines typically act as flow paths for water and would only likely see surface flows during heavy rainfall or flooding events.

Drainage lines appear more pronounced at their source where they are at a steeper gradient (and erosion is also present) and become less pronounced further downslope where the gradient becomes gentler, with the dispersion of potential flow more extensive and uneven making definite drainage paths difficult to detail. The large majority of drainage lines identified appear to have formed as a result of erosion due to historical gravel roads, pathways, small-scale excavation and borrowing activities.

		
Description	North-eastern downstream view of the drainage line developed as a result of erosion from historical land uses within the project area.	North-eastern downstream view of drainage line which appears to have developed an eroded channel with no riparian vegetation evident.
Location	33°28'49.10"S; 25°32'54.04"E	33°29'16.20"S; 25°33'45.37"E

- Irrigation canals

An irrigation water canal as part of the Orange-Fish-Sundays River Interbasin Transfer Scheme occurs along the northern portion of the property running north-west to the north-east. This should not be considered a natural watercourse, however, it is the collection of water important for the transfer of water and therefore should be considered a No-Go area and any proposed alterations to it would require prior authorisation from and consultation with DWS.

	
Description	South-eastern view of the LSRWUA irrigation water canal as part of the Interbasin Transfer Scheme.
Location	33°28'52.75"S; 25°34'16.20"E

Riparian vegetation

Vegetation within and surrounding the non-perennial rivers and drainage lines appeared to be predominantly terrestrial in nature and typical of the vegetation types identified by SANBI (2019), namely Sundays Valley Thicket (refer to Chapter 6 of the EIA Report).

Typically terrestrial species, *Acacia natalitia, Euphorbia mauritanica, Portulacaria afra, Lampranthus productus* and *Azima tetracantha* were some prominent species identified within riparian areas associated with the non-perennial rivers.

It is worth noting that through the analysis of available topographical data, aerial imagery and based on the site investigation, there are potential drainage lines evident on-site which appear to have developed from and along gravel roads, tracks, pathways and diversion berm structures. Drainage lines and erosion channels have developed along gravel roads and animal tracks where vegetation has been cleared and compacted. The development of the R336 and surrounding gravel roads with the absence of proper culverts and stormwater infrastructure has resulted in the complete alteration of drainage lines and non-perennial rivers within these areas, with no clear drainage path defined. As a result, only some original drainage paths remain and some new diversion paths off the road have developed.

6.2.2 Wetlands within and surrounding the study area

No natural wetlands were identified on the property under assessment, based on desktop analysis and site investigation. NWM5 (NBA, 2018) identified one natural riverine wetland associated with the Sundays River within 500m of the development footprint. This river was noted to have prominent reed beds. It is worth noting, that this river will not be affected by the project development, given its distance from the site and existing road, canal and cultivated/developed areas acting as a buffer between the property and the Sundays River.

6.2.3 Water storage/stock dams

A number of water storage dams occur within and surrounding the project footprint (see figure 6.9). Water storage dams (labelled D1-D3) are within the closest proximity. One off-channel water storage dam (D2) occurs within the property and two instream water storage dams occur adjacent to the border of the property (D1 and D3).

The remaining water storage dams occur on neighbouring properties within 500m of the development footprint and will not be affected by the development proposal.

Wetland vegetation was only observed within the two water storage dams (D1 and D3) adjacent to the property boundary and included *Typha capensis* and *Phragmites* species. The remainder of the water storage dams and along their perimeter was dominated by terrestrial vegetation with the same composition as that mentioned under the riparian vegetation section.

		
Description	North-western view of old water storage dam (D1) occurring outside, but within close proximity to the northern border of the property.	North-western view of water storage dam (D2) occurring within the northern border of the property.
Location	33°28'43.60"S; 25°32'59.73"E	33°28'43.81"S; 25°33'46.27"E

		
Description	South-western view of water storage dam (D3) occurring outside the northern border of the property.	South-western view of water storage dam (occurring within the property) formed as a result of backflooding of water associated with water storage dam (D3).
Location	33°28'51.18"S; 25°34'10.87"E	33°28'54.39"S; 25°33'58.13"E

6.2.4 Delineation of rivers and dams within and surrounding the development footprint.

Figure 6.9 provides a delineation of the riparian and wetland areas within and surrounding the study site. The delineation was undertaken based on available topographic non-perennial river data sets, 5m contours, historic and current aerial imagery and site observations.

Figure 6.10 Delineated riparian and wetland areas within 500m of the development footprint.

6.2.5 Delineation limitations

The following limitations were faced in the delineation of rivers and wetland areas and should be considered:

- The delineations were based on limited field work and accessibility whereby the potential river routes were mapped based on areas accessible on-site and pinpointed on google earth imagery prior to the site investigation.
- Available topographical rivers data differs to some extent from actual site observations and were in that case used only as a guideline.
- Significant alteration from roads, informal pathways, tracks, pipelines, irrigation water canal and water storage dams (both instream and off-channel) have significantly altered the natural flow paths.
- Available 5m contour lines used to assist with delineation and river flow paths appeared to differ to some extent from actual site observations.

7. SENSITIVITY ASSESSMENT

The sensitivity allocation is based on the desktop and site assessment of water resources within the study area.

Table 7.1 below provides a description of water resources which have been verified within and surrounding the development footprint as well as rationale behind the sensitivity ratings. Table 7.2 below provides a summary of the sensitivity ratings and the water resources that have been assigned a specific rating. Figure 7.1 provides a map of the proposed development superimposed over the sensitivity allocations within the study area.

The purpose of this sensitivity assessment is to represent the sensitivity of the surrounding environment and guide certain construction activities within these areas. The proposed pipelines will traverse high sensitivity areas as shown in Figure 7.1 and would require prior authorisation from DEDEAT/DWS. It should be noted that Figure 7.1 does not include buffer zone allocations as the proposed development was informed by initial sensitivity and buffer zone recommendations in the Environmental Risk Assessment. Initial sensitivity and buffer allocations were provided to inform a layout that follows best environmental practices and to avoid sensitive aquatic environments as far as possible. The layout proposed in this report (and subject to an EIA process) has been developed from that process and therefore sensitivity allocations provided in this report have been developed to inform the current layout and development proposals.

Table 7.1 Description of water resources and sensitivity rationale.

Water resource	Description of water resources	Sensitivity rationale
Perennial Rivers	• Sundays River. • Well defined active channel and banks. • Riparian vegetation and noticeable reed beds evident. • Modified to some degree as a result of in the reaches modified from historical agricultural activities.	• High sensitivity areas. • Moderate sensitivity allocation of areas within 100m in line with ECBCP, NFEPA and Mac Farlane *et al*., 2016. • This area will be unaffected by development proposals, however, still included for mapping purposes.
Non-perennial rivers	• Non-perennial rivers in terms of 1:50 000 topographical data (2019), although no well-defined banks and active channel. • Non-perennial rivers are in a modified state. • The non-perennial streams have no clear or well-defined active channel but rather have vegetated channels and more pronounced drainage pathways compared to the drainage lines. These non-perennial rivers would likely rarely see any flows, only during rainfall or flood events. A large majority of these non-perennial rivers are in a modified state from existing activities on the farm (gravel roads, tracks, animal pathways, historical and current cultivation). • These non-perennial rivers appear completely disconnected from the Sundays River system and are considered to be of relatively low ecological importance.	• High sensitivity and should be considered No-Go areas as far as possible. • Moderate sensitivity allocation of areas within 100m in line with ECBCP, NFEPA and Mac Farlane *et al*., 2016. • Where avoidance of high and moderate sensitivity areas associated with non-perennial rivers cannot be achieved then specialist input is provided and a permit/authorisation should be applied for through applicable provision of NEMA and NWA.

Water resource	Description of water resources	Sensitivity rationale
Drainage lines	• Classified as non-perennial rivers in terms of 1:50 000 topographical data (2019) with exact drainage pathway not well defined. • These drainage lines are in a modified state from existing activities on the farm portions (gravel roads, tracks, animal pathways). • Additional drainage lines were identified during the site investigation, although the majority formed as a result of gravel access roads, erosion and/or tracks used by wildlife.	• High sensitivity and should be considered No-Go areas as far as possible. • Minimum buffer of 40m based on lack of prominence and probably overall function. • Where complete avoidance of the buffer cannot be achieved then specialist input can be provided and a permit/authorisation should be applied for through applicable provision of NEMA and NWA.
Irrigation canal	• Artificial watercourse constructed for collection and transfer of water in an irrigation water canal as part of the Orange-Fish-Sundays River Interbasin Transfer Scheme.	• Although not natural, considered high sensitivity and No-Go area for any developments within these areas without prior authorisation from and consultation with DWS considering that it is important infrastructure part of the Orange-Fish-Sundays River Interbasin Transfer Scheme. • 32m buffer proposed, however, this can be adjusted following authorisations from and consultations with DWS.
Water storage dams	• Predominantly water storage dams with noticeable alterations and typical dam type structures. • Completely artificial and modified state.	• Moderate sensitivity. • Moderate sensitivity allocation of areas within 40m of dams. • Some of these are incorporated in non-perennial or drainage line buffers. • If a change of land use has been approved and the stand-alone water storage dams no longer have any purpose, then the developer can discuss arrangements with the landowner (dam infrastructure owner) to agree on mutual options/permissions. Under the NWA, these water storage dams would not trigger an activity unless noticeably natural and very important biodiversity has been achieved.

Table 7.2 Sensitivity ratings of water resources within the study area.

Sensitivity rating	Description/Rationale
Moderate	Moderate sensitivity is allocated to: • Water storage dams. • Irrigation canal. • Areas within 40m of drainage lines and water storage dams. • Areas within 32m of irrigation canal. • Areas within 100m of perennial and non-perennial rivers..
High	High sensitivity is allocated to: • All drainage lines, non-perennial and perennial rivers. Developments that take place within these areas require a Water Use Licence/General Authorisation and the mitigation measures mentioned in this report must be implemented.

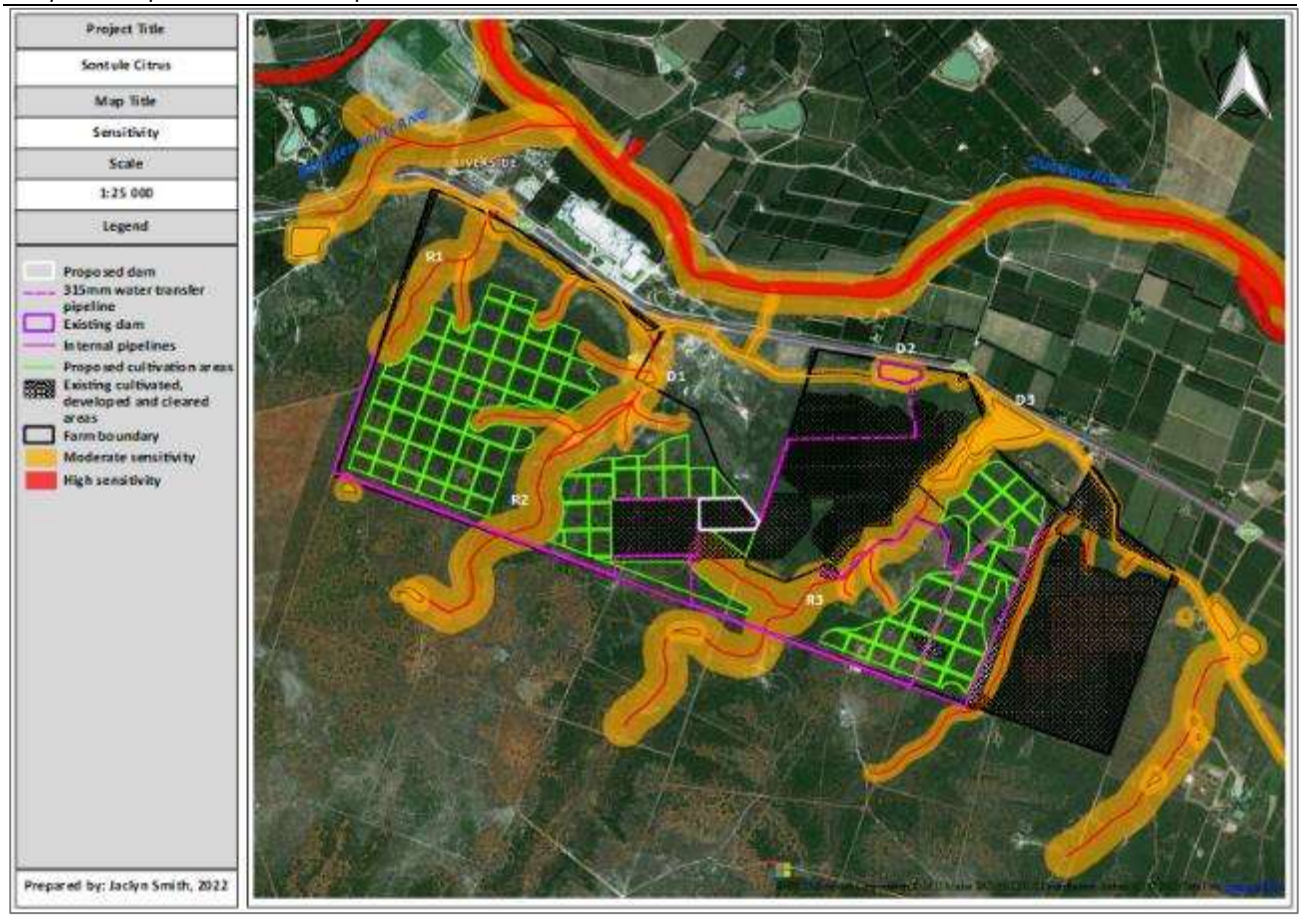

Figure 7.1 Sensitivity Map of the study area.

8. IDENTIFICATION AND ASSESSMENT OF IMPACTS

This impact assessment was conducted according to the assessment methodology provided by the EAP for the study. Impacts specifically on any *aquatic and wetland systems* are evaluated in this section. Impacts have been rated based on the project actions/impacts, as well as any potential cumulative impacts expected during the construction and operational phases of the project. Potential impacts are listed as follows, with the detail shown per impact in the tables below.

- Loss and/or alteration of riparian habitat and habitat associated with water storage/stock dams within and surrounding the Sontule Citrus development.
- Changes to the hydrological regimes of rivers and streams in and around the Sontule Citrus development.
- Pollution of water resources (non-perennial rivers, drainage lines and water storage/stock dams) in and around the Sontule Citrus development footprint due to construction and operational activities.
- Sedimentation and increasing turbidity levels of instream habitats.

8.1 PLANNING AND DESIGN PHASE DIRECT AND INDIRECT IMPACTS

The following section of the report identifies direct and indirect impacts that may be associated with the planning and design phase of the development.

Loss of riparian habitat at watercourse crossings and habitat around the dams.

Nature of the Impact	There will be some loss of riparian habitat associated with watercourse crossings. The development layout was informed by a preliminary environmental risk assessment that took into account freshwater and terrestrial ecosystems within and surrounding the development properties. Riparian habitat is fairly limited and mostly terrestrial in nature, except for the water storage dams, where *Typha capensis* and reeds have developed. Habitat around the dams is very limited as these areas are completely artificial in nature.
Extent	**Site specific -** at affected crossings.
Duration	**Short-term**
Consequence / Intensity	**Moderate**
Probability	**Definite** – given that there will be alteration of this habitat for infrastructure crossings and placement.
Reversibility	**Partially Reversible –** given that there will definitely be alteration, however, effective rehabilitation of these areas will mean recovery of some of these areas in terms of functionality.
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• A survey of the affected areas must be undertaken by a specialist prior to any construction to determine if there are any protected plants or species of conservation concern that require identification and permits prior to removal and/or relocation. • Pipeline crossing installation should not be planned during or immediately before or after, rainfall events. • Pipeline crossings should be below ground where possible. • Pipelines should be concrete encased for protection with outer encasing with partially permeable rock or material to allow for some sub-surface throughflow around the area to avoid any obstructions or backflooding in the long-term. • Pipelines and roads that may be required for the proposed development should be aligned with existing cleared areas (vehicle tracks / cutlines), as far as possible. • Existing and any upgrading/maintenance of existing roads should incorporate culvert structures where they cross non-perennial rivers and drainage lines to effectively channel water under the roads. • Appropriate stormwater protection measures should be incorporated around structures crossing watercourses. • All permits/authorisations must be in place prior to construction within these areas. • A rehabilitation and alien vegetation management plan must be developed for implementation during the construction and operation phases.

Significance and Status (with mitigation)	**Low Negative (-) –** The non-perennial rivers and drainage lines within the project footprint receive very little flows and likely only see flows during flooding or heavy rainfall events, this makes it feasible to undertake and plan for construction outside of these periods. The development layout was informed by a prior environmental risk assessment to allow for avoidance of water resources, as far as possible, and has therefore followed an environmentally conscious design as far as possible.

Potential pollution of ground and surface water.

Nature of the Impact	There is the potential for ground and surface water pollution during the construction and operation phases. The potential for these impacts is related to the proposed water storage dam, water pipelines and storage of hazardous substances (although likely in existing service and workshop areas) as well as hazardous and general waste (generated during construction and operation).
Extent	**Local** – the extent of any water pollution is likely to be site-specific, however, there is the possibility for it to be local in extent as should it go on for extended periods of time or go unnoticed.
Duration	**Medium-term**
Consequence / Intensity	**Moderate**
Probability	**Probably**
Reversibility	**Partially Reversible –** given that there will definitely be alteration, however, effective rehabilitation of these areas will mean recovery of some of these areas in terms of functionality.
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• The Contractor and Applicant must implement appropriate waste management storage and disposal systems. These systems must be included in the environmental awareness training conducted prior to commencement of the construction phase. • The proposed water storage dam and any other storage facilities should be lined and designed in such a way that prevents contamination of surrounding ground and surface water.
Significance and Status (with mitigation)	**Low to very low Negative (-)**

8.2 CONSTRUCTION PHASE DIRECT AND INDIRECT IMPACTS

The following section of the report identifies direct and indirect impacts that may be associated with the construction phase and preparation of the development footprint for planting of citrus orchards and associated infrastructure.

Loss of riparian habitat at watercourse crossings and limited habitat around dams.

Nature of the Impact	There will be some direct loss of riparian habitat along non-perennial river crossings. There may be some minor loss of habitat associated with water storage dams as a result

	of the construction of the 315mm water transfer pipeline to this area. This is anticipated to be minimal and temporary in terms of duration of the impact. The loss of habitat may result in erosion, sedimentation and the spread of alien invasive plants species within disturbed areas.
Extent	**Site-specific** – The pipeline routes and watercourse crossings have fairly small footprints.
Duration	**Temporary** – The impact is considered temporary provided mitigation measures are applied during construction. Revegetation and rehabilitation of the disturbed areas is likely to take place after construction.
Consequence / Intensity	**Medium to low** – Environmental function will continue, but in a modified manner.
Probability	**Definite**
Reversibility	**Reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium to Low Negative (-)**
Mitigation	• Prevent clearing to no more than the minimum width required. • Site camp and material lay down and stock pile areas must be established in already transformed, low sensitivity areas outside of high and moderate sensitive areas. • Stockpile natural vegetation (where possible) and topsoil removed during construction and use this to revegetate disturbed areas associated with the pipelines. • Construction work within areas associated with the pipeline crossings should be short-term with disturbed areas rehabilitated as soon as construction is complete to reduce the possibility of erosion of the areas and resultant sedimentation of the watercourses.
Significance and Status (with mitigation)	**Low Negative (-)**

Changes to hydrological regimes of the non-perennial rivers and drainage lines.

Nature of the Impact	Construction within non-perennial rivers and drainage lines may result in temporary flow modification and alteration of natural flow patterns.
Extent	**Site-specific** – The pipeline routes and watercourse crossings have fairly small footprints.
Duration	**Temporary** – The impact is considered temporary provided mitigation measures are applied during construction.
Consequence / Intensity	**Medium to low** – Environmental function will continue, but in a modified manner.
Probability	**Probable**
Reversibility	**Reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**

Mitigation	• Construction activities should not take place during, or immediately before or after, rainfall events. • Construction work within these areas should be short-term with disturbed areas being rehabilitated as soon as construction is complete to reduce the possibility of erosion of the areas and resultant sedimentation of the watercourses. • Any solid waste/debris created in these areas must be removed.
Significance and Status (with mitigation)	**Low Negative (-)**

Potential pollution of all water resources within and surrounding the development footprint.

Nature of the Impact	There is the possibility of pollution of surrounding watercourses during construction from accidental spillages associated with poor storage, handling and disposal of both general and hazardous waste including any on-site sanitation facilities.
Extent	**Site-specific** – The potential impact is limited to construction work areas and site camp.
Duration	**Short-term** during construction activities.
Consequence / Intensity	**Low**
Probability	**Probable**
Reversibility	**Reversible** as not highly impacting.
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• All hazardous substances and hazardous waste (if any) must be stored in existing impermeable structures placed at the logistical services area. • No hazardous substances and hazardous waste should be placed in high and moderate sensitivity areas associated with the water resources within the study area. • Emergency response plan must be drawn up to deal with any hazardous spillages/accidental leakages. • Spill kit and drip tray must be kept on site at all times when construction vehicles are on site. • All temporary chemical toilets/ablution facilities (if any) must be properly secured so that they cannot be windblown, be regularly serviced and should be placed outside of the moderate and high sensitivity areas associated with water resources within the study area. • All staff to undergo continual environmental awareness training during toolbox talks.
Significance and Status (with mitigation)	**Low to very low Negative (-) –** prevention of accidental spillages can be drastically mitigated with very low likelihood of occurrence through appropriate housekeeping and management and training of all staff.

Increase in sedimentation and turbidity levels of instream habitats (non-perennial rivers and drainage lines)

Nature of the Impact	This impact is linked to construction site clearing and excavation activities as a result of these activities taking place over an extended period of time, inappropriate management of the disturbed areas and unnecessary encroachment into surrounding areas outside the construction footprint.
Extent	**Site-specific**

Duration	**Temporary**
Consequence / Intensity	**Low-Medium**
Probability	**Probable**
Reversibility	**Partially Reversible**
Degree of Confidence	**Medium**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Construction work within these areas should be short-term with disturbed areas rehabilitated as soon as construction is complete to reduce the possibility of erosion of the areas and resultant sedimentation of the watercourses. • Any debris/solid waste accumulated as a result of construction activities must be removed. • Temporary stormwater and erosion control infrastructure must be put in place and monitored during the construction phase. Should any erosion channels become evident these must be backfilled, compacted and re-vegetated as soon as possible.
Significance and Status (with mitigation)	**Low Negative (-)**

8.2.1 Construction Phase Cumulative Impacts

Cumulative construction impacts are anticipated to occur, given the area (an area of large-scale agricultural developments). Cumulative impacts are likely to relate to the loss and alteration of riparian habitat and alteration of hydrological flow regimes associated with watercourse crossings, although, in the case of this project, this is expected to be relatively small. While, these cumulative impacts are anticipated, through the implementation of the mitigation measures in this report the overall significance of these cumulative impacts can be reduced to low negative significance.

8.3 OPERATIONAL PHASE DIRECT AND INDIRECT IMPACTS

Loss of and alteration of riparian habitat

Nature of the Impact	There is the possibility of the loss of and alteration of riparian habitat during the operational phase as a result of alien vegetation infestation during the development of the site and operation of the new citrus areas as well as the effectiveness of the rehabilitation of disturbed areas.
Extent	**Site-specific**
Duration	**Short-term**
Consequence / Intensity	**Medium**
Probability	**Probable**
Reversibility	**Partially reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially replaceable**

Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Any growth of alien invasive plant species within the rehabilitated areas must be removed and regular monitoring must take place and for a period agreed to with the Environmental Control Officer. • The site should be monitored for 12 months after construction to ensure disturbed areas are appropriately rehabilitated.
Significance and Status (with mitigation)	**Low Negative (-)**

Changes to the hydrological regime of the watercourses affected by the development proposals.

Nature of the Impact	The development of the cultivated areas, through land clearing and planting of citrus, will likely result in some changes in the hydrology of the catchments associated with the non-perennial and drainage line systems. This may result in increased and concentrated flows to the surrounding watercourses during heavy rainfall and irrigation of the cultivated areas.
Extent	**Site-specific**
Duration	**Short-term**
Consequence / Intensity	**Medium**
Probability	**Probable**
Reversibility	**Partially reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Drip irrigation or irrigation providing precise amounts (where possible) for the trees must be used as far possible to limit excess runoff. • Stormwater management and management of potential runoff as a result of irrigation must be in place. This could be in the form of berms or swales to capture and attenuate the runoff. • Should any erosion channels develop these must be backfilled, compacted and re-vegetated. • The site should be monitored for 12 months after construction to ensure disturbed areas are appropriately rehabilitated.
Significance and Status (with mitigation)	**Low Negative (-)**

Increase in sedimentation and turbidity levels of surrounding watercourses and increase in the potential for erosion.

Nature of the Impact	There is the possibility of increased sedimentation and turbidity levels of affected watercourses as a result of the poor implementation of mitigation measures, inadequate rehabilitation and extreme weather conditions (eg. flooding) during the construction, rehabilitation of the disturbed areas and operation of citrus areas.

Extent	**Site-specific**
Duration	**Short-term**
Consequence / Intensity	**Medium**
Probability	**Probable**
Reversibility	**Partially reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Partially replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Stormwater management and management of potential runoff as a result of irrigation must be in place. This could be in the form of berms or swales to capture and attenuate the runoff. • Should any erosion channels develop these must be backfilled, compacted and re-vegetated. • The site should be monitored for 12 months after construction to ensure disturbed areas are appropriately rehabilitated.
Significance and Status (with mitigation)	**Very Low Negative (-)**

Potential pollution of all water resources within and surrounding the development footprint.

Nature of the Impact	There is the possibility of pollution of surrounding watercourses during operation associated with runoff (containing fertilizers and pesticides) from irrigated areas.
Extent	**Site specific** – This is likely to only affect the non-perennial rivers, drainage lines and water storage dams within the farm boundary given the relatively disconnected nature of these systems to the Sundays River.
Duration	**Long-term**
Consequence / Intensity	**Medium**
Probability	**Probable**
Reversibility	**Reversible**
Degree of Confidence	**High**
Irreplaceable Loss of Resources	**Replaceable**
Status and Significance (without mitigation)	**Medium Negative (-)**
Mitigation	• Stormwater management and management of potential runoff as a result of irrigation must be in place. This could be in the form of berms or swales to capture and attenuate the runoff. • All storage of chemicals, fertilizers and hazardous substances must be in designated workshop/storage areas and in impermeable bunded facilities.

Significance and Status (with mitigation)	**Low Negative (-)**

8.3.1 Operational Phase Cumulative Impacts

It is anticipated that there will be cumulative operation impacts associated with the project. These relate to the change in the catchment hydrology through alteration and change in land use of the catchment of small non-perennial rivers and drainage lines occurring within and surrounding the project footprint. The layout and design of the proposed citrus expansion has taken into account appropriate buffers from the non-perennial rivers and drainage lines occurring within and surrounding the project footprint as far as possible. This approach to layout and design, coupled with the implementation of the mitigation measures provided in the operational impacts section will reduce the significance of these cumulative impacts.

9. LEGISLATIVE REQUIREMENTS

- Environmental Authorisation

Environmental Authorisation must be obtained prior to any construction activities taking place on site. The need for an Environmental Authorisation is triggered by the listed activities relating to developments within a watercourse in the EIA Regulations (2014, as amended), due to the proposed installation of irrigation infrastructure and construction of roads across drainage lines and non-perennial rivers identified on site.

- Water Use Licence/General Authorisation

A Water Use Licence or General Authorisation in terms of Section 21 (c) and (i) of NWA is required for all water use activities:

- Within a watercourse;
- Within the 1:100 year floodline or riparian habitat of watercourse; and
- Within 500m of wetland.

The relevant WUL/General Authorisation must be obtained from DWS prior to commencement of construction. These will be required for all watercourse crossings (pipelines and internal access roads) associated with this project.

10. CONCLUSION

It is the specialist's opinion that there are no fatal flaws associated with this development. The project involves the expansion of citrus orchards with some of these areas already transformed. The design layout has taken into account initial specialist findings and recommendations to avoid sensitive aquatic features as far as possible.

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Chapter 8: Soil Specialist Assessment: Land Capability Study

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

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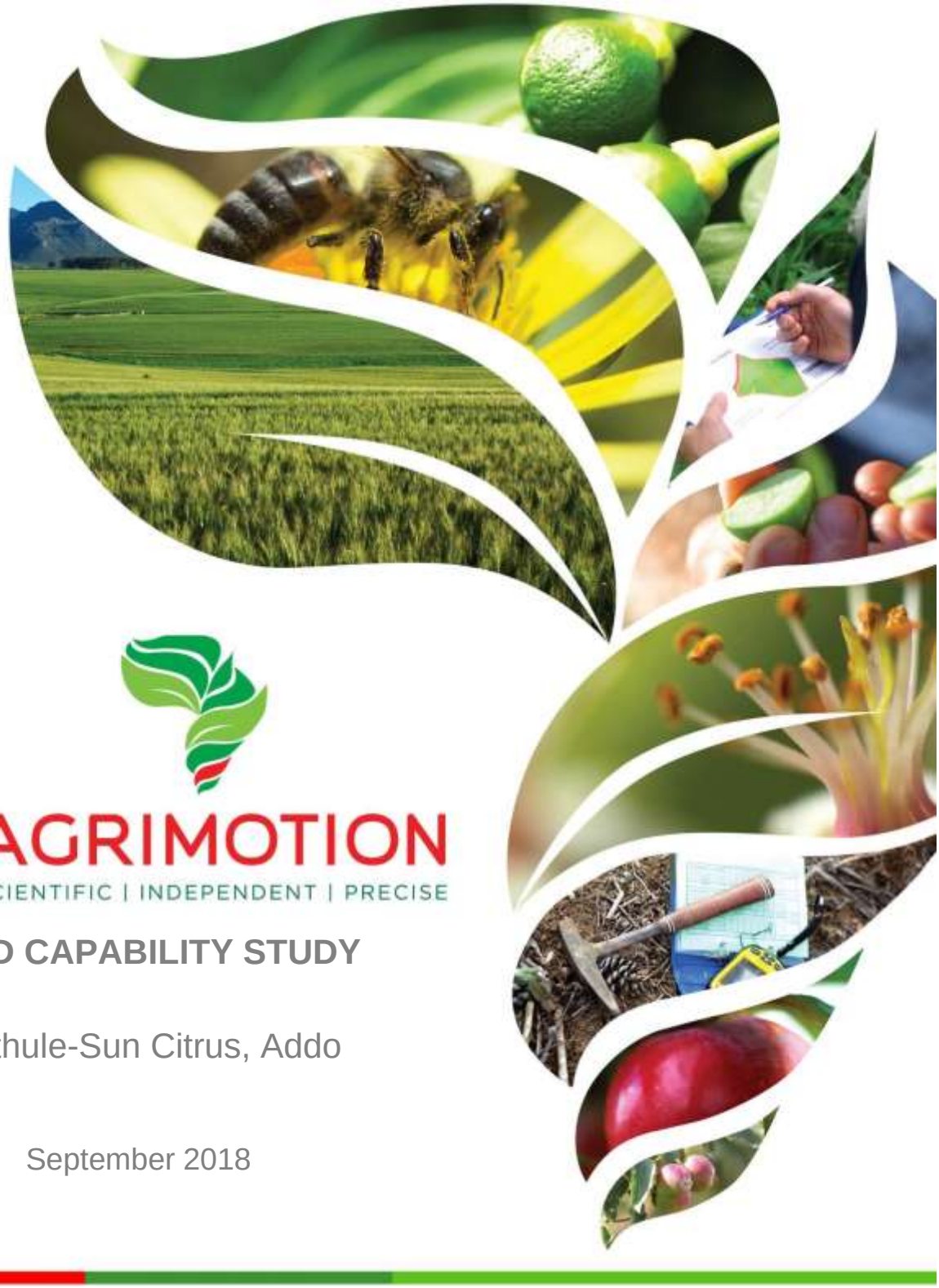
SUMMARY

The soil specialist study for this assessment was undertaken in two parts. An initial report surveyed a western portion of the farm, measuring approximately 128ha, in September 2018. This study identified an area of ~90ha that would be suitable for the commercial production of citrus. A second survey was subsequently undertaken on the central and eastern portion of the farm, measuring ~77ha in November 2019. The second study identified an additional 59ha that could potentially be planted with citrus. Therefore, based on the results of the two studies, a total area of ~149ha on RE/632 would be suitable for the cultivation of perennial crops. Due to the steep topography of some areas on the farm, slopes which have a percentage rise of 20% or higher have been deemed unplantable and were not investigated as part of the soil studies.

The key recommendations / amelioration measures from both reports are summarised as follows:

- Deep soil tillage to:
    - **a.** Loosen the soil with a **rip action** (only one direction) to improve root penetration and water infiltration and drainage
    - **b.** Shallow **mixing action** using a tine implement, which will loosen the topsoil to a depth of 30 cm and mix ameliorants into this layer.
    - **c. Ridge construction** using an excavator or grader to increase the root able volume of soil.
- Amelioration through addition of fertilizers as determined from the soil analysis.

During the reconnaissance survey conducted in September 2018 on the western portion of the farm, the northern tip of the gradual sloping area was not accessible due to dense vegetation. Although this area, measuring approximately 15 hectares, wasn't surveyed, the soil specialist is of the opinion that the soils in this portion of the farm will be similar to the majority of the soils identified across the rest of the site. Similarly, it is anticipated that these soils will have low - medium potential for citrus and will also require the use of the above recommended amelioration methods. Please refer to the specialist opinion provided by Agrimotion, attached as Annexure 1 to this Chapter.



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LAND CAPABILITY STUDY

Sonthule-Sun Citrus, Addo

September 2018

TABLE OF CONTENTS

1. INTRODUCTION

A land capability study comprising of a soil investigation was conducted in September 2018 at Sonthule, in the Addo area (**Appendix A**) by Bruno Herrmann from Agrimotion Consulting. The purpose of the study was to establish the suitability of the soil for commercial agriculture (citrus production). This reportdiscusses the terms of reference for the study, the soils observed, as well as the suitability of the soilsfor the cultivation of citrus. This report forms part of the Environmental Impact Assessment.

2. TERMS OF REFERENCE

The terms of reference (ToR) for a land capability study as requested by the applicant are stated below. The ToR for soil assessment for the application for clearing of natural vegetation for agricultural purposes are as follows:

- A reconnaissance soil survey of the uncultivated land in order to establish the soil distributionand limitations in terms of the soil's physical and morphological properties.
- Compilation of a soil map on a suitable scale to describe the natural distribution of the soils.
- Description of the different soil types in terms of their physical and morphological properties.
- To identify the more important soil physical and/or morphological limitations of the soil types.
- Evaluation of the relative suitability of the different soil types for cultivation of irrigated citrus.
- Assessment of chemical soil parameters determined from two (2) collected samples.

3. METHODOLOGY

Soil potential investigation

Predetermined positions for profile pits were sent through to the client to ensure that the total area wascovered, and that the observations are representative of the entire area under question. Due to very dense vegetation and steep topography, not all the locations could be reached by the TLB. The profilepit method is preferred to the soil auger method as the layering and structure can be observed in an undisturbed profile and the exact depth of limitations can be observed.

A total of 36 profile holes were investigated and classified according to the South African soil classification system (Published 1991, revised 2006) and the position of each profile hole was recordedby means of a GPS.

Profile classification entails identifying and distinguishing a specific sequence of **diagnostic soil horizons**. Horizons are horizontal layers which develop as a result of natural soil forming processes either from underlying rock or transported material. Within the South African soil classification system, 30 different diagnostic horizons are distinguished. Each diagnostic horizon is the result of a combination of soil forming factors that individually or collectively determine the characteristics of the horizon. In a broad sense, the major soil forming factors can be summarised as climate, topography, parent material and living organisms. The influence of these factors cause variation in soil structure, chemistry, wetness and the degree of weathering. It must also be noted that the same type of diagnostic horizon can vary quite considerably in terms of its clay content, sand grade, wetness, coarse fragments, depth, structure, colour, etc.

A specific sequence of diagnostic soil horizons determines the **soil form**. A total of 73 soil forms are defined in the South African soil classification system, each comprised of a unique horizon sequence. With the variation that can occur in each soil form, it is necessary to report all the profile characteristics in a soil code. The soil code is explained in **Appendix D** and the soil forms that were recorded in the surveyed area are described in **Appendix B**.

The soil description for each profile is given in a code format on the soil distribution map. The complete code is given in a table in **Appendix C**. The map indicates profile positions, soil distribution, soil potential and suitability. Soils of the same form were grouped and colour-coded based on their potentialfor the establishment of perennial crops.

Additional information regarding the soil's chemical attributes will also be supplied and evaluated oncelab analyses are complete and results obtained. This is to assess the influence of soil chemistry on thefeasibility of crop production in the area. Two soil samples were collected at specific sites and the following analyses will be completed: pH (KCl), resistance (Ohm), exchangeable cations, phosphorousand potassium content (mg/kg) and exchangeable acidity.

The soil properties, physical and chemical limitations and recommended soil management practices are discussed in the report and should be read with the map.

4. SOIL SUITABILITY

4.1 SOIL FORMS CLASSIFIED AT SONTHULE

Six (6) different soil forms were observed during the survey. The specific horizon sequence of each soiltype is as follows:

Brandvlei (Br)
Orthic A horizon (ot)
Soft carbonate (sk)

Coega (Cg)
Orthic A horizon (ot)
Hardpan carbonate (hk)

Gamoep (Gm)
Orthic A horizon (ot)
Neocutanic (ne)
Hardpan carbonate (hk)

Katspruit (Ka)
Orthic A horizon (ot)
Gleyed horizon (gc/gs)

Prieska (Pr)
Orthic A horizon (ot)
Neocarbonate (nc)
Hardpan carbonate (hk)

Shortlands (Sd)
Orthic A horizon (ot)
Red structured (vr)

See **Appendix B** for a detailed description of these soils according to South African Soil Taxonomy (Soil Classification Working Group, 1991).

See **Appendix C** for a map indicating the distribution of these soils. In addition, Appendix C also comprises of Table C1 indicating the soil codes as recorded in the field as well as a description of howto interpret the provided soil code.

Feel free to contact Agrimotion if further guidance regarding the interpretation of the soil code is required.

4.2 SOIL SUITABILITY INDEX

A soil suitability rating is awarded to each classified soil profile **according to the observations made in the field**. The index ranges between 1 (very poor) to 10 (exceptional) and it serves as an indication of the soil's capacity to sustain fruit production in its current natural state. Different soils are more or less suitable for different crop or cultivar types, depending on the plant's natural capacity to cope with different soil conditions. What should be kept in mind is that various cultivation practices can be appliedto the soil (e.g. soil preparation, ridging, drainage) to improve the soil's suitability for the cultivation of a specific crop.

The soil suitability distributions for Sonthule is shown in **Appendix C.** All of the observed soils fall within the medium to low suitability class and comprise of similar limitations to crop production. One deep profile with a medium high suitability was observed. The soil's suitability is briefly described in Table 1below.

Table 1. Soil potential description and suitability classes for Sonthule, Addo.

Soil Suitability Index & Class	General description of soils	Soil types & Area distribution (%)
6-7 **Medium High**	Bleached topsoil with a fine sand grade, 18% clay and no coarse fragments. The subsoil comprises of a non-luvic red structured horizon with 20% clay and no coarse fragments. A soft carbonate horizon is present underneath at a depth of 60 cm. The soft carbonate horizon contains 20% clay and no coarse fragments. Free lime and a high soil pH are the major limitations in these soils.	Shortlands (100%)
5-6 **Medium**	Bleached topsoil with a fine sand grade, 16-18% clay and between 10-20% coarse fragments. In the Gamoep soil form the subsoil comprises of a neocutanic horizon without any structure. The clay content is between 16-20% and 0-10% coarse fragments are present. At a depth of 40 cm a limiting layer consisting of coarse fragments cemented by carbonate occur. This layer contains 80% coarse fragments and 10-12% clay. In the Shortlands soil form the subsoil comprises of a red structured horizon. Even though there is a clay increase of 6-8% between the topsoil and this red structured layer, the soil structure is still favourable and does not present any limitations. At a depth of 40 cm a limiting layer consisting of coarse fragments cemented by carbonate occur. This layer contains 80% coarse fragments and 10-12% clay. The biggest limitation in this area are the hard carbonate layers, which should be broken up but not brought to the surface. The high pH and carbonate content present chemical limitations for root nutrient uptake.	Gamoep (43%) Shortlands (57%)
4-5 **Medium Low**	Bleached topsoil with a fine sand grade, 12-16% clay and between 10-20% coarse fragments. In the Brandvlei soil form the subsoil comprises of a soft carbonate horizon, which starts at a depth of 20 cm below the soil surface. This layer contains 12-14% clay and 20-60% coarse fragments, mostly comprising of larger rocks.	Brandvlei (42%) Coega (33%) Gamoep

	Limitations exist in this layer due to high pH and carbonate content. At a depth of 50 cm a hard carbonate layer occurs, consisting of coarse fragments cemented by carbonates. This layer contains 60-80% coarse fragments and 12-14% clay. In the Coega soil form the subsoil comprises of a hard carbonate layer which occurs at a depth of 30cm. This limiting layer contains 10-20% clay and 80% coarse fragments, mostly comprising of larger rocks. In the Gamoep soil form the subsoil comprises of a neocutanic horizon without any structure. The clay content is 18% and contains 10% coarse fragments. At a depth of 40 cm a limiting layer occurs, consisting of coarse fragments cemented by carbonates. This layer contains 80% coarse fragments and 10-12% clay. In the Prieska soil form the subsoil comprises of a neocarbonate horizon which contains 16% clay and 50% coarse fragments. This horizon has the same favourable soil structure as a neocutanic horizon, however free lime is present. At a depth of 40 cm a limiting layer occurs, consisting of coarse fragments cemented by carbonates. This layer contains 30% coarse fragments and 10% clay. In the Shortlands soil form the subsoil comprises of a red structured horizon. Even though there is a clay increase between the topsoil and this red structured layer, the soil structure is still favourable and does not present any limitations. At a depth of 40 cm a limiting layer occurs, consisting of coarse fragments cemented by carbonates. This layer contains 50-80% coarse fragments and 14-16% clay. Free lime represents the biggest limitation in this area. In the case of the hardened carbonate layers, a physical and chemical limitation is present.	(8%) Prieska (8%) Shortlands (8%)
3-4 **Low**	Bleached topsoil with a fine sand grade, 12-18% clay and 20-60% coarse fragments. In localized areas carbonates are also present in the topsoil. These are indicated on the soil map. In the Coega soil form the subsoil comprises of a hard carbonate layer which occurs at a depth of 30cm. Thislimiting layer contains 10-14% clay and 80% coarse fragments, mostly comprising of larger rocks. In the Shortlands soil form the subsoil comprises of a red structured horizon. There is a clay increase of 8% between the topsoil and the subsoil, which results in a denser subsoil horizon. This horizon also contains carbonates and therefore limits the usable soil to the top 10 cm. The most significant limitations in this area are the carbonates, present in both the soft and hard variants. The hard carbonates however present the biggest limitation due to the physical limitations. Areas where the topsoil is calcareous should also be avoided.	Coega (57%) Brandvlei (36%) Shortlands (7%)

1-2 Not suitable	Bleached topsoil with a fine sand grade, 20% clay and 30% coarse fragments. The subsoil is comprised of a gleyed horizon, containing 35% clay and no coarse fragments. Weathered parent material with signs of wetness occur at depth. The soils in this area is not suitable for perennial crop production.	Katspruit (100%)

Table 2. Summary per suitability class for Sonthule, Addo.

Suitability Class	Limitation	% of observations	Approx. Area (ha)
6-7 Medium High	• Steep topography • Free lime in subsoil	0.23	0.3
5-6 Medium	• Free lime in subsoil. • Physical limitation at 40cm, caused by the hard carbonate layer. • Localized areas with high amounts of coarse fragments.	14.62	18.78
4-5 Medium Low	• Free lime in subsoil. • Physical limitation at 40cm, caused by the hard carbonate layer. • Localized areas with a high amount of coarse fragments.	27.16	34.87
3-4 Low	• Free lime in subsoil. • Physical limitation at 30-40cm, caused by the hard carbonate layer. • Localized areas with free lime in the topsoil.	57.20	73.45
1-2 Not suitable	• Periodic waterlogged conditions. • Dense clay layer. • Free lime in topsoil	0.79	1.02*

*According to the applied interpolation model only 1.02 Ha are not suitable. This calculation however has not considered any steep topography or areas where profiles have not been dug. The unsuitable areas are indicated in **Appendix G**, on the Soil Form & Soil Suitability Map. Unsuitable areas have been identified while surveying the area and are made up of the following:

- 1.74 Ha (small area, valley north of the surveyed area, steep topography)
- 15.45 Ha (larger area, all the valleys across the surveyed area, steep topography)
- 7.51 Ha (Katspruit, lowest lying areas, calcareous A, includes 1.02 Ha Ka)

  24.7 Ha Total (Not suitable)

4.3 GENERAL DESCRIPTION OF THE CLASSIFIED SOILS

Although similar soil forms were recorded across the classified area, variations in the depth and consistency of the subsoil horizons dictate the suitability of the soil for crop production. Calcareous horizons were also observed in all of the profiles and represent one of the major limitations to crop production in the area.

The topsoil across the classified area is fairly uniform and extends to depths of between 20-30 cm. These soil horizons exhibit a red-brown (slightly bleached) colour and comprise of a fine sand fraction. In addition, the topsoil also contains 14-20% clay. Coarse fragments were observed at a few profiles and are mainly in the form of rocks with diameter 2.5 -7.5 cm and larger. Crop production will mostly take place in this top 20-30 cm of soil. In localized areas carbonates are present in the topsoil.

Where the profiles are deeper and not limited by a hardpan carbonate layer, the subsoil comprises primarily of neocutanic, neocarbonate, soft carbonate or red structured horizons (Gamoep, Prieska, Brandvlei and Shortlannds). The soils will be discussed in further detail as per horizon.

Per definition, the neocutanic horizons are young and develop on transported materials. Physically, thishorizon presents the ideal structure for root growth. Physical and chemical limitations only occur in thehorizon below (hardpan carbonate). On the surveyed area the Gamoep soil form is mainly found towards the northern side, in the lower parts of the upper slope.

Where carbonates are present, but do not dominate the morphology, the subsoil horizon is described as a neocarbonate. This horizon has the same physical properties as a neocutanic horizon, but free-lime carbonates have accumulated in this layer. The Prieska soil form is found towards the northern side, in the lower parts of the upper slope.

In the soft carbonate horizon, free-lime carbonates dominate the morphology of the subsoil. Even though these soils do not present any physical limitations, they are highly limiting with regards to soil chemistry. Free lime creates a chemical limitation to roots by increasing the soil pH and making it difficult for roots to take up nutrients. The soft carbonate horizon is widely spread over the area and forms partof the Brandvlei soil form, which is found in the mid part of the upper slope.

A higher clay content in the subsoil has led to the formation of moderate structure. In most cases the transition would be a neocutanic horizon. The moderate structure however puts it in the red structured category. The red structured horizons of the Shortlands soil form are mostly found in lower parts of theupper slope. An accumulation of clay is caused due to the topographically lower lying position. The moderate soil structure in this case does not present any limitations to root development, but the carbonate layers underneath physically and chemically limit root and crop growth.

The soils at Sonthule will need to be prepared (loosening action, ridging) correctly, ensuring no subsoil material is brought to the surface, in order to make crop production viable in this area.

Figure 1. The typical Branvlei (Left) and Coega soils (Right) observed at Sonthule, Addo.

4.4 SOIL LIMITATIONS

The soils described above have been grouped into suitability classes specifically for the cultivation of perennial crops, based on the limitations present within each observation. The limitations are described below.

4.4.1 Free lime

Free lime present in all the soils, at varying depths, which leads to an increase in the soil pH. This increase may lead to lowered nutrient availability to pH sensitive crops. Elemental deficiencies such asphosphorous, zinc, copper and iron may occur in these crops, which will greatly hamper crop performance. In some cases, the free lime conditions may also be associated with salinity problems. For this reason, these soils need to be analysed chemically and ameliorated accordingly.

4.4.2 Impermeable calcareous layer

Dense layers, cemented by calcium carbonates, are present over the whole area, at varying depths. These layers need to be broken without bringing the carbonate rich material to the surface.

4.4.3 Wetness

Waterlogging within the plant root zone is extremely detrimental to crop production. When soils become saturated with water, oxygen is displaced from the soil pores resulting in a decrease in the rate of diffusion at the root-soil interface. Soil wetness is evident in the valley bottom and lower lying areas (Ka). Drainage will be required and deep soil preparation to break any limitations and create preferential drainage paths.

4.5 AMELIORATION AND SOIL PREPARATION

To be able to transform the existing soil body at Sonthule into an economically productive agriculturalunit, the following amelioration practices would be required:

- Deep soil tillage to:
    - **a.** Loosen the soil with a **rip action** (only one direction) to improve root penetration andwater infiltration and drainage
    - **b.** Shallow **mixing action** using a tine implement, which will loosen the topsoil to a depthof 30 cm and mix ameliorants into this layer.
    - **c.** **Ridge construction** using an excavator or grader to increase the root able volume ofsoil.
- Amelioration through addition of fertilizers as determined from the soil analysis.

These recommendations are not final and will be refined according to the results of a detailed soil survey.

5. TOPOGRAPHY

Due to the steep topography some areas were not reachable by the TLB to dig profile pits. These areashave been identified and are indicated on the **Slope Percentage Rise map (Appendix E) and Soil Form & Suitability Map (Appendix G).**

Five (5) meter contours have been used to analyse the area. Two areas have been identified which have a gradual topography and a slope below 5%. The steepest slopes have been removed and do notform part of the potential area. See Appendix G.

Slopes that are greater than 10% are likely to have a higher risk of erosion if cleared of vegetation anddeveloped for the commercial production of citrus.

6. SUMMARY & CONCLUSION

Medium to low potential soils are prevalent across Sonthule Farm in Addo. Soil suitability is limited by calcareous subsoil layers across the whole area. The higher lying areas with gradual topography can be further investigated by means of a detailed survey. Areas with steep topography should not be investigated further.

Although the initial investigation indicates that the soils are marginally suited for the cultivation of perennial crops, appropriate soil preparation (e.g. deep soil tillage, ridging, and fertilizer) can serve to significantly improve the soil's ability to sustain perennial crops. The physical and chemical limitations of the calcareous soils will have to be considered as well as the cost involved for amelioration.

Two areas have been identified for further investigation **(Appendix G)** and make up a total of **90 hectares**:

A. 69.57 Ha

B. 20.41 Ha

During the reconnaissance survey the northern tip of the gradual sloping area was not reached due todense vegetation. Even though this area wasn't surveyed, the boundary of area A can be moved further north to compile a detailed survey thereof.

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APPENDIX A – AREA MAP

Figure 2: The location of Sonthule relative to Addo in the Eastern Cape Province of South Africa.

APPENDIX B - DESCRIPTION OF SOIL FORMS OBSERVEDAT SONTHULE, ADDO

Brandvlei (Br)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Soft carbonate horizon (sk):

The soft carbonate horizon is characterised by a build-up of free carbonates but to such an extent that the carbonates dominate the morphology of the horizon. This feature is used to distinguish a soft carbonate horizon from a neocarbonate B. Similarly, free carbonates create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Coega (Cg)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Hardpan carbonate horizon (hk):

The hardpan carbonate horizon is characterised by a build-up of free carbonates to the extent that the carbonates have cemented the horizon. The hardened nature of these horizons in effect pose a restriction to root growth and water infiltration. Hardpan carbonate horizons usually developed in drier areas where carbonates can accumulate without being leached out of the soil through frequent rainfall events.

Gamoep (Gm)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocutanic B horizon (ne):

A neocutanic B horizon is a weakly structured subsoil with cutanic character. Cutanic character refers to a morphological feature where mobile clay and other soil material forms films or skins (cutans) around larger soil aggregates. The presence of cutans are in many instances indicative of a more dispersive clay phase. Neocutanic horizons can vary in colour although the expression of cutans imply that colour will not be uniform as with red and yellow-brown apedal subsoils. Neocutanic horizons are young and by definition develop on transported materials. Physically, this horizon represents the ideal structure for root growth although chemical characteristics can be variable.

Hardpan carbonate horizon (hk):

The hardpan carbonate horizon is characterised by a build-up of free carbonates to the extent that the carbonates have cemented the horizon. The hardened nature of these horizons in effect pose a restriction to root growth and water infiltration. Hardpan carbonate horizons usually developed in drier areas where carbonates can accumulate without being leached out of the soil through frequent rainfall events.

Katspruit (Ka)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

G horizon (gs / gc / gl):

A diagnostic G horizon is a gleyed soil horizon that is, per definition, saturated with water for long periods of the year. These horizons are structurally diverse, exhibit low chroma (grey) colours and has a consistency that is firmer than the overlying A or E horizon. Sesquioxide mottles are often also present but not to the extent that the horizon has a plinthic character. These horizons also do not resemble saprolite. No removal of colloidal material has taken place but rather an accumulation thereof can be observed implying heavier textures. A G horizon usually occurs in lower lying landscape positions and is associated with wetland conditions. They pose a distinct restriction to root growth due to the anoxic and reducing conditions brought about by water saturation.

If a thick A or E horizon is present, crops that are less sensitive to wetness can be cultivated on ridges, with drainage also being an option in some instances.

Prieska (Pr)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocarbonate B horizon (nc):

A neocarbonate B is similar in concept to the neocutanic B (weakly structured, non-uniform colour, cutanic character) except that this horizon is characterised by a build-up of free carbonates. These carbonates do not, however, dominate the morphology. Neocarbonate horizons develop in dry climates or in lower lying landscape positions where leaching is restricted. The free carbonates can create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Hardpan carbonate horizon (hk):

The hardpan carbonate horizon is characterised by a build-up of free carbonates to the extent that the carbonates have cemented the horizon. The hardened nature of these horizons in effect pose a restriction to root growth and water infiltration. Hardpan carbonate horizons usually developed in drier areas where carbonates can accumulate without being leached out of the soil through frequent rainfall events.

Shortlands (Sd)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Red structured B horizon (vr):

A Red structured B horizon has a moderate to strongly developed block structure similar to a pedocutanic B but also exhibits a uniform red soil colour (as for the red apedal B). The red colours are again the result of the presence of hematite (Fe oxide) coatings on the soil mineral particles. In addition, the moderate to strongly developed block structure represents a restriction to root growth although variations in the degree of structural development is often present. Fine blocky structure is more suitable for root development and crop cultivation than a coarser block structure.

APPENDIX C - SOIL DISTRIBUTION AND SUITABILITY MAP

Appendix C. Map indicating the soil type distribution and suitability towards crop production at Sonthule, Addo. The profile positions as well as the soil form abbreviation is indicated on the map andtable. The lighter orange/yellow colour represents soils with a Medium–Low Potential whilst the darkerorange colour represents Low potential soils. In general, the soils observed at Sonthule are marginallysuited for crop production in their current natural state. With the correct soil preparation and rootstock selection the entire area (indicated in Appendix G) can however be considered for cultivation, after conducting a detailed survey. The colours correlate with Table 1 in Section 4 of the report

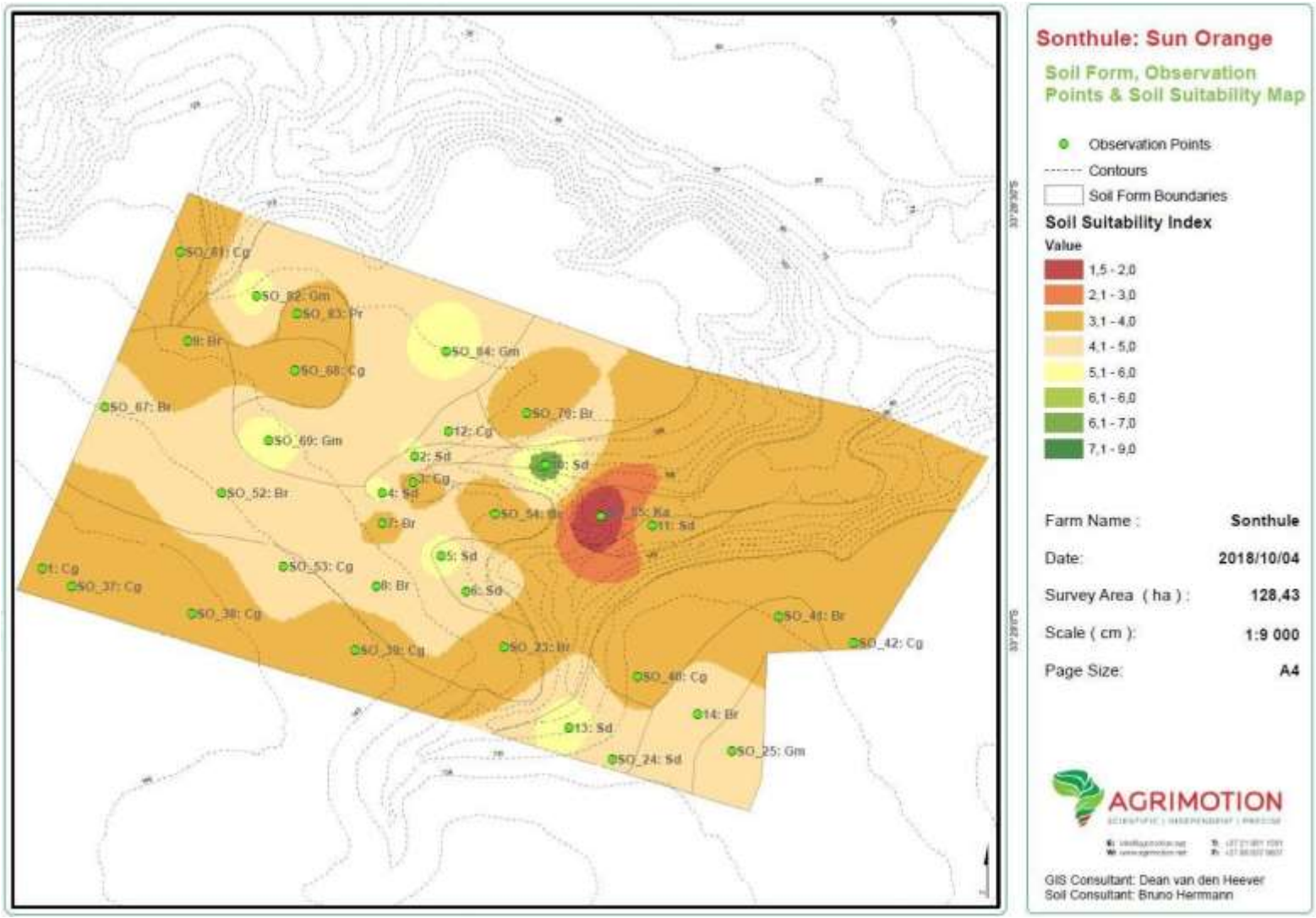


Figure 2 - -Observation point and abbreviated soil code on a soil suitability map.

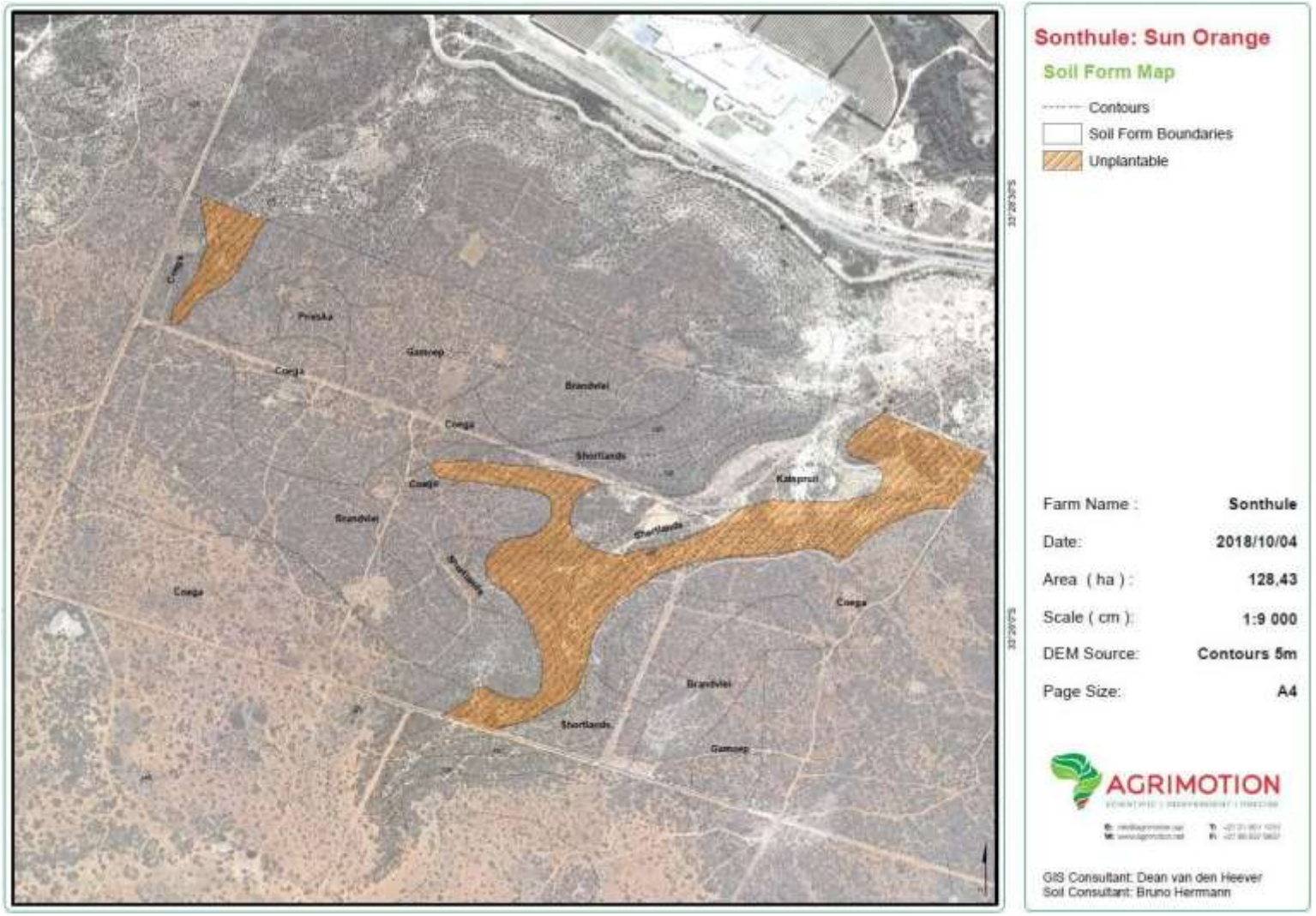


Figure 4 – Soil Form and non-suitable areas

Table C1. Soil codes as described in the field**.**

Profile number	Code above line	Code below line
SO_23	2 Br 1000 sk(12)+f2g3k1 (60/20) (3.5)	f3 fi 3(12) 2
SO_24	24 Sd 1220 hk(14)+g3k5 vr(14) (60/40) (4.5)	fi 1(14) 2
SO_25	14 Gm 2210/Sd hk(-)+g2k4 ne/vr(18)+g1 (60/40) (5.0)	fi f1g1 4(16) 3/4
SO_37	3 Cg 1000 hk(5) (60/30) (3.5)	fi 4(18) 2
SO_38	3 Cg 1000 hk(5) (60/30) (3.5)	fi 4(18) 2
SO_39	3 Cg 1000 hk(5) (60/30) (3.5)	fi 4(18) 2
SO_40	3 Cg 1000 hk(10)+g5k3 (60/30) (3.5)	f1g5 fi 4(18) 2
SO_41	13 Br 1000 hk(-)+g3k5 (60/20) (3.5)	g2 fi 3(12) 2
SO_42	3 Cg 1000 hk(10)+g3k5 (60/30) (4.5)	f1 fi 4(18) 2
SO_52	25 Br 1000 hk(14)+g3k5 sk(14)+g2k4 (60/30) (4.5)	g2 fi 3(14) 2
SO_53	3 Cg 10000 hk(12)+g3k5 (60/30) (4.5)	g3 fi 4(16) 2
SO_54	25 Br 1000 hk(12)+g3k5 sk(12)+g3k3 (60/20) (3.5)	g2 fi 3(14) 2
SO_55	15 Ka 1000 sw(35)+f3g5 gc(35) (60/20) (1.5)	f3 fi 4/5(20) 6
SO_67	3 Br 1000/Cg sk/hk(14)+g3k3 (80/30) (4.5)	g1 fi 4(16) 2
SO_68	3 Cg 1000 hk(5) (60/30) (3.5)	f1g3 fi 4(18) 2
SO_69	14 Gm 2210 hk(12)+g3k5 ne(16)+g1 (60/40) (5.5)	g1 fi 3(14) 2
SO_70	25 Br 1000 hk(12)+g3k5 sk(12)+g3k3 (60/20) (3.5)	g2 fi 3(14) 2
SO_81	3 Cg 2000 hk(14)+g3k5 (60/30) (3.5)	f1 fi 4(16) 2
SO_82	14 Gm 2210 hk(10)+g3k5 ne(18) (60/40) (5.5)	g2 fi 4(16) 2
SO_83	14 Pr 2210/Cg hk(10)+g3 nc/sk(16)+f1g2k2 (60/20) (4.0)	f2g1 fi 4(16) 2
SO_84	14 Gm 2210 hk(-)+g3k5 ne(20)+f1 (60/40) (5.5)	f1 fi 4(16) 2
1	3 Cg 1000 hk(5) (60/30) (3.5)	fi 4(18) 2
2	25 Sd 1110 hk(10)+f2g4 vr(24) (80/40) (5.5)	f1g1 fi 4(16) 2
3	3 Cg 1000 hk(5) (60/30) (3.5)	fi 4(18) 2
4	24 Sd 1110 sk(12)+f2g2k3 vr(24)+f3 (80/40) (5.5)	fi 4(18) 2
5	24 Sd 1110 sk(12)+f2g2k3 vr(24)+f3 (80/40) (5.5)	fi 4(18) 2
6	24 Sd 1110/Gm hk(16)+k5 vr/ne(26)+g1k2 (80/40) (5.0)	f1g1k1 fi 4(16) 2
7	1 Br 1000/Cg sk/hk(10)+f3g3k2 (80/20) (4.0)	f1 fi 2/3(10) 2
8	25 Br 1000 hk(14)+g3k3 sk(14) (80/20) (4.5)	fi 3(14) 2
9	24 Br 1000/Cg sk/hk(14)+f2g3k3 (80/20) (3.5)	fi 3(14) 2
10	36 Sd 1110/Et sk(20) vr/ne(20) (80/60) (6.5)	fi 4(18) 2
11	15 Sd 3110 sk/vr(26) vr/sk(26) (80/30) (3.5)	fi 4(18) 3/4
12	4 Cg 1000 hk(20)+g2k6 (60/40) (4.5)	fi 4/5(20) 2
13	3 Cg 1000 hk(18)+g3k5 (60/30) (4.5)	g1k2 fi 4(18) 2
13	14 Sd 1110/Gm hk(-) vr/ne(24)+f2 (60/40) (5.5)	f1g2k3 fi 4(18) 3/6
14	25 Br 1000 hk(12)+g3k5 sk(12)+g2 (60/20) (4.5)	g2 fi 3(12) 2

APPENDIX D - DESCRIPTION AND INTERPRETATION OF SOIL CODE

363 Oa 1210/Tu lo/lw(45)+f2g3 ne/yp(20)+f3 (80/30)

(6)f2 me 2(8) 2/3

The information above the line explains the soil type, family and subsoil horizon characteristics.

363:	Horizon depths:	The first numbers in the soil code provides an indication of the depth at which horizon transitions occur. In the provided example, the A horizon ranges from 0-30cm (with the transition at 30 cm i.e. depth code 3), the B horizon from 30-60cm and the last horizon begins at 60cm. The repeated 3 at the end is used to indicate that coarse fragments start at a depth of 30cm.
Oa:	Soil form:	The symbol for the soil form. Each of the 73 soil forms have a unique 2-letter symbol. These symbols, together with the soil form descriptions, are given in appendix B.
1210:	Soil family:	The next four numbers indicate the soil family. It provides additional diagnostic characteristics that are common in a given soil form. This can include the presence of carbonates, soil colour, structure etc.
/Tu:	Transitional form:	In many instances a soil profile can possess characteristics similar to that of a variety of soil forms. The dominant horizon characteristics then need to be used to differentiate between the potential soil form options. An alternative soil form can be reported in the soil code using a / after the dominant soil form and family have been established.
lo/lw:	Subsoil horizons:	The properties for the subsoil horizons are always provided directly after the soil family code. Each of the diagnostic horizons have a unique 2-letter symbol as indicated in appendix B. If the material foundat the bottom of the classified profile cannot be inferred from the soil form, this 2-letter symbol is used to provide further description. In this example, the last horizon is a transition, as indicated with the '/lw'. Thehorizon abbreviations are provided in appendix B.
( ):	Subsoil clay percentage	The clay percentages of the observed subsoil horizons are indicated in brackets after the specific horizon description.
+f2g3:	Coarse fragments:	There are 20% fine coarse fragments (i.e. letter 2) and 30% medium coarse fragments (i.e. letter 3) noted in the last horizon. Symbols & diameter: 'f' for fine (0.2 – 2.5cm), 'g' for medium (2.5 - 7.5cm), 'k' for stone (7.5 – 25cm) and 'r' for rock (25+cm).
(yp):	Additional horizon properties:	Additional properties for each subsoil horizon can be indicated after the specific subsoil horizon description. In the example above the B horizon is hard setting when dry (yp).

(80/30): Rip and delve depth: The pair of numbers in brackets indicate the *depth in cm* to which 1) a rip-action can be completed and 2) to which depth the soil can be mixed.

(6.5):	Soil Potential:	The second number in brackets is the soil's potential which is given out of a total of 10. This concept is discussed further in section 4.

The information below the line characterises the topsoil horizon and profile wetness.

f2:	Coarse Fragments:	There are 20% fine coarse fragments in the A horizon.
me:	Sand grade:	The A horizon has a medium sand grade. 'me' for medium sand grade, 'fi' for fine sand grade and 'co' for coarse sand grade.
2(8):	Clay percentage:	This indicates that there is an estimated 8% clay in the A horizon.
2/3:	Soil wetness:	The 2/3 class is a soil wetness estimation dependent on the depth at which the signs of wetness were observed, and the period of time that the soil will remain wet for. A wetness class of 1 indicates that the soil in the profile is dry throughout the year. A soil with a wetness class of 9 is saturated with water from a depth of 30cm for the whole year.

APPENDIX E – TOPOGRAPHY MAPS

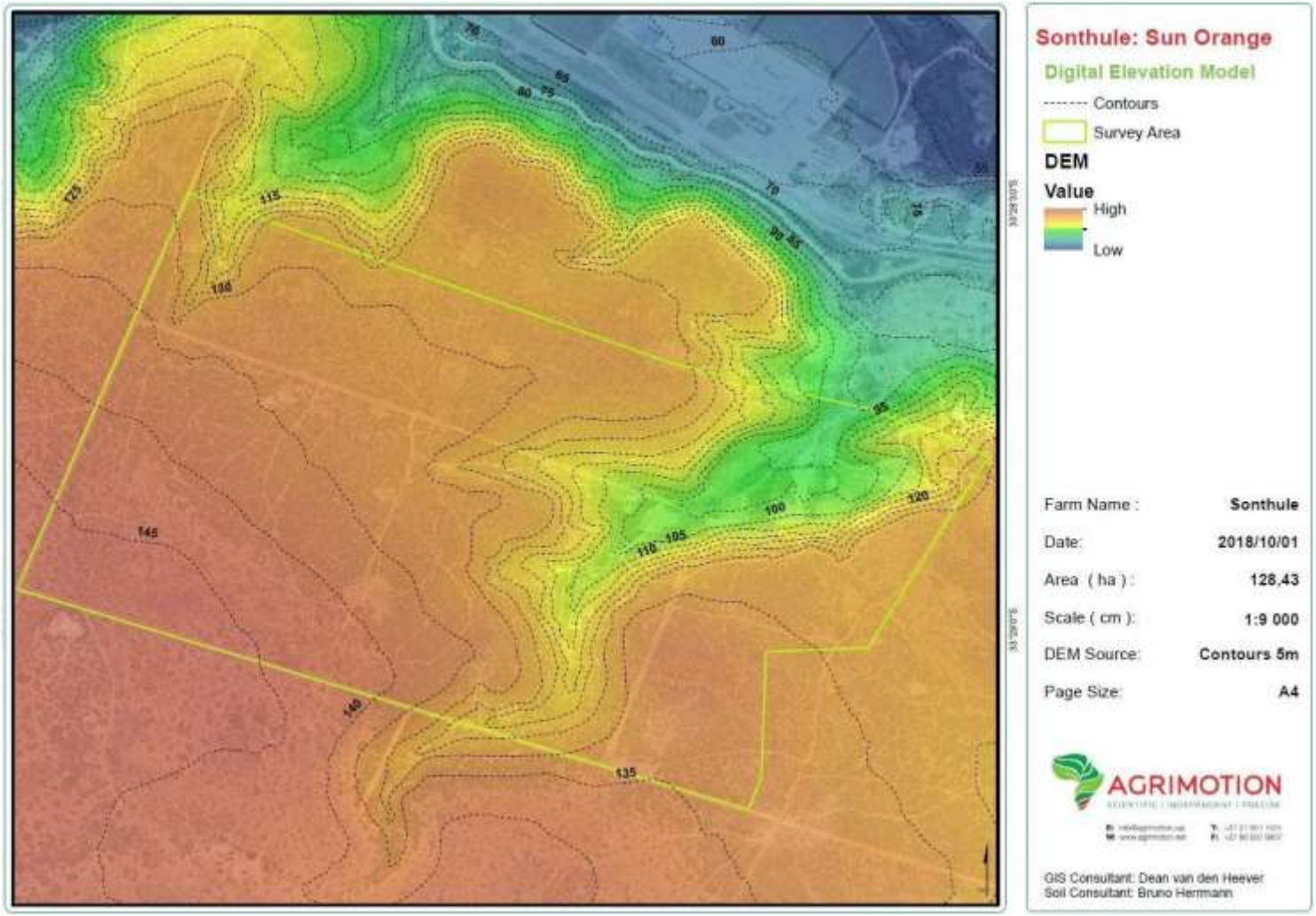


Figure 5 - Digital Elevation Model

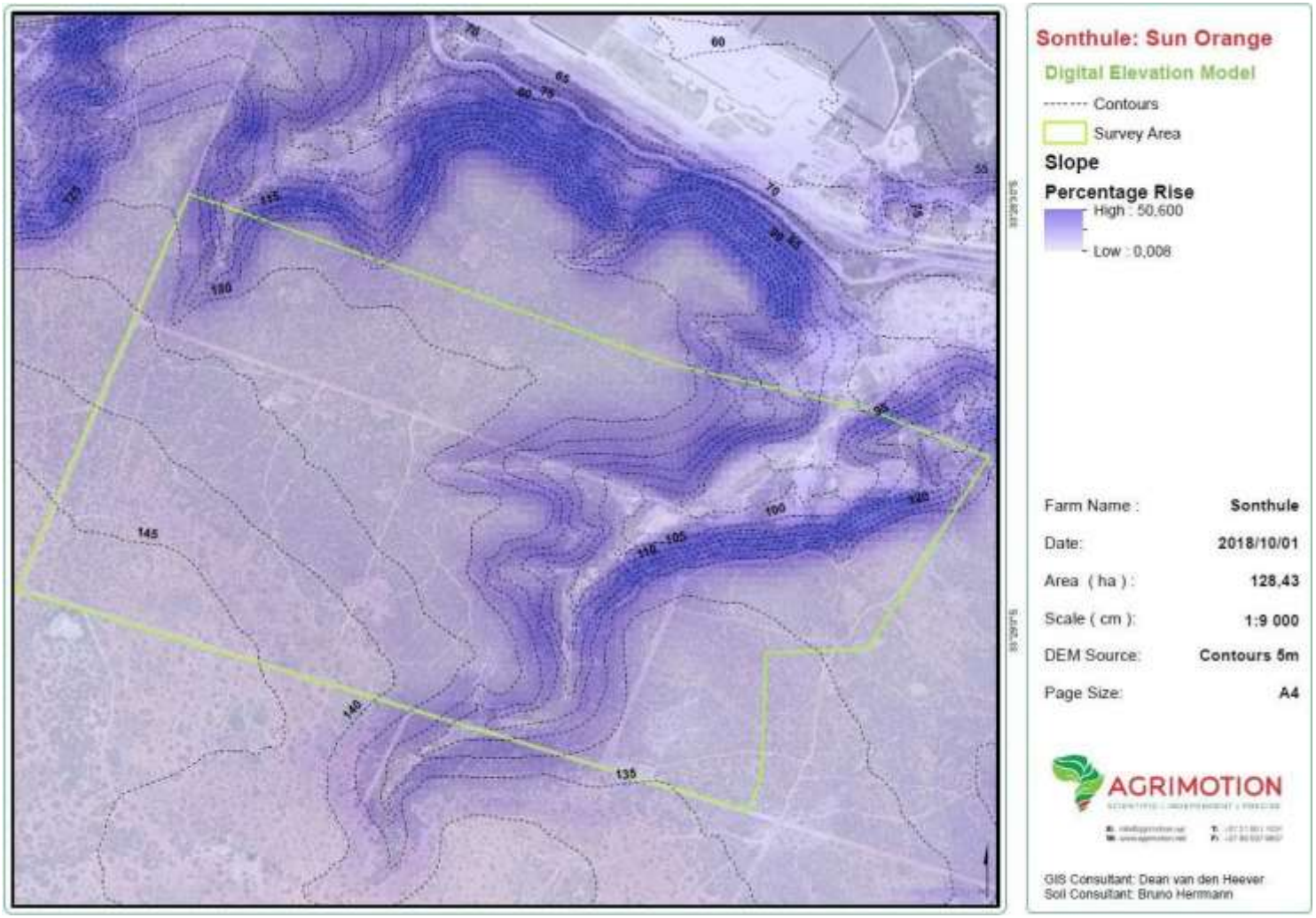


Figure 6 - Slope Percentage Rise

APPENDIX F - EFFECTIVE PROFILE DEPTH

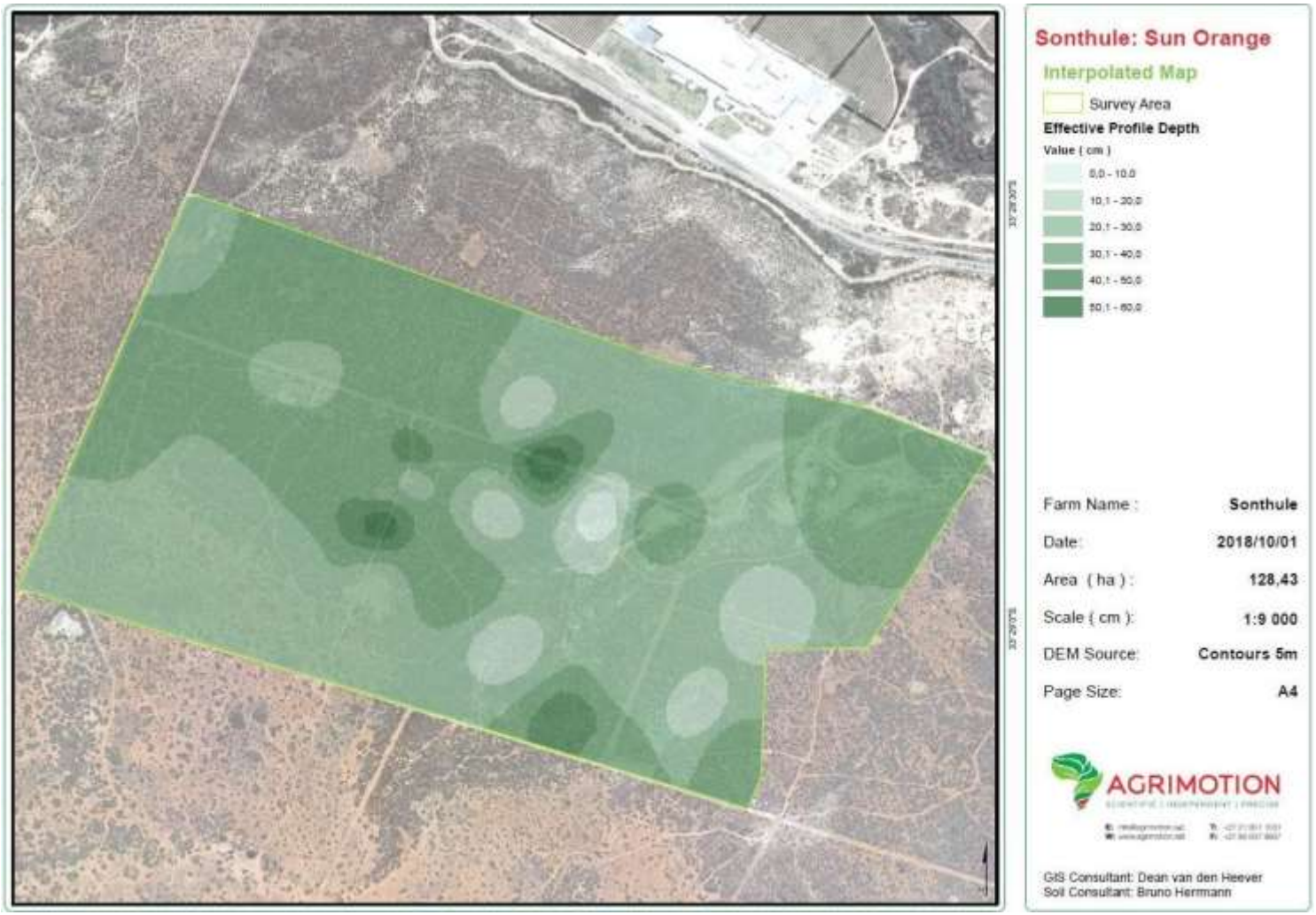


Figure 7 - Effective Profile depth determined by calcareous layer.

APPENDIX G - AREAS

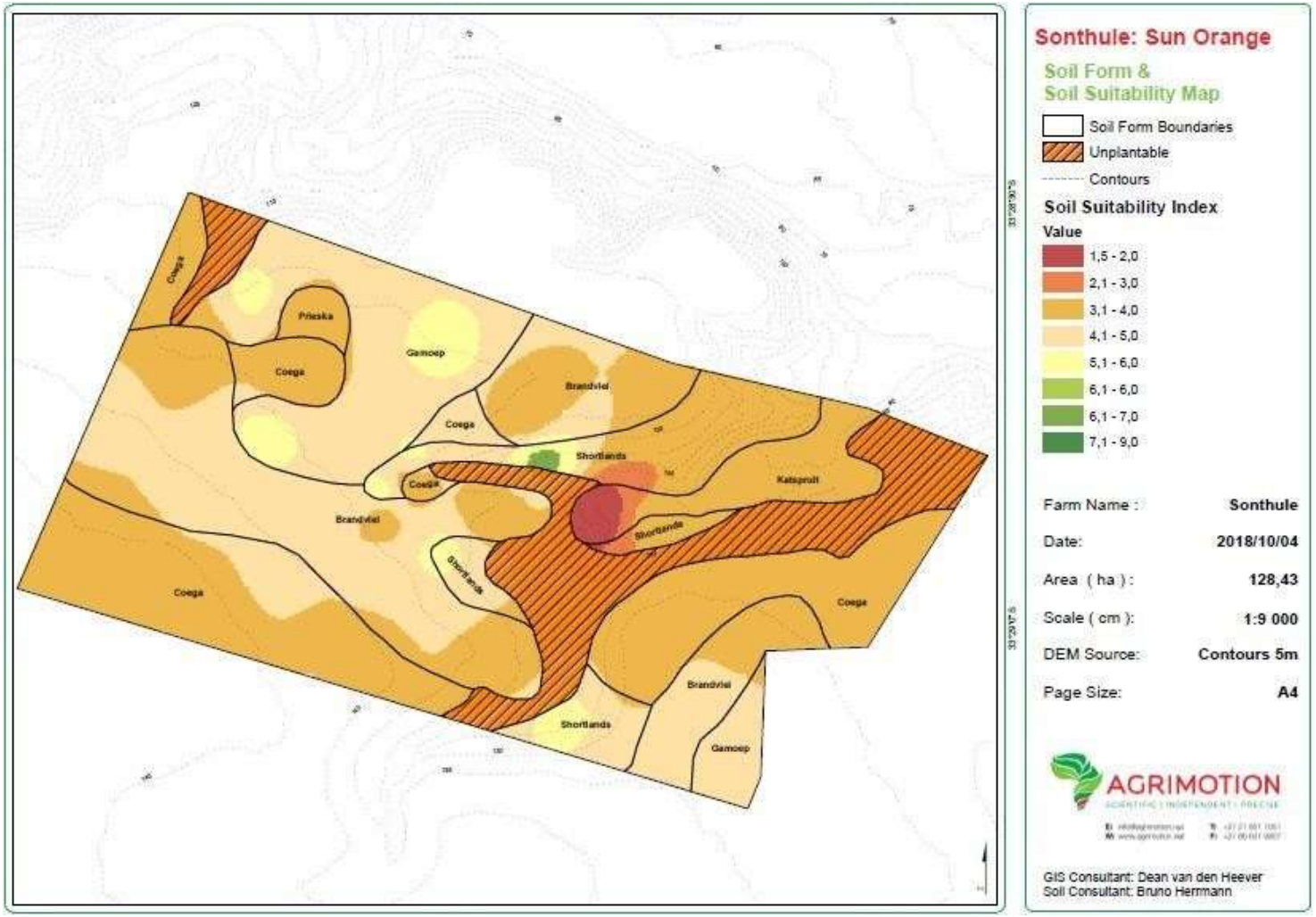


Figure 8 - Map indicating non-suitable areas as determined by slope percentage.

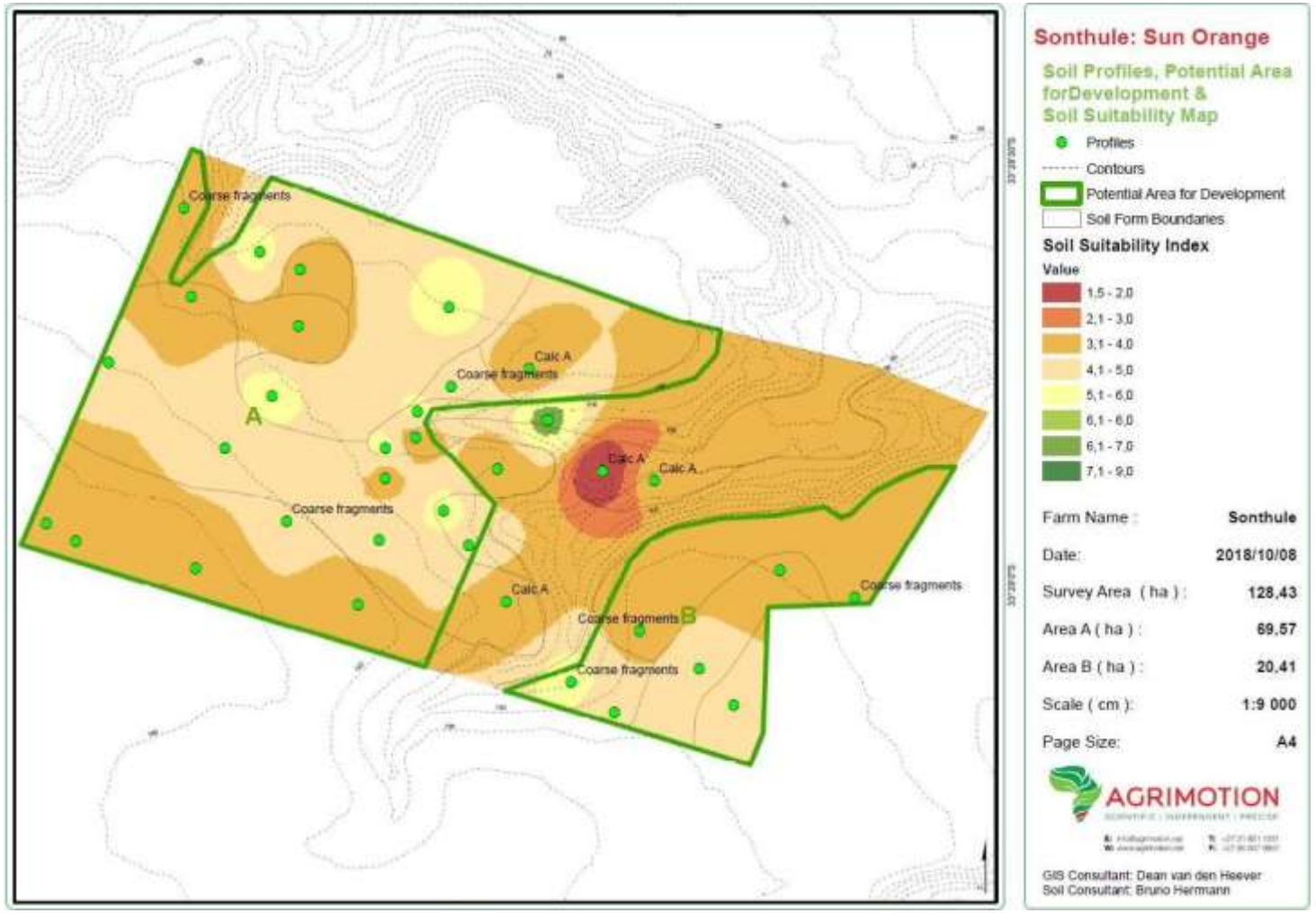
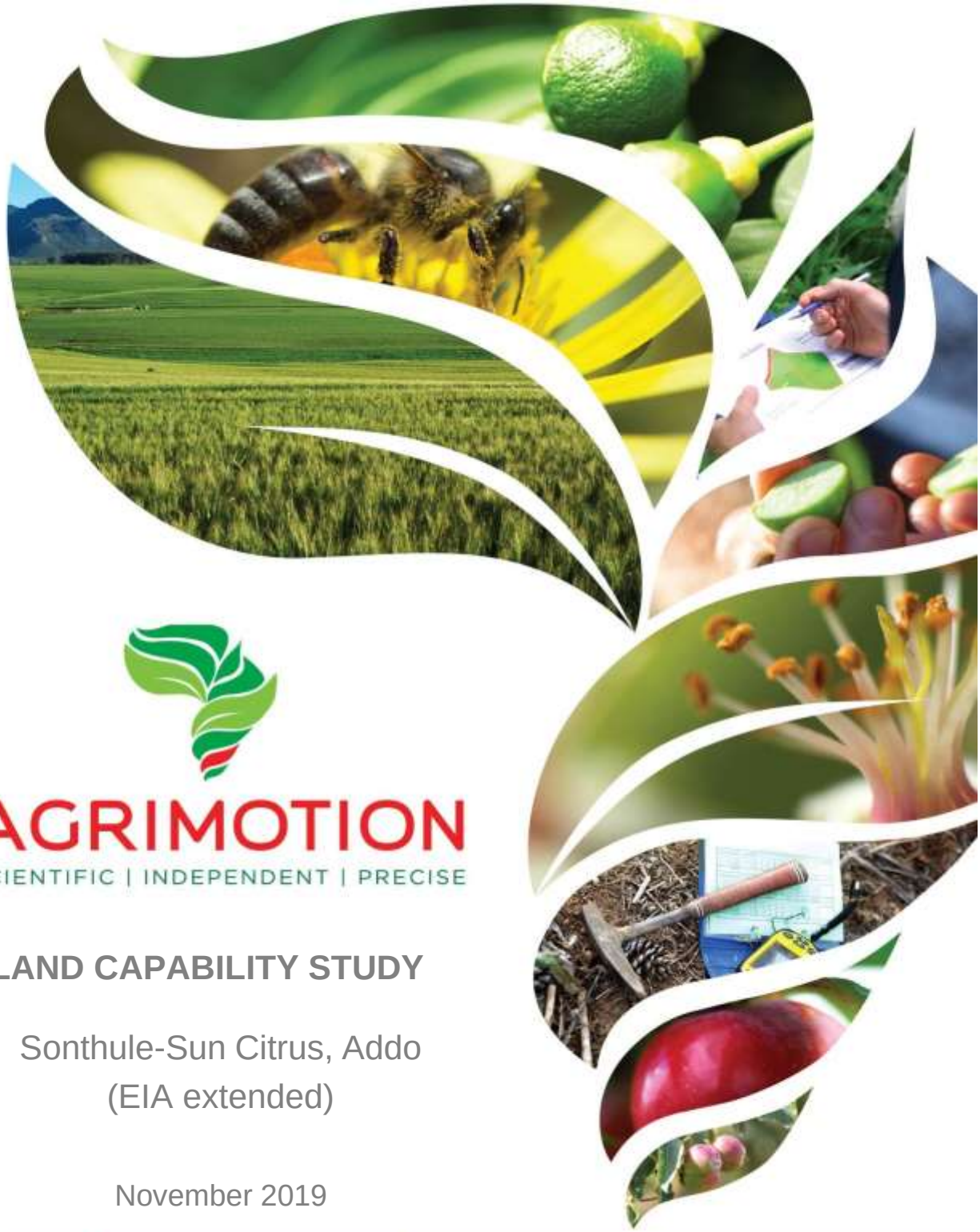


Figure 9 – Map with two potential areas (A & B) for further investigation



AGRIMOTION

SCIENTIFIC | INDEPENDENT | PRECISE

LAND CAPABILITY STUDY

Sonthule-Sun Citrus, Addo
(EIA extended)

November 2019

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TABLE OF CONTENTS

1. INTRODUCTION

A land capability study comprising of a soil investigation was conducted in November 2019 at Sonthule,in the Addo area (**Appendix A**) by Bruno Herrmann from Agrimotion Consulting. This survey is an extension of the area surveyed in September 2018. The purpose of the study was to establish the suitability of the soil for commercial agriculture (citrus production). This report discusses the terms of reference for the study, the soils observed, as well as the suitability of the soils for the cultivation of citrus. This report forms part of the Environmental Impact Assessment.

2. TERMS OF REFERENCE

The terms of reference (ToR) for a land capability study as requested by the applicant are stated below. The ToR for soil assessment for the application for clearing of natural vegetation for agricultural purposes are as follows:

- A reconnaissance soil survey of the uncultivated land in order to establish the soil distributionand limitations in terms of the soil's physical and morphological properties.
- Compilation of a soil map on a suitable scale to describe the natural distribution of the soils.
- Description of the different soil types in terms of their physical and morphological properties.
- To identify the more important soil physical and/or morphological limitations of the soil types.
- Evaluation of the relative suitability of the different soil types for cultivation of irrigated citrus.

3. METHODOLOGY

Soil potential investigation

Predetermined positions for profile pits were sent through to the client to ensure that the total area wascovered and that the observations are representative of the entire area under question. Due to very dense vegetation and steep topography, three locations could be reached by the TLB. The profile pit method is preferred to the soil auger method as the layering and structure can be observed in an undisturbed profile and the exact depth of limitations can be observed.

A total of 21 profile holes were investigated and classified according to the South African soil classification system (Published 1991, revised 2006) and the position of each profile hole was recordedby means of a GPS.

Profile classification entails identifying and distinguishing a specific sequence of **diagnostic soil horizons**. Horizons are horizontal layers which develop as a result of natural soil forming processes either from underlying rock or transported material. Within the South African soil classification system, 30 different diagnostic horizons are distinguished. Each diagnostic horizon is the result of a combinationof soil forming factors that individually or collectively determine the characteristics of the horizon. In a broad sense, the major soil forming factors can be summarised as climate, topography, parent material and living organisms. The influence of these factors cause variation in soil structure, chemistry, wetness and the degree of weathering. It must also be noted that the same type of diagnostic horizon can vary quite considerably in terms of its clay content, sand grade, wetness, coarse fragments, depth, structure, colour, etc.

A specific sequence of diagnostic soil horizons determines the **soil form**. A total of 73 soil forms are defined in the South African soil classification system, each comprised of a unique horizon sequence. With the variation that can occur in each soil form, it is necessary to report all the profile characteristics in a soil code. The soil code is explained in **Appendix D** and the soil forms that were recorded in the surveyed area are described in **Appendix B**.

The soil description for each profile is given in a code format on the soil distribution map. The complete code is given in a table in **Appendix C**. The map indicates profile positions, soil distribution, soil potential and suitability. Soils of the same form were grouped and colour-coded based on their potentialfor the establishment of perennial crops.

The soil properties, physical and chemical limitations and recommended soil management practices are discussed in the report and should be read with the map.

4. SOIL SUITABILITY

4.1 SOIL FORMS CLASSIFIED AT SONTHULE

Eight (8) different soil forms were observed during the survey. The specific horizon sequence of each soil type is as follows:

Augrabies (Ag)
Orthic A horizon (ot)
Neocarbonate (nc)
Unspecified material

Brandvlei (Br)
Orthic A horizon (ot)
Soft carbonate (sk)

Coega (Cg)
Orthic A horizon (ot)
Hardpan carbonate (hk)

Glenrosa (Gs)
Orthic A horizon (ot)
Lithocutanic (lo/lw/so/sw)

Montagu (Mu)
Orthic A horizon (ot)
Neocarbonate (nc)
Unspecified material with signs of wetness

Oakleaf (Oa)
Orthic A horizon (ot)
Neocutanic (ne)

Prieska (Pr)
Orthic A horizon (ot)
Neocarbonate (nc)
Hardpan carbonate (hk)

Shortlands (Sd)
Orthic A horizon (ot)
Red structured (vr)

See **Appendix B** for a detailed description of these soils according to South African Soil Taxonomy (Soil Classification Working Group, 1991).

See **Appendix C** for a map indicating the distribution of these soils. In addition, Appendix C also comprises of Table C1 indicating the soil codes as recorded in the field as well as a description of how to interpret the provided soil code.

Feel free to contact Agrimotion if further guidance regarding the interpretation of the soil code is required.

4.2 SOIL SUITABILITY INDEX

A soil suitability rating is awarded to each classified soil profile **according to the observations made in the field**. The index ranges between 1 (very poor) to 10 (exceptional) and it serves as an indication of the soil's capacity to sustain fruit production in its current natural state. Different soils are more or less suitable for different crop or cultivar types, depending on the plant's natural capacity to cope with different soil conditions. What should be kept in mind is that various cultivation practices can be applied to the soil (e.g. soil preparation, ridging, drainage) to improve the soil's suitability for the cultivation of aspecific crop.

The soil suitability distributions for Sonthule is shown in **Appendix C.** All of the observed soils fall within the medium to low suitability class and comprise of similar limitations to crop production. One deep profile with a medium high suitability was observed. The soil's suitability is briefly described in Table 1 below.

Table 1. Soil potential description and suitability classes for Sonthule, Addo.

Soil Suitability Index & Class	General description of soils	Soil types & Area distribution (%)
4-5 **Medium Low**	Bleached topsoil with a fine sand grade, 12-16% clay and between 10-20% coarse fragments. In the Brandvlei soil form the subsoil comprises of a soft carbonate horizon, which starts at a depth of 30cm below the soil surface. This layer contains 18% clay and 60% coarse fragments, mostly comprising of larger rocks. Limitations exist in this layer due to high pH and carbonate content. At a depth of 50cm a hard carbonate layer occurs, consisting of coarse fragments cemented by carbonates. This layer contains 60-80% coarse fragments and 12-14% clay. In the Prieska soil form the subsoil comprises of a neocarbonate horizon which contains 18% clay and 20% coarse fragments. This horizon has the same favourable soil structure as a neocutanic horizon, however free lime is present. At a depth of 40cm a limiting layer occurs, consisting of coarse fragments cemented by carbonates. In the Shortlands soil form the subsoil comprises of a red structured horizon. Even though there is a clay increase between the topsoil and this red structured layer, the soil structure is still favourable and does not present any limitations. At a depth of 50cm a limiting layer occurs. Free lime represents the biggest limitation in this area. In the case of the hardened carbonate layers, a physical and chemical limitation is present.	Brandvlei (37.5%) Glenrosa (12.5%) Oakleaf (12.5%) Prieska (12.5%) Shortlands (25%)
3-4 **Low**	Bleached topsoil with a fine sand grade, 10-16% clay and 20-60% coarse fragments. In the Coega soil form the subsoil comprises of a hard carbonate layer which occurs at a depth of 30cm. This limiting layer contains 16-20% clay and 50-90% coarse fragments, mostly comprising of larger rocks. The most significant limitations in this area are the carbonates, present in both the soft and hard variants.	Augrabies (9.0%) Coega (45.5%) Brandvlei (27.3%)

	The hard carbonates however present the biggest limitation due to the physical limitations. Areas where the topsoil is calcareous should also be avoided.	Glenrosa (9.0%) Montagu (9.0%)
2- 3 Very Low	Bleached topsoil with a fine sand grade, 14-16% clay and 20-30% coarse fragments. The subsoil is comprised of a gleyed horizon, containing 35% clay and no coarse fragments. Weathered parent material with signs of wetness occur at depth. The soils in this area is not suitable for perennial crop production.	Coega (100%)

Table 2. Summary per suitability class for Sonthule, Addo.

Suitability Class	Limitation	% of observations	Approx. Area (ha)
4-5 Medium Low	• Free lime in subsoil. • Physical limitation at 40cm & 60cm, caused by the hard carbonate layer. • High amount of coarse fragments in topsoil.	38.10	29.5
3-4 Low	• Free lime in subsoil. • Physical limitation at 30-50cm, caused by the hard carbonate layer. • Localized areas with free lime in the topsoil. • High amount of coarse fragments throughout the profile.	52.38	40.5
2-3 Very Low	• Free lime in topsoil • Physical limitation at 20-30cm, caused by the hard carbonate layer. • High amount of coarse fragments throughout the profile.	9.52	7.4

*According to the applied interpolation model only two spots are not suitable. This calculation however has not considered any steep topography. The unsuitable areas are indicated in **Appendix F,** on the Soil Form & Soil Suitability Map. Unsuitable areas have been identified and the **projected area not to be planted amounts to 18.56ha** from 77.4ha.

4.3 GENERAL DESCRIPTION OF THE CLASSIFIED SOILS

The classified soils are fairly uniform across the whole area. Soil variation occurs in higher lying landscape positions as well as depressions. The depth and consistency of the subsoil horizons dictate the suitability of the soil for crop production. Calcareous horizons were also observed in all of the profiles and represent one of the major limitations to crop production in the area.

The topsoil across the classified area is fairly uniform and extends to depths of between 20-30cm. These soil horizons exhibit a red-brown (slightly bleached) colour and comprise of a fine sand fraction. In addition, the topsoil also contains 14-20% clay. Large amounts of coarse fragments were observed at most profiles and are mainly in the form of rocks with diameter 2.5 -7.5cm and larger. Crop production will mostly take place in this top 20-30cm of soil. In localized areas carbonates are present in the topsoil.

Where the profiles are deeper and not limited by a hardpan carbonate layer, the subsoil comprises primarily of neocutanic, neocarbonate, soft carbonate or red structured horizons (Montagu, Oakleaf, Prieska, Brandvlei and Shortlands). The soils will be discussed in further detail as per horizon.

Per definition, the neocutanic horizons are young and develop on transported materials. Physically, this horizon presents the ideal structure for root growth. Physical and chemical limitations only occur in the horizon below (hardpan carbonate). On the surveyed area the Oakleaf soil form is mainly found towards the eastern side, in the higher lying landscape position.

Where carbonates are present, but do not dominate the morphology, the subsoil horizon is described as a neocarbonate. This horizon has the same physical properties as a neocutanic horizon, but free-lime carbonates have accumulated in this layer. The Prieska soil form is found towards the western side, in the higher lying landscape position.

In the soft carbonate horizon, free-lime carbonates dominate the morphology of the subsoil. Even though these soils do not present any physical limitations, they are highly limiting with regards to soil chemistry. Free lime creates a chemical limitation to roots by increasing the soil pH and making it difficult for roots to take up nutrients. The soft carbonate horizon is widely spread over the area and forms part of the Brandvlei soil form, which is found in the mid part of the upper slope.

A higher clay content in the subsoil has led to the formation of moderate structure. In most cases the transition would be a neocutanic horizon. The moderate structure however puts it in the red structured category. The red structured horizons of the Shortlands soil form are mostly found in lower parts of the upper slope. An accumulation of clay is caused due to the topographically lower lying position. The moderate soil structure in this case does not present any limitations to root development, but the carbonate layers underneath physically and chemically limit root and crop growth.

The soils at Sonthule will need to be prepared (loosening action, ridging) correctly, ensuring no subsoil material is brought to the surface, in order to make crop production viable in this area.

Figure 1 The typical Branvlei (Left) and Coega soils (Right) observed at Sonthule, Addo

4.4 Soil Limitations

The soils described above have been grouped into suitability classes specifically for the cultivation of perennial crops, based on the limitations present within each observation. The limitations are described below.

4.4.1 Free lime

Free lime present in all the soils, at varying depths, which leads to an increase in the soil pH. This increase may lead to lowered nutrient availability to pH sensitive crops. Elemental deficiencies such asphosphorous, zinc, copper and iron may occur in these crops, which will greatly hamper crop performance. In some cases, the free lime conditions may also be associated with salinity problems. For this reason, these soils need to be analysed chemically and ameliorated accordingly.

4.4.2 Impermeable calcareous layer

Dense layers, cemented by calcium carbonates, are present over the whole area, at varying depths. These layers need to be broken without bringing the carbonate rich material to the surface.

4.4.3 Wetness

Waterlogging within the plant root zone is extremely detrimental to crop production. When soils become saturated with water, oxygen is displaced from the soil pores resulting in a decrease in the rate of diffusion at the root-soil interface.

4.5 AMELIORATION AND SOIL PREPARATION

To be able to transform the existing soil bodies at Sonthule into an economically productive agricultural unit, the following amelioration practices would be required:

- Deep soil tillage to:
    - **a.** Loosen the soil with a **rip action** (only one direction) to improve root penetration and water infiltration and drainage
    - **b.** Shallow **mixing action** using a tine implement, which will loosen the topsoil to a depthof 30 cm and mix ameliorants into this layer.
    - **c.** **Ridge construction** using an excavator or grader to increase the root able volume of soil.
- Amelioration through addition of fertilizers as determined from the soil analysis.

These recommendations are not final and will be refined according to the results of a detailed soil survey.

5. TOPOGRAPHY

Due to the steep topography some areas were not reachable by the TLB to dig profile pits. These areas have been identified and are indicated on the **Slope Percentage Rise map (Appendix E) and Soil Form & Suitability Map (Appendix F).**

Five (5) meter contours have been used to analyse the area. Two areas have been identified which have a gradual topography and a slope below 5%. The steepest slopes have been removed and do notform part of the potential area. See Appendix G.

Slopes that are greater than 10% are likely to have a higher risk of erosion if cleared of vegetation and developed for the commercial production of citrus.

6. SUMMARY & CONCLUSION

Medium-low to low potential soils are prevalent across Sonthule Farm in Addo. Soil suitability is limited by calcareous subsoil layers across the whole area. The higher lying areas with gradual topography can be further investigated by means of a detailed survey. Areas with steep topography should not be investigated further.

Although the initial investigation indicates that the soils are marginally suited for the cultivation of perennial crops, appropriate soil preparation (e.g. deep soil tillage, ridging, and fertilizer) can serve to significantly improve the soil's ability to sustain perennial crops. The physical and chemical limitations of the calcareous soils will have to be considered as well as the cost involved for amelioration.

The soils of the extended survey area are less suitable for perennial crop production in comparison to the soils which were surveyed in 2018.

The area which has been identified for further investigation **(Appendix F)** makes up a total of **58.84 hectares**.

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APPENDIX A – AREA MAP

Figure 2: The location of Sonthule relative to Addo in the Eastern Cape Province of South Africa

Figure 3: Sonthule EIA Survey 2018 and 2019 (extended)

APPENDIX B - DESCRIPTION OF SOIL FORMS OBSERVED AT SONTHULE, ADDO

Augrabies (Ag)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocarbonate B horizon (nc):

A neocarbonate B is similar in concept to the neocutanic B (weakly structured, non-uniform colour, cutanic character) except that this horizon is characterised by a build-up of free carbonates. These carbonates do not, however, dominate the morphology. Neocarbonate horizons develop in dry climates or in lower lying landscape positions where leaching is restricted. The free carbonates can create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Unspecified material:

This is not a defined horizon but it encapsulates different soil types, which occur at depth and exhibit a wide variety of characteristics.

Brandvlei (Br)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Soft carbonate horizon (sk):

The soft carbonate horizon is characterised by a build-up of free carbonates but to such an extent that the carbonates dominate the morphology of the horizon. This feature is used to distinguish a soft carbonate horizon from a neocarbonate B. Similarly, free carbonates create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Coega (Cg)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Hardpan carbonate horizon (hk):

The hardpan carbonate horizon is characterised by a build-up of free carbonates to the extent that the carbonates have cemented the horizon. The hardened nature of these horizons in effect pose a restriction to root growth and water infiltration. Hardpan carbonate horizons usually developed in drier areas where carbonates can accumulate without being leached out of the soil through frequent rainfall events.

Glenrosa (Gs)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Lithocutanic B horizon (lo/lw/so/sw):

A lithocutanic horizon is a youthful soil horizon that is still in its early stages of development and which consequently possess characteristics of both soil and the underlying rock that the soil is weathering from. With depth this horizon gradually changes to unweathered rock. These horizons exhibit cutanic characteristics (mobile clay and other soil material which form a film or skin around larger soil aggregates) and is not always horizontally continuous within the profile. Lithocutanic B horizons can also vary based on the percentage of rock present in the horizons (hard vs not-hard) and their tendency to become saturated with water. These horizons can impose a physical restriction to root growth.

Montagu (Mu)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocarbonate B horizon (nc):

A neocarbonate B is similar in concept to the neocutanic B (weakly structured, non-uniform colour, cutanic character) except that this horizon is characterised by a build-up of free carbonates. These carbonates do not, however, dominate the morphology. Neocarbonate horizons develop in dry climates or in lower lying landscape positions where leaching is restricted. The free carbonates can create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Unspecified material with signs of wetness:

This horizon distinguishes subsoils that have suffered the effects (e.g. iron reduction) of intermittent or prolonged water saturation. Although such horizons can exhibit a wide variety of other characteristics, only the signs of wetness is recognised and pertinently mentioned due to its significance towards land-use.

Oakleaf (Oa)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocutanic B horizon (ne):

A neocutanic B horizon is a weakly structured subsoil with cutanic character. Cutanic character refers to a morphological feature where mobile clay and other soil material forms films or skins (cutans) around larger soil aggregates. The presence of cutans are in many instances indicative of a more dispersive clay phase. Neocutanic horizons can vary in colour although the expression of cutans imply that colour will not be uniform as with red and yellow-brown apedal subsoils. Neocutanic horizons are young and by definition develop on transported materials. Physically, this horizon represents the ideal structure for root growth although chemical characteristics can be variable.

Unspecified material:

Unspecified soil material is not a defined horizon but it encapsulates different soil types which occur at depth and exhibit a wide variety of characteristics.

Prieska (Pr)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Neocarbonate B horizon (nc):

A neocarbonate B is similar in concept to the neocutanic B (weakly structured, non-uniform colour, cutanic character) except that this horizon is characterised by a build-up of free carbonates. These carbonates do not, however, dominate the morphology. Neocarbonate horizons develop in dry climates or in lower lying landscape positions where leaching is restricted. The free carbonates can create a chemical limitation to roots by increasing the soil pH and making it difficult for roots to absorb nutrients.

Hardpan carbonate horizon (hk):

The hardpan carbonate horizon is characterised by a build-up of free carbonates to the extent that the carbonates have cemented the horizon. The hardened nature of these horizons in effect pose a restriction to root growth and water infiltration. Hardpan carbonate horizons usually developed in drier areas where carbonates can accumulate without being leached out of the soil through frequent rainfall events.

Shortlands (Sd)

Orthic A horizon (ot):

The orthic A horizon is a topsoil horizon which does not classify as an organic O, humic, vertic or melanic A horizon. It is the most widespread topsoil in South Africa and it exhibits an extensive range of characteristics, which in most instances mimics that of the subsoil. There is nothing specifically limiting or characteristic of this horizon.

Red structured B horizon (vr):

A Red structured B horizon has a moderate to strongly developed block structure similar to a pedocutanic B but also exhibits a uniform red soil colour (as for the red apedal B). The red colours are again the result of the presence of hematite (Fe oxide) coatings on the soil mineral particles. In addition, the moderate to strongly developed block structure represents a restriction to root growth although variations in the degree of structural development is often present. Fine blocky structure is more suitable for root development and crop cultivation than a coarser block structure.

APPENDIX C - SOIL DISTRIBUTION AND SUITABILITY MAP

Appendix C. Map indicating the soil type distribution and suitability towards crop production at Sonthule, Addo. The profile positions as well as the soil form abbreviation is indicated on the map and table. The lighter orange/yellow colour represents soils with a Medium–Low Potential whilst the darker orange colour represents Low potential soils. In general, the soils observed at Sonthule are marginally suited for crop production in their current natural state. With the correct soil preparation and rootstock selection the area indicated in Appendix F can be considered for cultivation, after conducting a detailed survey. The colours correlate with Table 1 in Section 4 of the report.

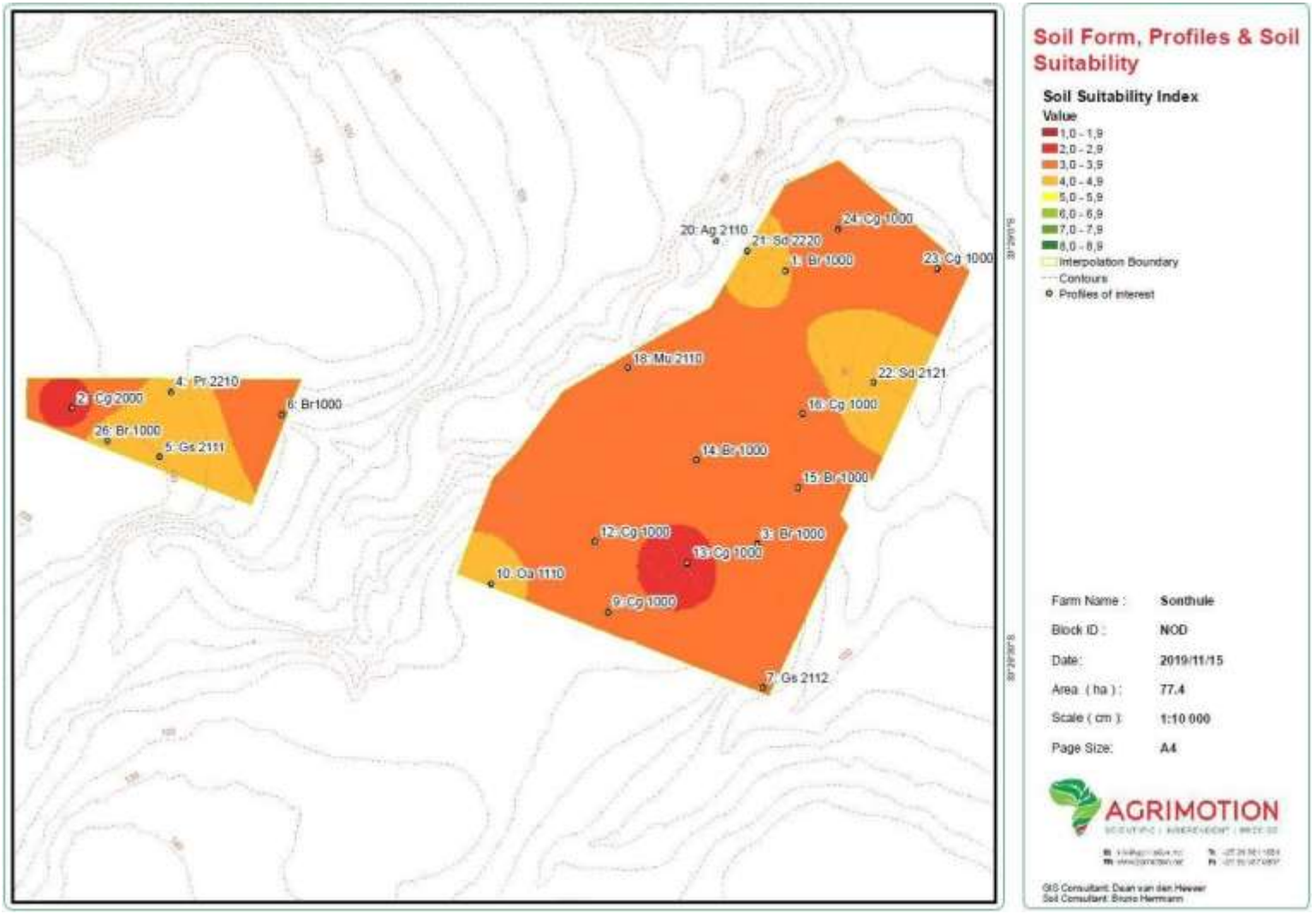

Figure 4 - -Observation point and abbreviated soil code on a soil suitability map.

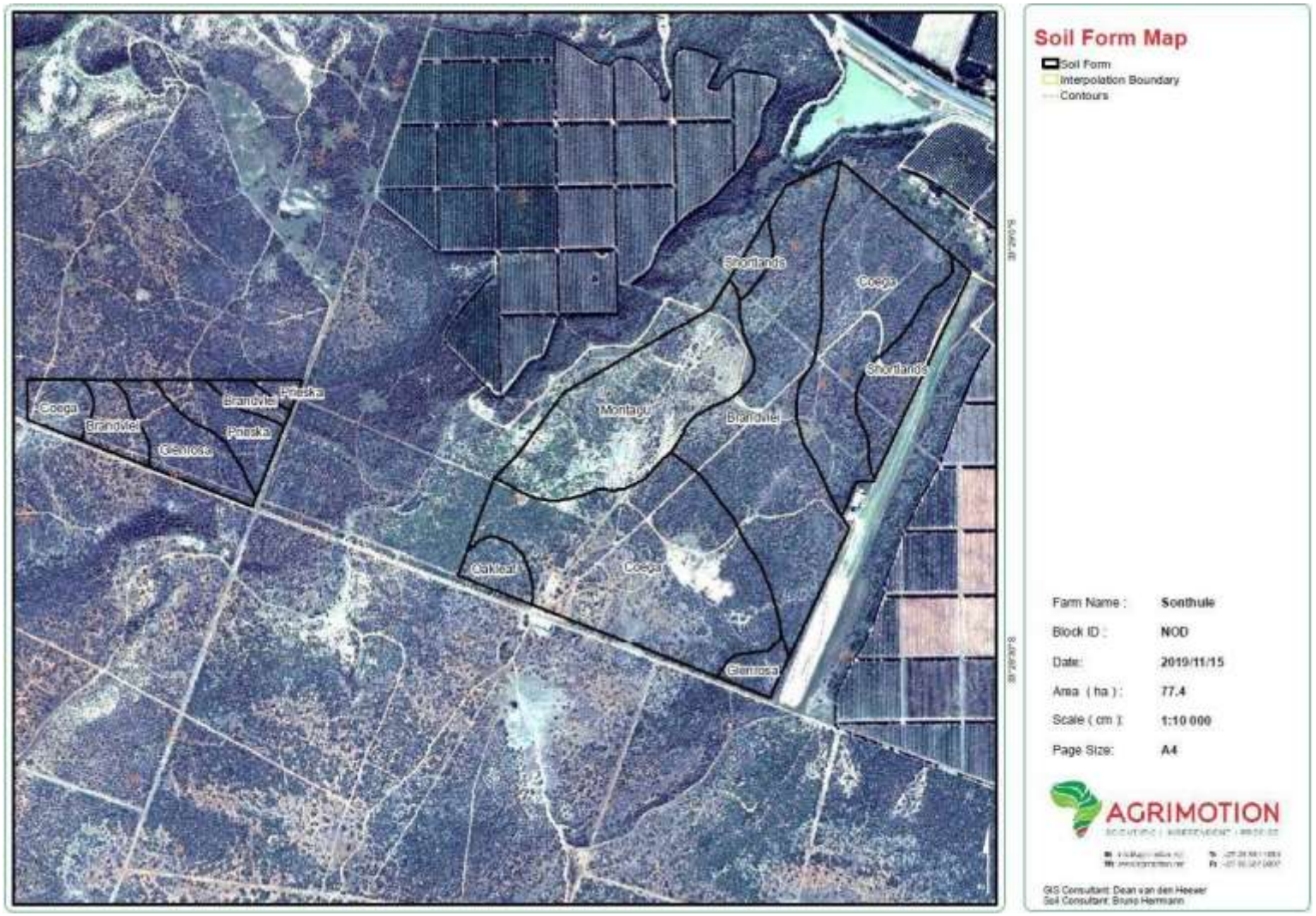

Figure 5 – Soil Form and non-suitable areas

Table C1. Soil codes as described in the field**.**

Profile number	Code above line	Code below line
1	33 Br 1000 sk(18)+f2g4 (60/30) (4)	f2 3(12) Fi 1
2	33 Cg 2000 hk(14)+f2g4k2 (60/30) (2.5)	f2g1 3(14) Fi 1
3	353 Br 1000 hk(20)+g3k3 sk(20)+f3g2 (60/30) (4)	f3g1 2(10) Fi 1
4	242 Pr 2210 hk() nc(18)+f2 (60/20) (4)	f2g1 3(14) Fi 1
5	33 Gs 2111 so/ne(18)+f2g4k2 (80/40) (5)	f2g3k1 3(14) Fi 1
6	33 Br 2000 sk(26)+f2g3k1 (80/20) (3.5)	f3g1 4(16) Fi 2
7	33 Gs 2112 so/sk(24)+f2g5k1 (60/30) (3.5)	f2g1 3(14) Fi 1
9	33 Cg 1000 hk(16)+g4k4 (60/30) (3)	g2 4(16) Fi 1
10	242 Oa 1110/Pr hk(16)+g8 ne/nc(16)+f2g3k2 (60/40) (4.5)	f1g2k2 4(16) Fi 1
12	33 Cg 1000 hk(16)+f1g3k1 (60/30) (3)	g2 4(16) Fi 1
13	23 Cg 1000 hk(16)+g4k4 (60/30) (2.5)	g2 4(16) Fi 1
14	22 Br 1000 sk(16)+f2g6k1 (60/30) (3.5)	f2 4(16) Fi 1
15	22 Br 1000 sk(16)+f2g6k1 (60/30) (3.5)	f2 4(16) Fi 1
16	33 Cg 1000 hk(20)+g2k6 (60/30) (3.5)	f2g2k1 3(14) Fi 1
18	37 Mu 2110 nc/sp(24) nc(20) (80/30) (3.5)	f1g1 4(16) Fi 2
20	22 Ag 2110 nc(26)+f2g4 (80/30) (3.5)	f2g1 4(20) Fi 2
21	35 Sd 2220 lo(18) vr(18) (80/30) (4.5)	f2 2(10) Fi 2
22	262 Sd 2121 sk(28)+f3g3 vr/ne(22)+f3 (80/60) (5)	f3 3(14) Fi 1
23	44 Cg 1000 hk(16)+g3k4r2 (60/40) (3.5)	f2g2r2 4(16) Fi 1
24	33 Cg 1000 hk/sp(14)+f3g6 (60/30) (3.5)	f2 3(14) Fi 1
26	33 Br 1000 sk(18)+f3g3 (60/30) (4.5)	f3 3(14) Fi 1

APPENDIX D - DESCRIPTION AND INTERPRETATION OF SOIL CODE

363 Oa 1210/Tu lo/lw(45)+f2g3 ne/yp(20)+f3 (80/30) (6)

f2 me 2(8) 2/3

The information above the line explains the soil type, family and subsoil horizon characteristics.

363:	Horizon depths:	The first numbers in the soil code provides an indication of the depth at which horizon transitions occur. In the provided example, the A horizon ranges from 0-30cm (with the transition at 30 cm i.e. depth code 3), the B horizon from 30-60cm and the last horizon begins at 60cm. The repeated 3 at the end is used to indicate that coarse fragments start ata depth of 30cm.
Oa:	Soil form:	The symbol for the soil form. Each of the 73 soil forms have a unique 2-letter symbol. These symbols, together with the soil form descriptions, are given in appendix B.
1210:	Soil family:	The next four numbers indicate the soil family. It provides additional diagnostic characteristics that are common in a given soil form. This can include the presence of carbonates, soil colour, structure etc.
/Tu:	Transitional form:	In many instances a soil profile can possess characteristics similar to that of a variety of soil forms. The dominant horizon characteristics then need to be used to differentiate between the potential soil form options. An alternative soil form can be reported in the soil code using a / after the dominant soil form and family have been established.
lo/lw:	Subsoil horizons:	The properties for the subsoil horizons are always provided directly after the soil family code. Each of the diagnostic horizons have a unique 2-letter symbol as indicated in appendix B. If the material foundat the bottom of the classified profile cannot be inferred from the soil form, this 2-letter symbol is used to provide further description. In thisexample, the last horizon is a transition, as indicated with the '/lw'. The horizon abbreviations are provided in appendix B.
( ):	Subsoil clay percentage	The clay percentages of the observed subsoil horizons are indicated in brackets after the specific horizon description.
+f2g3:	Coarse fragments:	There are 20% fine coarse fragments (i.e. letter 2) and 30% medium coarse fragments (i.e. letter 3) noted in the last horizon. Symbols & diameter: 'f' for fine (0.2 – 2.5cm), 'g' for medium (2.5 - 7.5cm), 'k' for stone (7.5 – 25cm) and 'r' for rock (25+cm).
(yp):	Additional horizon properties:	Additional properties for each subsoil horizon can be indicated after the specific subsoil horizon description. In the example above the B horizon is hard setting when dry (yp).
(80/30):	Rip and delve depth:	The pair of numbers in brackets indicate the *depth in cm* to which 1) a rip-action can be completed and 2) to which depth the soil can be mixed.
(6.5):	Soil Potential:	The second number in brackets is the soil's potential which is given out of a total of 10. This concept is discussed further in section 4.

The information below the line characterises the topsoil horizon and profile wetness.

f2:	Coarse Fragments:	There are 20% fine coarse fragments in the A horizon.

me:	Sand grade:	The A horizon has a medium sand grade. ‘me’ for medium sand grade, ‘fi’ for fine sand grade and ‘co’ for coarse sand grade.
2(8):	Clay percentage:	This indicates that there is an estimated 8% clay in the A horizon.
2/3:	Soil wetness:	The 2/3 class is a soil wetness estimation dependent on the depth at which the signs of wetness were observed, and the period of time that the soil will remain wet for. A wetness class of 1 indicates that the soil in the profile is dry throughout the year. A soil with a wetness class of 9 is saturated with water from a depth of 30cm for the whole year.

APPENDIX E - TOPOGRAPHY

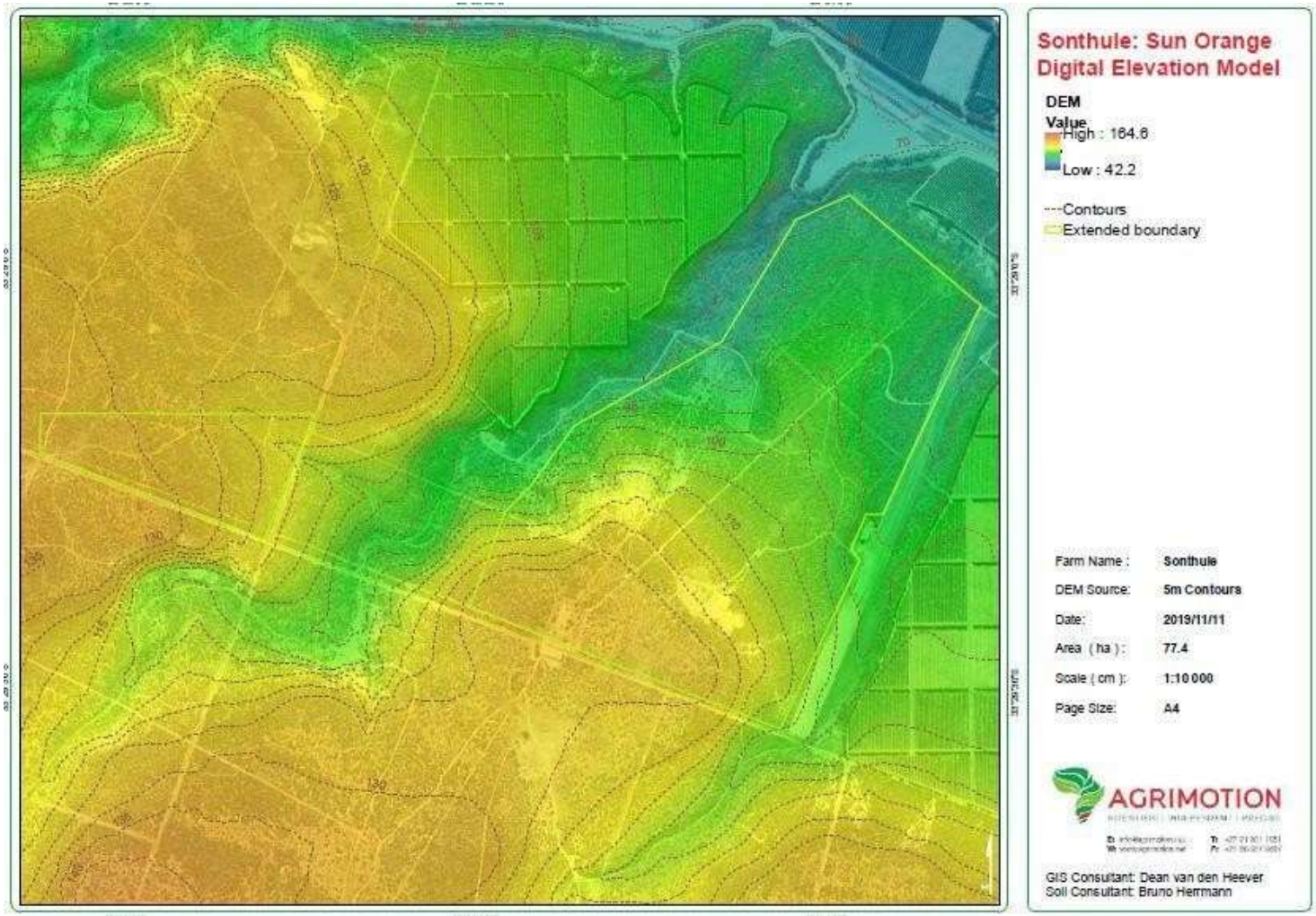

Figure 6 – Digital Elevation Model

Figure 7 – Slope Percentage Rise

APPENDIX F – AREAS

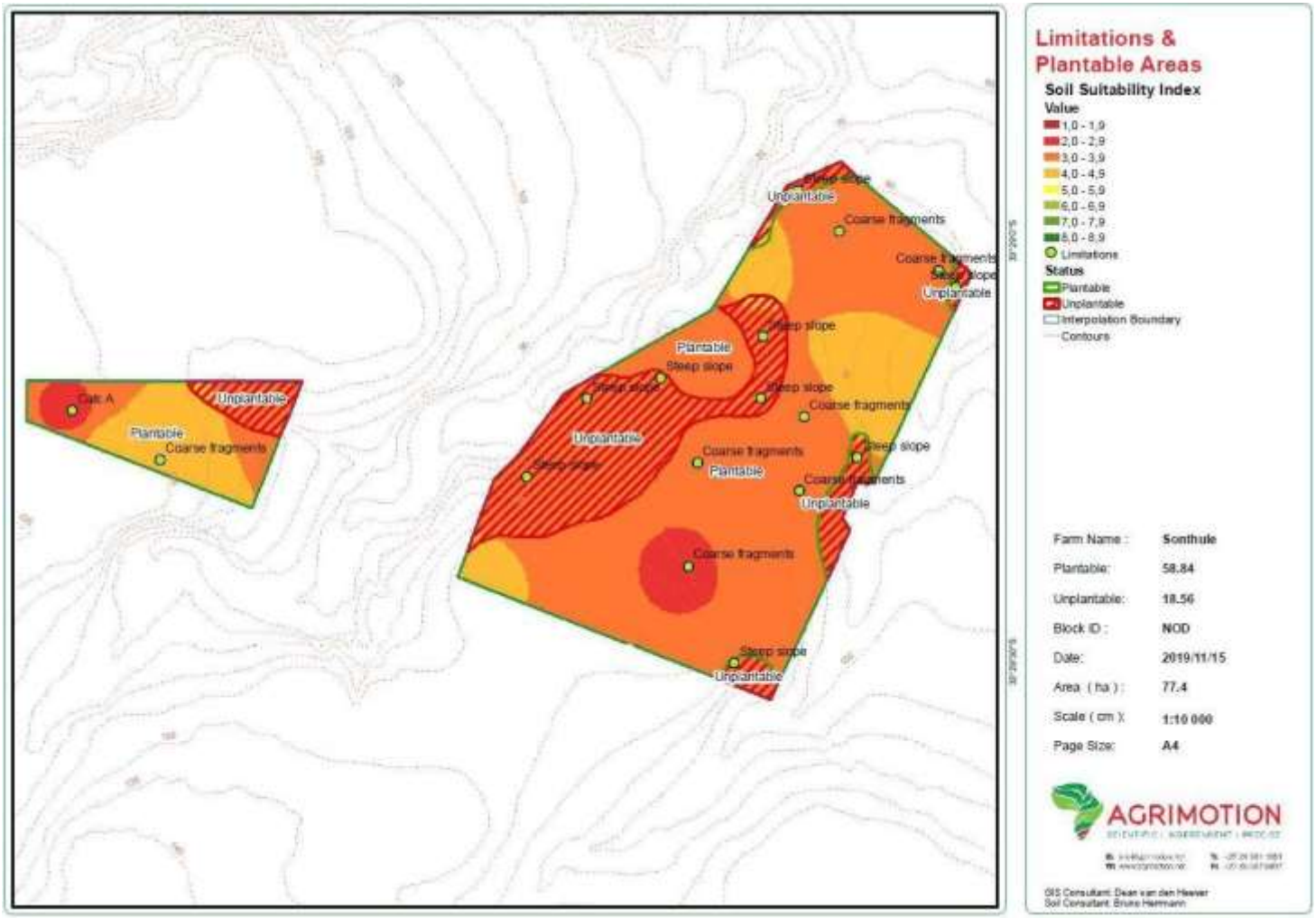

Figure 8 – Limitations and Plantable Areas

ANNEXURE 1: COMMENTS ON SUITABILITY OF SOILS NOT YET INVESTIGATED

AGRIMOTION
SCIENTIFIC | INDEPENDENT | PRECISE

May 2022

San Miguel

Extension Review of Land Capability Study Completed in 2018

(Sonthule)

General Comments

Below an image of the soil suitability of the area surveyed at Sonthule farm in 2018, overlayed onto the EIA demarcations in red.

The blue circle indicates the current area under investigation, as shown in the figure below, *Agrimotion* does not have soil data for this specific area, however, at least 90% of the current surveyed area contains soils specifically from the carbonate family of soil types. Extrapolating from this we can assume that the remaining soils are also calcareous soil-types of low - medium potential (at best). Specific rootstock-selection and soil preparation (amongst other management practices) can be expected to be required for sustainable (perennial) crop production.

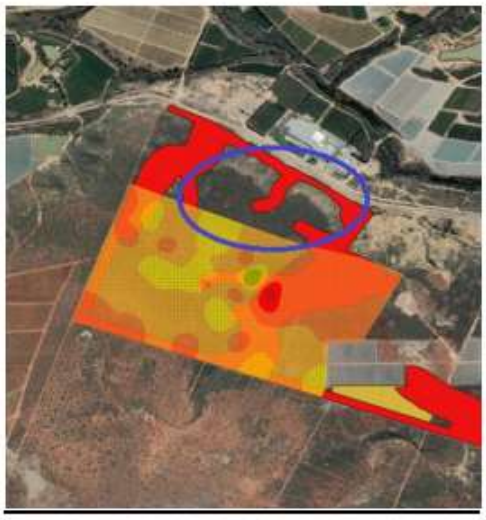

Figure 1: EIA Demarcations and Soil Suitability at Sonthule Farm.

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Chapter 9: Archaeological Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

Archaeological Specialist
Compiled by: Mr Kobus Reichert
Reviewed by: Dr Johan Binneman
Eastern Cape Heritage Consultants cc
P.O. Box 689
Jeffreys Bay
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Public Process Consultants

A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF 144 HA OF CITRUS ORCHARDS AND ASSOCIATED INFRASTRUCTURE AS WELL AS THE CONSTRUCTION OF A DAM ON THE REMAINDER OF FARM 632 NEAR SUNLANDS, SUNDAYS RIVER VALLEY MUNICIPALITY, EASTERN CAPE PROVINCE

Prepared for: Public Process Consultants
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Compiled by: Mr Kobus Reichert **Reviewed by:** Dr Johan Binneman

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Date: December 2021

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A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF 144 HA OF CITRUS ORCHARDS AND ASSOCIATED INFRASTRUCTURE AS WELL AS THE CONSTRUCTION OF A DAM ON THE REMAINDER OF FARM 632 NEAR SUNLAND, SUNDAYS RIVER VALLEY MUNICIPALITY, EASTERN CAPE PROVINCE

Note: This report follows the minimum standard guidelines required by the South African Heritage Resources Agency for compiling Archaeological Heritage Phase 1 Impact Assessment (AHIA) reports.

EXECUTIVE SUMMARY

Public Process Consultants on behalf of Sun Orange Farms (Pty) Ltd appointed Eastern Cape Heritage Consultants cc to conduct a Phase 1 Archaeological Impact Assessment (AIA) for the proposed development of 144 hectares of citrus orchards and associated infrastructure as well the construction of a dam on the Remainder of Farm 632 near Sunland, Sundays River Valley Municipality, Eastern Cape Province. The project will be known as the Sontule Citrus development.

Access to the study area was easy, but dense vegetation and grass in certain areas made it difficult to find *in situ* archaeological sites/materials. Nonetheless, occasional Middle Stone Age (MSA) stone tools were observed in a vehicle track along the southern boundary fence. These stone tools were in secondary context and not associated with any other archaeological material and no further action is needed. There is a dilapidated old building next to a quarry on the property. There are no known graves older than 60 years on the property.

The proposed development will take place near the Sundays River, in an area where one would expect to find freshwater mussel middens. It is recommended that if such features or any other concentrations of archaeological material are exposed, it must be reported to the archaeologist at the Albany Museum in Makhanda (Grahamstown) or to the Eastern Cape Provincial Heritage Resources Authority so that a systematic and professional investigation can be undertaken. Furthermore, all clearing activities must be monitored and managers/foremen should be informed before clearing/construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The ECO can be trained to monitor the clearing of the vegetation and to report finds. In general, the proposed areas for development appears to be of **low archaeological sensitivity** and the development may proceed as planned.

9.1 PROJECT INFORMATION

9.1.1 Type of development

The farm measures approximately 459 hectares and is currently a working citrus farm with an additional 144 ha of orchards and associated infrastructure proposed. The effective irrigation areas are ~127ha.

The Sontule citrus development will also require the construction of a new dam on site and will be supplied with water from an existing dam on the property, which is supplied with water from the LSRWUA canal system.

- The existing dam has a capacity of 20 000m³
- The proposed new dam will be supplied with water from the existing dam via a 315mm uPVC pipe
- New dam specs:
    - Dam wall height 5 meters
    - Total proposed dam footprint ~31 800 m²
    - Estimated dam capacity ~49 000 m³
- New pumphouse (electrical consumption for pumps ~75kw)
- Relay water to orchards via pipes of varying sizes of either 250mm or 315mm uPVC pipe

The footprint for the new dam will be 3.18 ha and the area proposed for clearing for orchards and associated infrastructure is approximately 144 ha. A total clearance area of 147 ha is therefore proposed.

Applicant

Sun Orange Farms (Pty) Ltd.

Consultant

Public Process Consultants
P.O. Box 27688
Greenacres, 6057
Tel.: 041-374 8426
Contact person: Ms Sandy Wren
Email: sandy@publicprocess.co.za

9.2 Purpose of the study

The purpose of the study was to conduct a Phase 1 Archaeological Impact Assessment (AIA) for the proposed development of ~144 hectares of citrus orchards and associated infrastructure as well as the construction of a dam on the Remainder of Farm 632 near Sunland, Sundays River Valley Municipality, Eastern Cape Province. The survey was conducted to establish:

- the range and importance of possible exposed and *in situ* archaeological sites, features and materials,
- the potential impact of the development on these resources and,
- to make recommendations to minimize possible damage to these resources.

9.3 Site and Location

The site for the proposed developments is located within the 1:50 000 topographic reference maps 3325BC Coerney (Map 1). The proposed areas for the citrus orchard and dam developments are situated approximately 7 kilometres northwest of Sunlands, and it is located close to the Sundays River (Map 2). The property consists of hills with moderate to steep gradients and relatively flat areas in between. The proposed development area comprises of reddish alluvial soils and it is covered by short grass and dense vegetation in places (Figure 1). Some areas have been disturbed by previous agricultural and other activities (Figure 2). There are no known graves or buildings older than 60 years on the property. A general GPS reading was taken at 33.28.906S; 25.32.781E.

9.3.1 Selected relevant impact assessments from the adjacent region, databases and collections

Binneman, J. and Reichert, K. 2021a. A phase 1 archaeological impact assessment for the proposed development of approximately 250 hectares of citrus on Portion 15 of the Farm Oliphants Kop No. 194 (Gates Farm), near Addo within the Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Humansdorp. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2021b. Phase 1 Archaeological Impact Assessment (AIA) for the proposed development of approximately 250 hectares of citrus orchards and associated infrastructure on Portion 4 of the Farm Klein Rooipoort No. 632 and the development of a storage dam on Portion 2 of Farm 658 near Sunlands within the Sundays River Valley Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2020a. An archaeological assessment of the proposed amendment application for the authorised Instomi citrus farm, that includes the installation of irrigation pipelines, near Addo within the Sundays River Valley Local Municipality, Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2020b. An archaeological assessment of the proposed amendment application for the establishment of a goat breeding facility on the authorised Instomi citrus farm near Addo within the Sundays River Valley Local Municipality, Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2020c. A phase 1 archaeological assessment for the proposed cultivation of 67 ha of citrus and associated infrastructure on Portion 11 of Farm 100 (Tango) near Addo in the Sundays River Valley Local Municipality of the Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc.

Binneman, J. and Reichert, K. 2019. A phase 1 archaeological impact assessment for the proposed establishment of a big 5 game reserve with lodge accommodation and a water pipeline to various dams near Addo in the Sunday's River Valley Municipality of the Eastern Cape Province. Prepared for Habitat Link Consulting. Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2018. A phase 1 archaeological impact assessments for the proposed agricultural activities on Portion 525 of the farm Strathsomers Estate No. 42 and associated irrigation infra-structure on Portion 523 of the farm Strathsomers Estate No. 42 in the Sundays River Valley Municipality of the Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc.

Binneman, J. and Reichert, K. 2016a. A phase 1 archaeological impact assessment for the proposed clearing of natural vegetation to establish citrus orchards and grazing for game on the Remainder of Portion 1 of farm 119 (Wolverton) in the Sundays River Valley Municipality of the Eastern Cape Province. Prepared for Public Process Consultants. Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2016b. A phase 1 archaeological impact assessments for the proposed clearing of vegetation in three areas to establish citrus orchards on the farm Boschkraal near Kirkwood, Sunday's River Valley Local Municipality Eastern Cape Province. Prepared for Prime Resources (Pty) Ltd. Parklands. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2016c. A phase 1 archaeological impact assessment for the proposed clearing of natural vegetation to expand the existing agricultural activities on portion 274, Strathsomers Estate No. 42 in the Sundays River Valley Municipality of the Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2016d. A phase 1 archaeological impact assessment for the proposed clearing of natural vegetation to establish citrus orchards on the Remainder of Portion 14 of the farm Geelhoutboom No. 89 in the Sundays River Valley Municipality of the Eastern Cape Province. Prepared for Public Process Consultants. Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. and Reichert, K. 2015. A letter of recommendation (with conditions) for the exemption of a full phase 1 archaeological impact assessment for the proposed clearing of 20 ha of natural vegetation to establish citrus orchards on the farm Hitgeheim, Sunland, Sundays River Valley Municipality, Eastern Cape Province. Prepared for Engineering Advice & Services (Pty) Ltd. Humewood. Eastern Cape Heritage Consultants cc. Jeffreys Bay

Binneman, J. 2014a. A phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on Portion 7 of the Farm Scheepers Vlakte No. 98, Sunland near Kirkwood, Sundays River Valley Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Stellenbosch. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. 2014b. A phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on Farm 632, Sunland near Kirkwood, Sundays River Valley Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Stellenbosch. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. 2014c. A phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on the remaining extent of Farm 714, Sunland Near Kirkwood, Sundays River Valley Local Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Stellenbosch. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. 2014d. Phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on Luthando farm, Portion 320 of Strathsomers Estate No. 42, Kirkwood, Sundays River Valley Municipality, Eastern Cape Province. Prepared for Public Process Consultants. Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Binneman, J. 2013. A phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on portion 5 of the Farm Nooitgedacht No. 118, Sunland, Sundays River Valley Municipality, Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants cc. Jeffreys Bay.

Gaigher, S. 2013. Heritage Impact Assessment for the Stormwater infrastructure in Valencia, Addo, Sundays River Valley Municipality, Eastern Cape Province.

Rossouw, L. (Paleo Field Service). 2013 a. Phase 1 Heritage Impact Assessment of Disco Chicks Farm 2 (Farm 713), Sundays River Valley Municipality.

Rossouw, L. 2015. Phase 1 Archaeological Impact Assessment of Intsomi Game Farm, Sundays River Valley Municipality, Eastern Cape Province. Prepared for Public Process Consultants Greenacres. National Museum. Bloemfontein.

The Albany Museum in Makhanda (Grahamstown) houses collections and information from the wider region.

9.4 BRIEF ARCHAEOLOGICAL BACKGROUND

9.4.1 Literature review

The oldest evidence of the early inhabitants in the Sundays River region are large stone tools, called hand axes and cleavers, which can be found amongst river gravels and in old spring deposits in the region. These large stone tools are from a time period called the Earlier Stone Age (ESA) and may date between 1,5 million and 250 000 years old. In a series of spring deposits at Amanzi Spring near Addo, a large number of stone tools were found *in situ* to a depth of 3-4 metres. Remarkably, wood and seed material preserved in the spring deposits, possibly dating to between 250 000 to 800 000 years old (Inskeep 1965; Deacon 1970) were also found.

Evidence of MSA sites occur throughout the region and date between 250 000 and 30 000 years old. These stone artefacts, like the Earlier Stone Age tools are also found in the gravels along the banks of the Sundays River and, like hand axes, are mainly in secondary context. Fossil bone may, in rare cases, be associated with MSA occurrences.

The majority of archaeological sites found in the area date from the past 10 000 years (called the Later Stone Age) and are associated with the campsites of San hunter-gatherers and Khoi pastoralists. These sites are difficult to find because they are in the open veld and often covered by vegetation and sand. Sometimes these sites are only represented by a few stone tools and fragments of bone (Deacon & Deacon 1999). The preservation of these sites is poor, and it is not always possible to date them. There are many San hunter-gatherer sites in the nearby Suurberg and adjacent mountains. Here, caves and rock shelters were occupied by the San during the Later Stone Age with well-preserved living deposits and paintings along the walls (Deacon 1976).

Some 2 000 years ago Khoi pastoralists occupied the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goat and cattle) and ceramic vessels to southern Africa. Often archaeological sites are found close to the banks of large streams and rivers. Large piles of freshwater mussel shell (called middens) usually mark these sites. Prehistoric groups collected the freshwater mussel from the muddy banks of the rivers as a source of food. Mixed with the shell and other riverine and terrestrial food waste are also cultural materials. Human remains are often found buried in the middens.

9.4.2 References

Deacon, H.J. 1970. The Acheulian occupation at Amanzi Springs, Uitenhage District, Cape Province. Annals of the Cape Provincial Museums. 8:89-189.

Deacon, H. J., 1976. Where hunters gathered: a study of Holocene Stone Age people in the Eastern Cape. South African Archaeological Society Monograph Series No. 1.

Deacon, H.J. & Deacon, J. 1999.Human beginnings in South Africa. Cape Town: David Phillips Publishers.

Inskeep, R.R. 1965. Earlier Stone Age occupation at Amanzi: preliminary investigations. South African Journal of Science. 61:229-242.

9.5 ARCHAEOLOGICAL INVESTIGATION

9.5.1 Methodology

The farm manager was contacted prior to the investigation to inform him about the visit and to gain access to the property. All previous relevant survey information for the immediate and adjacent areas was reviewed before the survey started. The farm manager pointed out the proposed areas for the

development at the start of the survey and he was consulted about possible locations of archaeological remains, graves and historical buildings and features. A Google Earth aerial image study was also conducted of the area, prior to the investigation. The investigation was conducted on foot by an archaeologist and by doing spot checks from a vehicle. To cover as much of the proposed development areas as possible, vehicle tracks and cut lines on the farm were followed. GPS readings were taken with a Garmin and all the important features were digitally recorded.

9.5.2 Limitations and assumptions

It was not possible to do a complete survey of the areas due to the short grass and dense vegetation in places which made it difficult to locate *in-situ* archaeological sites/materials. Some areas on the property have been cleared of vegetation in the past and there are number of vehicle tracks and cut lines where the archaeological visibility was relatively good. The experiences and knowledge gained from several other investigations in the wider surrounding region provided background information to make assumptions and predictions on the incidences and the significance of possible pre-colonial archaeological sites/material which may be located in the areas, or which may be covered by soil and vegetation.

9.5.3 Finds and results

Although it was difficult to locate archaeological sites/materials, occasional Middle Stone Age (older than 30 000 years) stone tools were observed in areas where surface soil was removed in a gravel road along the southern boundary fence (Figure 1, bottom right insert). These Middle Stone Age (MSA) stone tools were manufactured from quartzite river cobbles/pebbles and the flakes displayed typical facetted striking platforms. The stone tools were found randomly without any recognised distribution patterns. They were in secondary context and not associated with any other archaeological remains. Few points and blades were observed and most of the tools were thick, small 'informal' flakes. No further action is needed. Apart from the occasional stone tools no other archaeological sites/materials were found.

There is a dilapidated old building on the property next to a quarry. In general, it would appear that the area is of **low archaeological sensitivity** and that it is unlikely that any sensitive archaeological remains will be exposed during the development.

9.6 ASSESSMENT OF THE IMPACTS

Direct impacts

Table 1. The potential physical disturbance and destruction of surface and buried pre-colonial archaeology sites/remains during all developments (rating based on the surface visibility of archaeological remains).

Nature of the Impact	**Possible loss of non-renewable heritage resources:** The main impact on archaeological sites/remains (if any) will be the physical disturbance of the material and its context. The clearing of the vegetation may expose, disturb and displace archaeological sites/material. However, from the investigation it would appear that the proposed areas earmarked for development are of low archaeological sensitivity. The Middle Stone Age stone tools observed in the area to be developed are considered to be of low cultural significance, because they are in secondary context and not associated with any other archaeological remains. Notwithstanding, important materials may be

	covered by soil and vegetation. There are no known graves or buildings older than 60 years on the area surveyed.
Extent	**Site specific -** The impact will be limited to the development footprint.
Duration	**Permanent -** Disturbance to archaeological material will be permanent.
Intensity	**Medium**
Probability	**Probable** – the archaeological material within the proposed development footprint will be disturbed, displaced or destroyed.
Reversibility	**Irreversible** – Once the archaeological material has been removed or destroyed this impact cannot be reversed.
Degree of Confidence	**Medium / High**
Status and Significance of Impact (no mitigation)	**Low Negative (-)**
Mitigation	• All construction activities must be monitored or alternatively a person must be specially trained, for example the ECO, to conduct the monitoring. This must include the clearing of vegetation, leveling, excavations for pipelines and other underground/ buried infrastructure and all above ground construction activities such as roads and buildings. • Construction managers/foremen should also be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. If any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease in the immediate area of the finds and must be reported immediately to the archaeologist at the Albany Museum in Makhanda (Tel.: 046 6222312) or to the Eastern Cape Provincial Heritage Resources Authority (Tel.: 043 7450888). Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation and may include: • Consultation with the local communities regarding the conditions for the possible removal, storage and reburial (in the case of human remains) of heritage material. • If the local communities agree to the removal of human remains and heritage, an archaeologist must apply for permits from the Eastern Cape Province Heritage Resources Authority to collect and/or excavate sites/materials from archaeological sites impacted by the development. • Consultation with the Albany Museum (repository for archaeological material in the Eastern Cape) regarding permit(s) to remove the heritage material, the storing, curating and costs involved. • A Phase 2 Mitigation process to systematically excavate and to remove the archaeological deposits before construction of the development continues. <u>Note:</u> All costs must be financed by the applicants. This may include: All monitoring and mitigation expenses regarding the excavations/collecting of material, travel, accommodation and subsistence, analysis of the material, radiocarbon date(s) of the site(s) and a once-off

	curation/storage fee payable to the Department of Archaeology at the Albany Museum.
Significance and Status (with mitigation)	**Neutral (0)**
Residual Impact	The cumulative impacts on above and below ground heritage will increase when further developments take place in adjoining areas, such as the proposed development of approximately 250 hectares of citrus orchards and associated infrastructure on Portion 4 of the Farm Klein Rooipoort No. 632 (located to the south and adjacent to the proposed Sontule Citrus development) and the development of a storage dam on Portion 2 of Farm 658 (located to the north and adjacent to the proposed Sontule Citrus development). It is anticipated that archaeological material uncovered or found during the development will be of low cultural significance similar to those observed during this survey. The cumulative impact of the developments therefore does not change the overall impact rating. **Low Negative (-)**

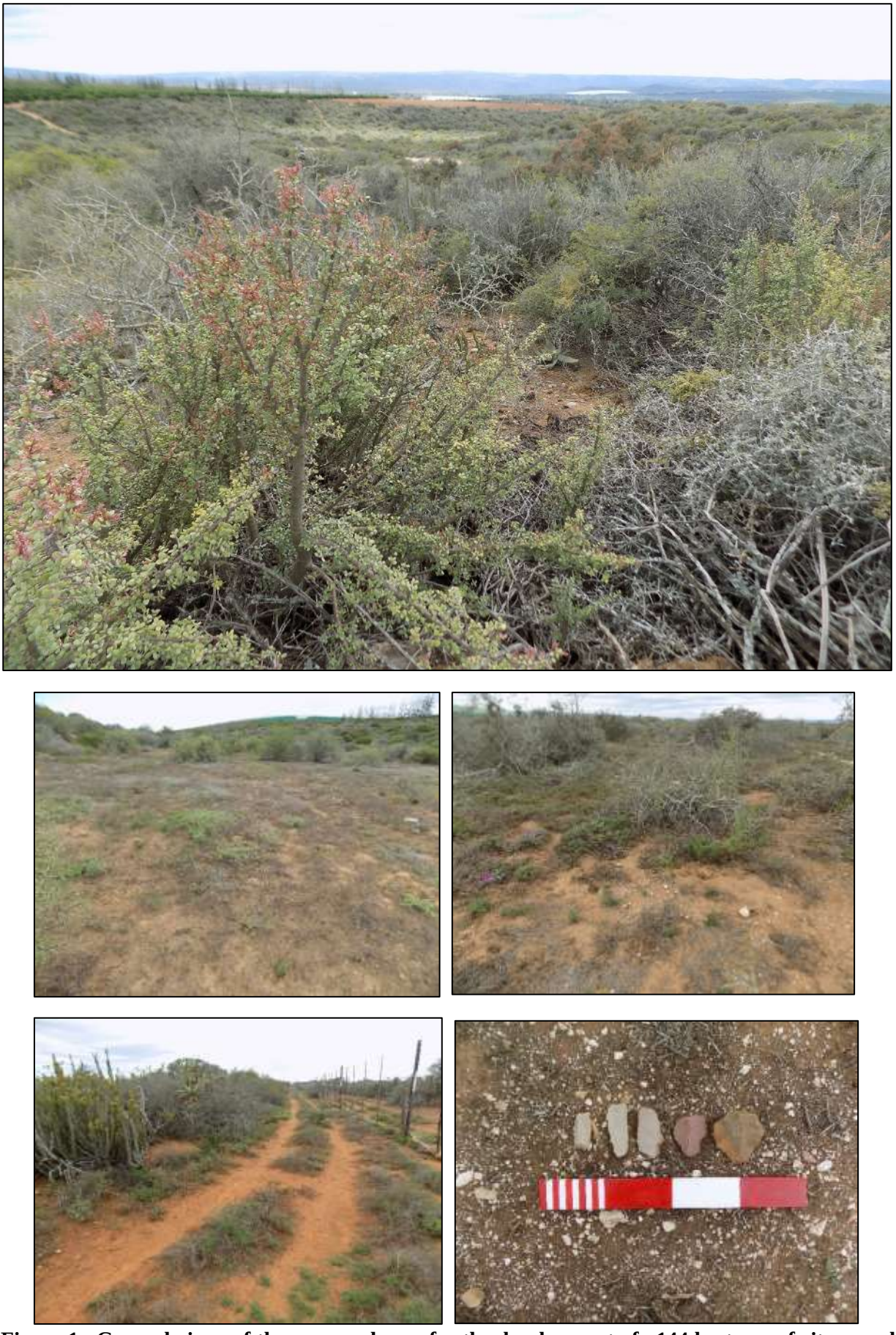


Figure 1. General views of the proposed area for the development of ~144 hectares of citrus orchards and associated infrastructure. A sample of Middle Stone Age stone tools (bottom right image) observed in a gravel road along the southern boundary of the property.

Figure 2. General views of the proposed area for the construction of a dam on the Remainder of Farm 632

9.7 DISCUSSION AND MITIGATION

The areas investigated are mostly covered by reddish alluvial soil and with short grass and dense vegetation in places. The archaeological visibility was relatively good in areas disturbed by agricultural and other activities. The proposed dam area for example has been cleared and levelled recently but no sites or stone artefacts were observed in this area (Figure 2). Middle Stone Age (MSA) tools were found along the southern boundary of the property but no further action is required. The proposed development will take place near the Sundays River in an area where one would expect to find freshwater shell middens. These are important archaeological sites and special care must be taken that these sites are not destroyed during development. The main potential impact on possible archaeological sites/remains will be the physical disturbance of the material and its context. However, from the investigation, it would appear that the proposed areas earmarked for the development are of **low archaeological sensitivity**.

It is recommended that:

1. Although it would seem unlikely that any significant archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological remains such as freshwater shell middens and historical material may be uncovered during the development. Should such material be exposed during construction, all work must cease in the immediate area (depending on the type of find) and it must be reported to the archaeologist at the Albany Museum in Makhanda (Grahamstown) (Tel: 046 6222 312) or to the Eastern Cape Provincial Heritage Resources Authority (Tel: 043 7450 888), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation (See appendix B of this Specialist Chapter for a list of possible archaeological sites that maybe found in the area).

2. All clearing activities and other developments must be monitored. Managers/foremen should be informed before clearing/construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. Alternatively, it is suggested that a person must be trained (ECO) as a site monitor to report to the foreman when heritage sites/materials are found.

9.8 GENERAL REMARKS AND CONDITION

Note: This is an Archaeological Impact Assessment (AIA) report compiled for the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) to enable them to make informed decisions regarding the heritage resources assessed in this report and only they have the authority to revise the report. This Report must be reviewed by the ECPHRA where after they will issue their Review Comments to the EAP/developer. The final decision rests with the ECPHRA who must grant permits if there will be any impact on cultural sites/materials as a result of the development.

This report is a Phase 1 Archaeological Impact Assessment and does not exempt the developer from any other relevant heritage impact assessments as specified below:

In terms of the National Heritage Resources Act, No. 25 of 1999 (section 38) ECPHRA may require a full Heritage Impact Assessment (HIA) to assess all heritage resources, that includes *inter alia*, all places or objects of aesthetical, architectural, historic, scientific, social, spiritual, linguistic, or technological significance that may be present on a site earmarked for development. A full Heritage Impact Assessment (HIA) should assess all these heritage components, and the assessment may include archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasized that this Phase 1 AIA is based on the visibility of archaeological sites/material and may not therefore reflect the true state of affairs. Sites and material may be covered by soil and vegetation and will only be located once this has been removed. In the event of such finds being uncovered during construction activities, ECPHRA or an archaeologist must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed (see attached list of possible archaeological sites and material). The developer must finance the costs should additional studies be required as outlined above. The *onus* is on the developer to ensure that the provisions of the National Heritage Resources Act No. 25 of 1999 and any instructions from ECPHRA are followed. The EAP/developer must forward this report to ECPHRA in order to obtain their Review Comments, unless alternative arrangements have been made with the heritage specialist to submit the report.

APPENDIX A: brief legislative requirements

Parts of sections 35(4), 36(3) and 38(1) (8) of the National Heritage Resources Act 25 of 1999 apply:

Archaeology, palaeontology and meteorites

35 (4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves

36. (3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b)any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Heritage resources management

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50m in length;
(c) any development or other activity which will change the character of the site –
(i) exceeding 5000m^2 in extent, or
(ii) involving three or more erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
(d) the re-zoning of a site exceeding 10 000m^2 in extent; or
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must as the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

APPENDIX B: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM INLAND AREAS: guidelines and procedures for developers

Human Skeletal material

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general, human remains are buried in a flexed position on their side but are also found buried in a sitting position with a flat stone capping. Developers are requested to be on alert for the possibility of uncovering such remains.

Freshwater mussel middens

Freshwater mussels are found in the muddy banks of rivers and streams and were collected by people in the past as a food resource. Freshwater mussel shell middens are accumulations of mussel shell and are usually found close to rivers and streams. These shell middens frequently contain stone tools, pottery, bone, and occasionally human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m^2 in extent, should be reported to an archaeologist.

Large stone cairns

They come in different forms and sizes but are easy to identify. The most common are roughly circular stone walls (mostly collapsed) and may represent stock enclosures, remains of wind breaks or cooking shelters. Others consist of large piles of stones of different sizes and heights and are known as *isisivane.* They are usually near river and mountain crossings. Their purpose and meaning are not fully understood however some are thought to represent burial cairns while others may have symbolic value.

Stone artefacts

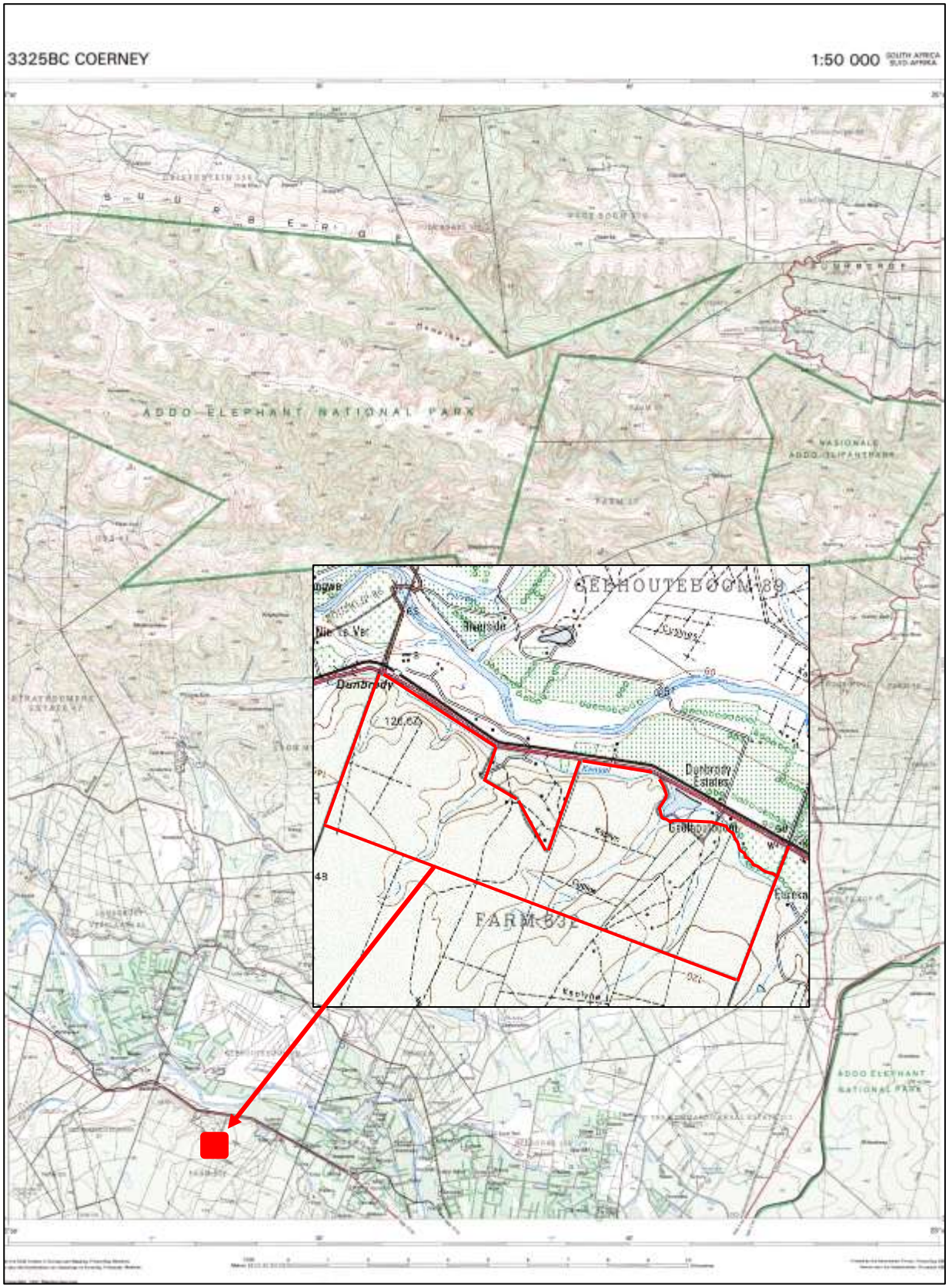
These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately, and archaeologists notified.

Fossil bone

Fossil bones may be found embedded in geological deposits. Any concentrations of bones, whether fossilized or not, should be reported.

Historical artefacts or features

These are easy to identify and include foundations of buildings or other construction features and items from domestic and military activities**.**



Map 1. 1:50 000 Topographic maps indicating the approximate location of the Remainder of Farm 632 indicated by the red arrow and red square.

Map 2. Aerial images indicating the location of the Remainder of Farm 632 outlined by the red lines.

Map 3. Map of the area surveyed indicated in green. The proposed clearance of ~144 hectares of vegetation for the cultivation of citrus will be located within the green area. The proposed area for the construction of a dam is indicated by the yellow placemark (Map courtesy of Public Process Consultants).

Chapter 10: Palaeontological Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

Palaeontological Specialist
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Public Process Consultants

PALAEONTOLOGICAL SPECIALIST STUDY: COMBINED DESKTOP & FIELD-BASED ASSESSMENT

Proposed Sontule Citrus agricultural expansion on the Remainder of Farm 632 near Addo, Sundays River Valley Municipality, Eastern Cape

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March 2022

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FIGURES:

EXECUTIVE SUMMARY

Sun Orange Farms (Pty) Ltd. is proposing the Sontule Citrus agricultural development on the Remainder of Farm 632, situated between Kirkwood and Addo in the Sundays River Valley Municipality, Eastern Cape Province. The project involves the establishment of new citrus orchards and associated infrastructure, including a new farm dam, irrigation infrastructure and internal roads on an existing citrus farm.

The Sontule Citrus agricultural project area is underlain at depth by fossiliferous marine sediments of the Sundays River Formation (Uitenhage Group) of Early Cretaceous age. Shelly invertebrate fossils have been previously recorded from the Cretaceous beds here in the scientific literature (e.g. McLachlan & McMillan 1976). During a recent one-day site visit several rich fossil sites yielding well-preserved bivalve molluscs as well as storm-generated coquinas (shell beds) of broken shelly remains and a few blocks of well-preserved petrified wood were recorded from small exposures of marine siltstones and calcareous sandstones along the low escarpment on the northern borders of the project area. However, none of these fossil sites lie within the project footprint and therefore no mitigation measures are recommended in their regard.

The proposed agricultural expansion will be situated in an undulating, gently sloping plateau area which has already been partly disturbed by agriculture, farm tracks and quarrying and is largely vegetated by dense subtropical thicket. The Cretaceous bedrocks here are entirely mantled by deep (several meters) alluvial deposits of the Late Caenozoic Kudus Kloof Formation. These sandy to gravelly sediments of inferred Pliocene age are often calcretised in the subsurface and are generally unfossiliferous. No fossil remains, apart from possible calcretised plant root traces of low scientific interest, were recorded within them.

Given (1) the small (partially disturbed) footprint of the proposed agricultural expansion, (2) the likely deeply weathered condition of the underlying Mesozoic bedrocks near-surface, as well as (3) the low palaeontological sensitivity of the overlying superficial sediments, the palaeontological heritage impact significance of all components of the proposed agricultural expansion (i.e. new blocks of citrus plantation, new dam, internal roads, irrigation pipeline etc) is assessed as LOW (negative) without mitigation. Current impacts on palaeontological heritage within the wider project area involve on-going destruction of newly exposed fossils by natural weathering and erosion processes (Impacts due to farming activities or illegal fossil collection here are likely to be negligible). This assessment applies to the individual project components as well as their anticipated cumulative impact.

There are no objections on palaeontological heritage grounds to authorisation of the proposed Sontule Citrus agricultural development. No further palaeontological heritage studies or specialist mitigation are required for the proposed developments, pending the potential discovery or exposure of any significant fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, shelly fossil horizons) during the construction phase. The ECO responsible for these developments should be alerted to the possibility of important fossil remains being found either on the surface or exposed by fresh excavations during construction.

Should fossil remains such as bones, shells or petrified wood be discovered during construction, these should be safeguarded (preferably in situ) and the ECO should alert the Eastern Cape Provincial Heritage Resources Authority (ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist (See tabulated Chance Fossil Finds Procedure in Appendix 2 to this report). The specialist involved would require a collection permit from ECPHRA. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013).

1. INTRODUCTION

The project applicant, Sun Orange Farms (Pty) Ltd., is proposing the Sontule Citrus agricultural development on parts of the Remainder of Farm 632 (c. 459 ha in total area), situated near Dunbrody on the southern side of the Sundays River and the R336 tar road, c. 13 km southeast of Kirkwood and c. 15 km NW of Addo in the Sundays River Valley Municipality, Eastern Cape Province (Figs. 1 & 2). The project involves the establishment of new citrus orchards and associated infrastructure (144 ha) including a new farm dam (~3ha), irrigation infrastructure and internal roads on an existing citrus farm.

The following project details have been provided by Public Process Consultants:

- **Proposed New Dam**

The Sontule citrus development will require the construction of a new dam on site which will be supplied with water from the LSRWUA canal system via an existing dam on the property.

- The existing dam has a capacity of 20 000m³
- The proposed new dam will be supplied with water from the existing dam via a 315mm uPVC pipe
- New dam specs:
  - Dam wall height 5 meters
  - Total proposed dam footprint ~31 800 m²
  - Estimated dam capacity ~49 000 m³
- New pumphouse (electrical consumption for pumps ~75kw)
- Relay water to orchards via pipes of varying sizes of either 250mm or 315mm uPVC pipe

- **Internal Irrigation Infrastructure**

Irrigation water will be supplied to the orchards via uPVC pipes varying in diameter from 250mm to 315mm. Irrigation water will be reticulated within the orchards via a network of underground pvc irrigation pipes and valves, with varying internal diameters (60mm to 160mm). The applicant proposes to utilise drip/ micro irrigation as the preferred method of water delivery to the trees within the orchards.

- **Electrical Infrastructure**

Pumping requirements will be 75kW for the existing dam and 30kW for the new (top) dam. A step-up transformer to be placed at the existing Eskom point with a cable to be placed in the same trench as the pipeline. A step-down transformer will be required at the proposed new dam. Electricity capacity is yet to be confirmed and will require written confirmation from Eskom.

- **Access**

Access to the site and proposed orchards will be from the existing gravel roads on the farm. The internal roads will be ~9m in width, but lengths will be confirmed in the Civil Engineering Services Report. A Traffic Impact Assessment has been undertaken by a traffic specialist to determine the suitability of the existing farm access to accommodate the additional generated traffic and the potential impact of the proposed development on the R336.

- **Footprint**

The footprint for the new dam will be 3.18 ha and the area proposed for clearing is approximately 144 ha and thus, dependent on the outcome of the various specialist assessments, a total clearance area of 147 ha is proposed. Approximately 321ha of natural area is remaining on the

farm. However, portions thereof are anticipated to be unsuitable for development due to biophysical constraints such as unsuitable soils, steep slopes, drainage lines and the requirement to conserve a representative portion of the vegetation types identified on site in order to meet conservation targets.

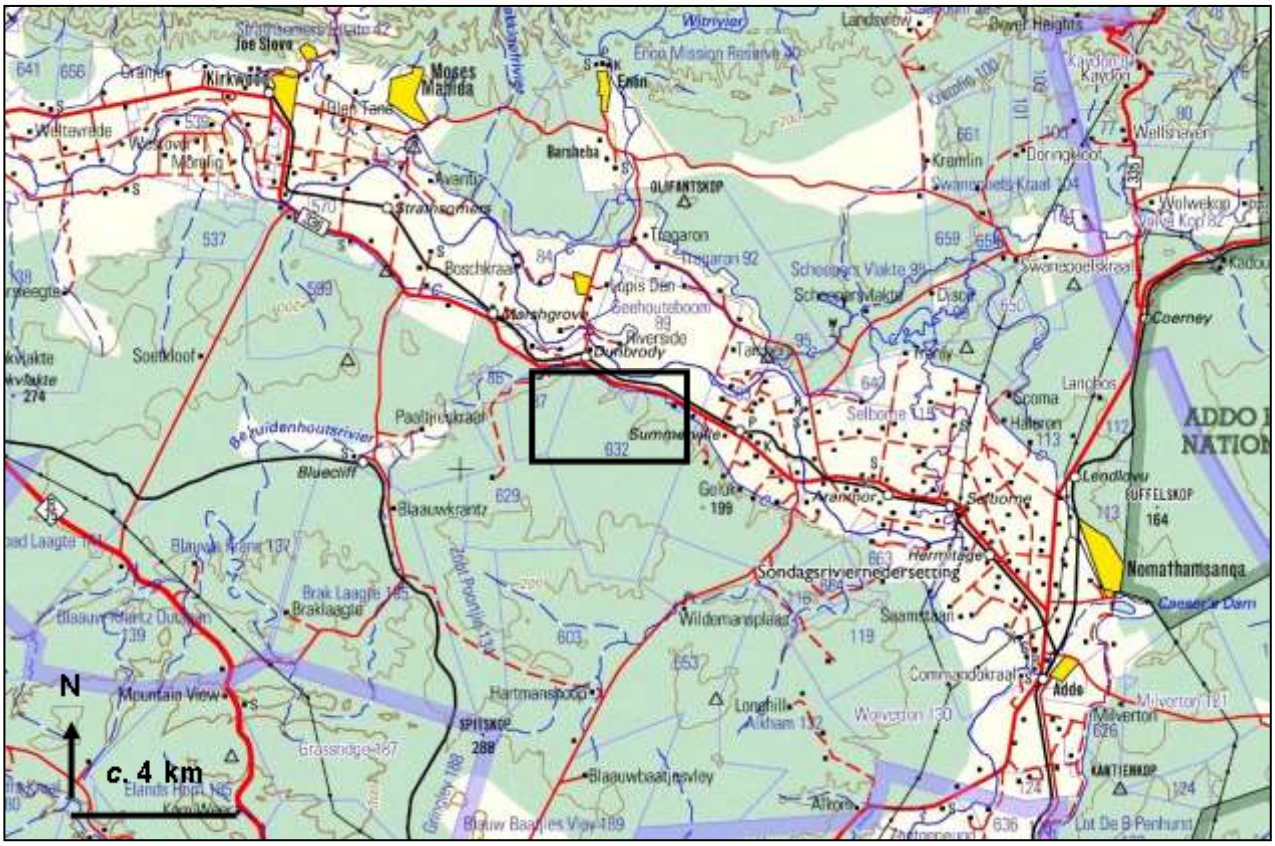

Figure 1: Approximate location of the Sontule Citrus agricultural project study area (black rectangle) on the Remainder of Farm 632, situated near Dunbrody on the southern side of the Sundays River and the R336 tar road, c. 13 km southeast of Kirkwood and c. 15 km NW of Addo in the Sundays River Valley Municipality, Eastern Cape (Extract from 1: 250 000 topographical sheet 3324 Port Elizabeth, courtesy of The Chief Directorate: National Geo-spatial information, Mowbray).

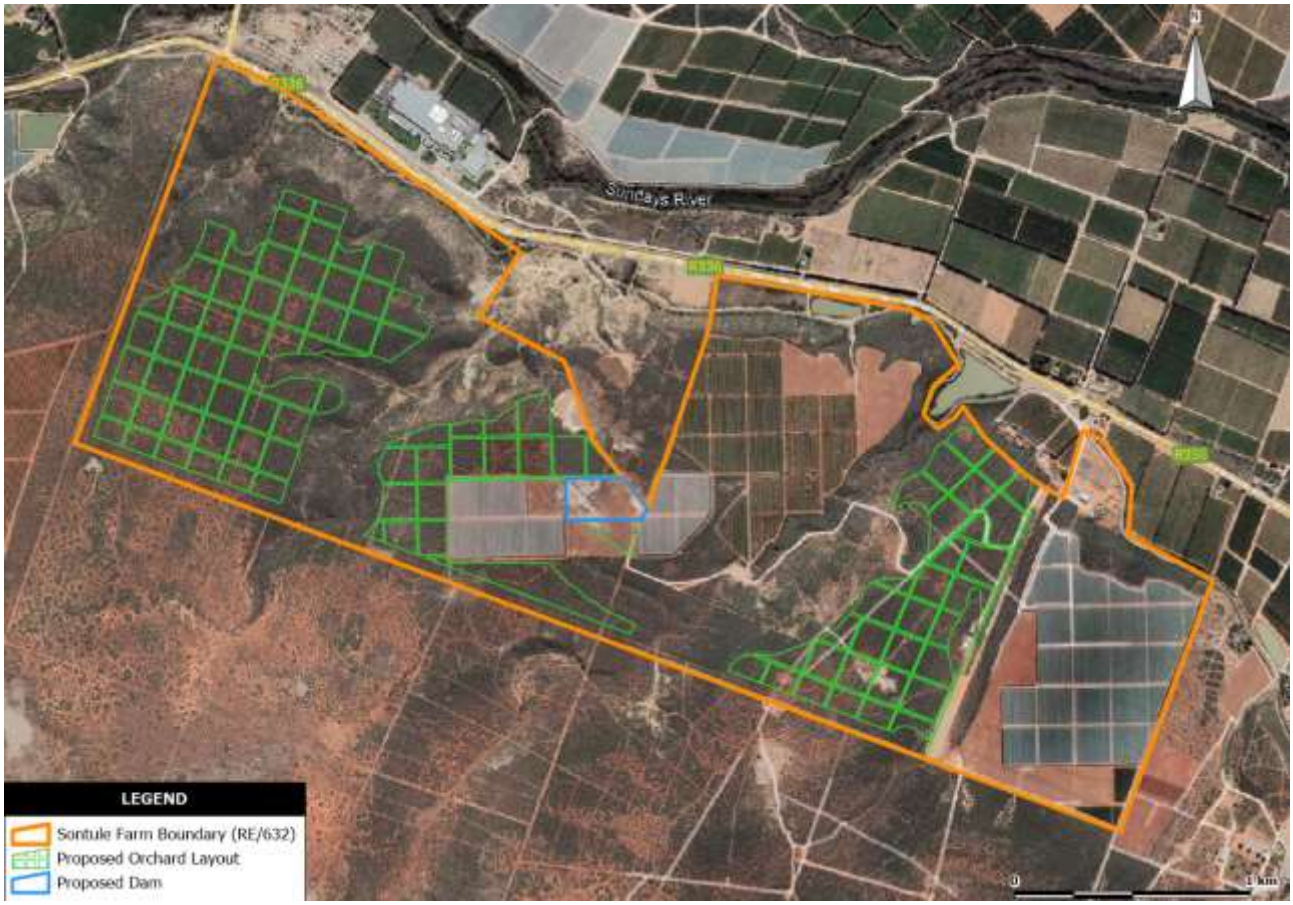

Figure 2: Google Earth© satellite image of the Sontule Citrus project area on the Remainder of Farm 632 (orange polygon).

The Sontule Citrus project area is underlain at depth by potentially fossiliferous sediments of the Sundays River Formation (Uitenhage Group) of Early Cretaceous age. In accordance with the National Heritage Resources Act, 1999, a palaeontological heritage assessment is required as part of a Heritage Impact Assessment for such projects, since important fossil material of scientific and conservation value has previously been recorded from the Kirkwood – Addo region area within this formation (e.g. McLachlan & McMillan 1976).

The present PIA (Palaeontological Impact Assessment) report has accordingly been commissioned as part of the EA Process on behalf of the applicant by the Independent Environmental Assessment Practitioners Public Process Consultants (Contact details: Ms Sandra Wren, Public Process Consultants, 120 Diaz Road, Adcockvale, Port Elizabeth 6001. Phone: 041 374 8426. Cell: 082 4909 828. E-mail: sandy@publicprocess.co.za).

1.1. Legislative context of this palaeontological study

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act (1999) include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites;
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:
(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.

(2) All archaeological objects, palaeontological material and meteorites are the property of the State.
(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
(4) No person may, without a permit issued by the responsible heritage resources authority—
(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—
(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Minimum standards for the palaeontological component of heritage impact assessment reports have been developed by SAHRA (2013).

2. APPROACH TO THE PALAEONTOLOGICAL HERITAGE ASSESSMENT

This combined desktop and field-based PIA study was based on the following information sources:

1. A short project outline, kmz files and maps provided by Public Process Consultants;

2. A review of the relevant scientific literature, including published topographical maps (1: 50 000 scale map 3325BC Bersheba, 1: 250 000 scale map 3324 Port Elizabeth), geological maps (sheet 3324 Port Elizabeth, Council for Geoscience, Pretoria and the associated short sheet explanation by Toerien & Hill 1989), Google Earth© satellite images, and several previous palaeontological heritage assessments in the region (See Almond in References);

3. A one-day site visit by the author and an experienced assistant on 27 January 2022.

4. The author's database on the formations concerned and their palaeontological heritage (cf Almond et al. 2008).

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations etc) represented within the study area are determined from geological maps and

satellite images. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience (Consultation with professional colleagues as well as examination of institutional fossil collections may play a role here, or later following field assessment during the compilation of the final report). This data is then used to assess the palaeontological sensitivity of each rock unit to development. The potential impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature and scale of the development itself, most significantly the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a Phase 1 field assessment study by a professional palaeontologist is usually warranted to identify any palaeontological hotspots and make specific recommendations for any mitigation required before or during the construction phase of the development.

On the basis of the desktop and Phase 1 field assessment studies, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are then determined. Adverse palaeontological impacts normally occur during the construction rather than the operational or decommissioning phase. Phase 2 mitigation by a professional palaeontologist – normally involving the recording and sampling of fossil material and associated geological information (e.g. sedimentological data) may be required (a) in the pre-construction phase where important fossils are already exposed at or near the land surface and / or (b) during the construction phase when fresh fossiliferous bedrock has been exposed by excavations. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from the relevant heritage management authority, i.e. the Eastern Cape Provincial Heritage Resources Authority, ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). It should be emphasized that, providing appropriate mitigation is carried out, the majority of developments involving bedrock excavation can make a positive contribution to our understanding of local palaeontological heritage.

2.1. Assumptions & limitations

The accuracy and reliability of palaeontological specialist studies as components of heritage impact assessments are generally limited by the following constraints:

1. Inadequate database for fossil heritage for much of the RSA, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas have never been surveyed by a palaeontologist.

2. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant ("mappable") bedrock units as well as major areas of superficial "drift" deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil etc), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.

3. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information;

4. The extensive relevant palaeontological "grey literature" - in the form of unpublished university theses, impact studies and other reports (e.g. of commercial mining companies) - that is not readily available for desktop studies;

5. Absence of a comprehensive computerized database of fossil collections in major RSA institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

(a) underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or

(b) overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc).

Since most areas of the RSA have not been studied palaeontologically, a palaeontological desktop study usually entails inferring the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.

In the case of the proposed Sontule Citrus agricultural project the major limitation for fossil heritage assessment is the low level of Mesozoic bedrock exposure due to extensive cover by largely unfossiliferous superficial sediments as well as the limited access to many parts of the study area because of the dense thicket vegetation. However, sufficient sedimentary rock exposures were examined during the course of the one-day site visit, supported by several previous field-based palaeontological heritage studies in the wider region, to allow an adequate assessment of the potential impacts of the proposed development.

2.2. Legislative context

The present combined desktop and field-based palaeontological heritage report falls under Sections 35 and 38 (Heritage Resources Management) of the South African Heritage Resources Act (Act No. 25 of 1999), and it will also inform the EMPr for this project.

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites;
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.

(2) All archaeological objects, palaeontological material and meteorites are the property of the State.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—
(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Minimum standards for the palaeontological component of heritage impact assessment reports (PIAs) have been published by SAHRA (2013) and by Heritage Western Cape (2021).

3. GEOLOGICAL BACKGROUND

The Sontule Citrus agricultural project area on the Remainder of Farm 632 is situated on the southern side of the Sundays River near Dunbrody, midway between Kirkwood and Addo and just east of the tributary valley of the Bezuidenhoutsrivier (Figs. 1 & 2). It largely comprises gently undulating terrain on a broadly north-sloping pediment surface at elevations of c. 100-150 m amsl. (Figs. 3 to 6). This upland area is partly disturbed by farm tracks, existing citrus plantations and a few small quarries; most of the remainder – where the new citrus orchards will be established - is clothed in dense subtropical thicket vegetation with narrow pathways and small clearings. Bedrock exposure in this upland area is almost non-existent. A gently sloping, N-facing escarpment between c. 70 and 100 m amsl. incised by small stream valleys runs along the margins of the pediment plateau. Most of the escarpment slopes are clothed in thicket vegetation and mantled by gravelly soils and scree. Uitenhage Group bedrocks – the main target for the present palaeontological study - are exposed here and there in small footslope quarries and lower-lying areas incised by gully erosion.

The geology of the Kirkwood – Addo region of the Sundays River Valley is shown on 1: 250 000 geological map 3324 Port Elizabeth (Council for Geoscience, Pretoria; Toerien & Hill 1989) (Fig. 7). The present study area lies towards the northern edge of the extensive Algoa Basin which is infilled with a 3.5 km-thick succession of alluvial fan, fluvial and estuarine to marine shelf sediments of Late Jurassic to Early Cretaceous age (c. 150-125 Ma) that are referred to as the Uitenhage Group (McLachlan & Anderson 1976, Shone 2006). The Remainder of Farm 632 is entirely underlain at depth by marine sediments of the Sundays River Formation (Ks, red in map Fig. 7). These marine beds interfinger along the basin margin to the north, west and south, outside the project area, with continental facies of the Kirkwood Formation (J-Kk, orange in Fig. 7). Sandy to gravelly alluvial terrace deposits (“High Level Gravels”) of Late Caenozoic (Miocene to Recent) age that are assigned to the Kudus Kloof Formation mantle the Mesozoic Uitenhage Group bedrocks across the higher lying parts of the project area. The type area for this formation is

located on the farm Kudus Kloof 117 which lies some 5 km to the SE of the present study area (Hattingh 1994) (Fig. 8).

Figure 3: View northwards across the western sector of the Remainder of Farm 632 showing the flat, very gently N-sloping pediment surface on the skyline, gravelly hillslopes in the foreground and valley slopes clothed in dense subtropical thicket vegetation.

Figure 4: Most of the outcrop area of the Sundays River Formation along the escarpment slopes is mantled by colluvial gravels – Sundays River Formation sandstones and concretionary material, quartzite cobbles and pebbles from the Kuduskloof Formation – as well as thicket and soils.

Figure 5: Typical low-relief terrain on the upland plateau where the new citrus groves will be established with pervasive quartzitic eluvial surface gravels and sandy soils exposed in paths and clearings among dense thicket vegetation.

Figure 6: One of a few areas on the upland plateau that have been disturbed by quarrying for subsurface calcrete.

3.1. Sundays River Formation

The Sundays River Formation is of Early Cretaceous (Valanginian-Hauterivian) age, i.e around 140-130 Ma (million years old). It comprises a thick (up to 2 km) succession of thin-bedded, grey-green sandstones, siltstones and finer-grained mudrocks that are often highly fossiliferous (Shone 2006). Depositional settings range from estuarine through littoral (shoreline) to marine outer shelf (McMillan 2003). These beds are differentiated from the older to contemporaneous Kirkwood Formation of the Uitenhage Group by (a) the absence of reddish-hued mudrocks, (b) the presence of prominent-weathering calcareous sandstones, and (c) the frequent occurrence of fossil marine shells. These last are commonly, but not invariably, associated with the thin, calcareous sandstone beds, many of which are tempestites (i.e. storm deposits). Various members within the Sundays River succession have been identified from borehole data (Cooper 2018). Key geological accounts of the Sundays River Formation include those by Du Toit (1954), Rigassi & Dixon (1972), Winter (1973), McLachlan & McMillan (1976), Tankard et al. (1982), Dingle et al., (1983), McMillan (2003) and Shone (1976, 2006). For the study area the geological sheet explanations by Haughton (1928), Engelbrecht et al. (1962), Toerien and Hill (1989) and Le Roux (2000) are most relevant.

Uitenhage Group bedrocks are only exposed in small quarry and gullied areas in the escarpment zone while stream valley floor outcrops elsewhere are completely covered by gravelly colluvium, soil and vegetation. The best exposures are seen just west of a small cluster of houses towards the northern edge of the study area (Figs. 9 & 10). Here gently dipping, tabular bedded, gullied purple grey, grey-green to khaki massive siltstones with horizons of blocky-weathering, coffee-brown ferruginous diagenetic concretions (some septarian) pass upwards into a zone with thin (up to a few dm), pale brownish-weathering, thinly and flat-laminated sandstone interbeds. The reddish to purplish hues seen lower down in the succession suggest a nearby continental influence and are more typical of the Kirkwood Formation which crops out just to the west, while abundant shelly fossils (Section 4) are mainly associated with more typical Sundays River grey-green beds above. In the same sector of the farm can be seen thick (several m), medium-bedded, well-sorted, pale brown sandstone packages associated with dark brown-patinated ferruginous carbonate concretions, overlain by interbedded siltstones and thin sandstones with banks of shelly coquina ("shell beds") (Fig. 11) as well as well-jointed benches of tough, dark brown calcareous sandstone containing comminuted shelly debris and thin shelly coquinas (Fig. 12).

3.2. Caenozoic sediments

Sandy to gravelly alluvial deposits of the Kudus Kloof Formation have been described by Hattingh (1994) and mapped in detail along the Sundays River Valley by Hattingh (2001) (Fig. 8). Representatives of Terrace 5 (dark green in Fig. 8), Terrace 6 (purple), Terrace 7 (mid blue), Terrace 8 (orange) and Terrace 9 (grey) are mapped within the Sontule Citrus study area. These terrace gravels are of inferred Middle to Late Pliocene age. The various gravel subunits are not readily distinguished on the ground, however, and they have often been modified by erosional downwasting. Occasional relict banks of coarse, clast-supported Kudus Kloof alluvial conglomerates are visible on hillslopes (Fig. 15). Some of the denser gravel layers may be eluvial / remanié deposits that have been condensed by downwasting from thicker gravel-containing sand bodies. The gravels are generally poorly sorted, subrounded to well-rounded and oligomict; they are predominantly composed of grey to brownish Cape Supergroup quartzite with occasional darker brown Sundays River sandstone clasts.

A well-developed horizon of heavily calcretised, non-shelly, poorly-sorted breccio-conglomerates of the Kudus Kloof Formation occurs at c.115 m amsl along the northern edge of the project area where it directly overlies a package of tabular-bedded, olive-green Sundays River Formation sandstone and blocky-weathering, grey green siltstones (Figs. 13 & 14). The conglomerate clasts are mainly subrounded to well-rounded quartzite pebbles, cobbles and boulders but locally blocks of reworked olive green sandstone are incorporated within the calcretised sandstone matrix. Calcrete veins penetrate downwards between the bedrock layers. Based on its elevation, this

horizon may correspond to the Early Pliocene T4 terrace (115-125 m amsl) of Hattingh (2001). The extensive calcrete quarry at a similar to slightly higher elevation (c. 120 m amsl) (Fig. 6) may be related to the same alluvial terrace. Calcretised aeolianites and not just alluvium might also be represented here. The several meter thick, dense calcrete zone shows a greenish speckling, floating gritty grains and fine veins (Fig. 37); it is probably a composite unit and is capped by brown soils packed with calcrete rubble (Fig. 16).

Some test pits on the upland plateau expose sandy to bouldery alluvial sediments with interstitial calcrete derived from modified Kudus Kloof alluvium. Elsewhere deep, only sparsely gravelly orange-brown sandy soils might, at least in part, represent modified aeolian sands (cf Pliocene aeolianites and calcarenites of the Nanga Formation, Algoa Group, which are often secondarily rubified) (Fig. 20). They are best exposed in test pits where a well-developed subsurface calcrete hard pan at a depth of c.30-50 cm may sometimes be seen (Figs. 18 & 19). Flaked quartzite artefacts are common among the overlying surface gravels. Reworked colluvial gravels of quartzite, Sundays River sandstone and concretionary debris, calcrete blocks and saprolitic sandy to silty soils mantle the escarpment slopes which are underlain by Uitenhage Group bedrocks (Fig. 4).

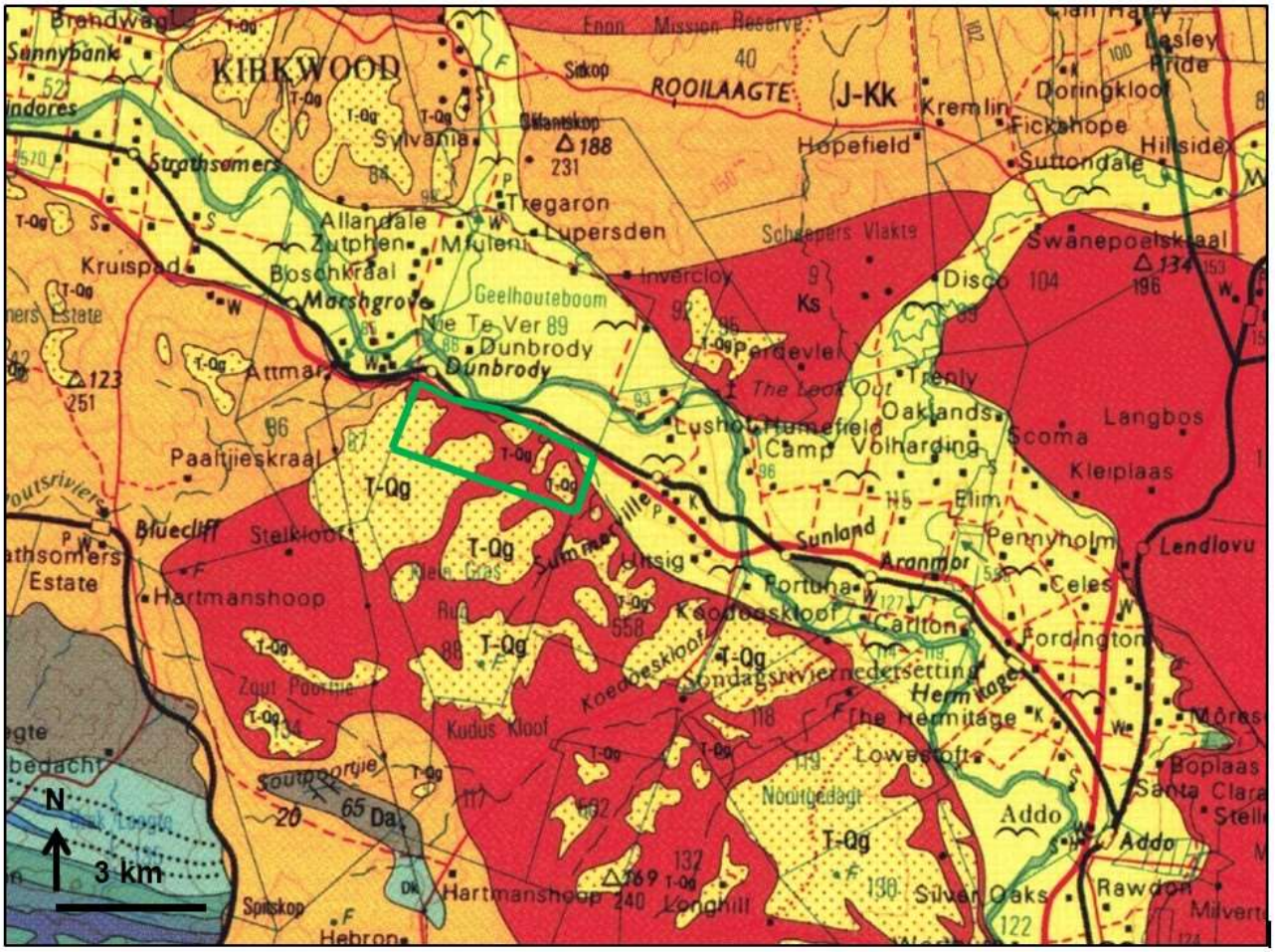

Figure 7: Extract from 1: 250 000 geological map 3324 Port Elizabeth (Council for Geoscience, Pretoria). The study area for the proposed Sontule Citrus agricultural project between Kirkwood and Addo in the Sundays River Valley, Eastern Cape (approximately indicated by the green rectangle) is underlain by Early Cretaceous marine sediments of the Sundays River Formation (Uitenhage Group) (Ks, red). A series of fluvial terrace gravel units of the Kudus Kloof Formation ("High Level Gravels") of Late Tertiary / Neogene age are also mapped here (T-Qg, yellow with red stipple) capping a stepped pediment surface incised into the Uitenhage Group bedrocks on the southern flanks of the Sundays River Valley.

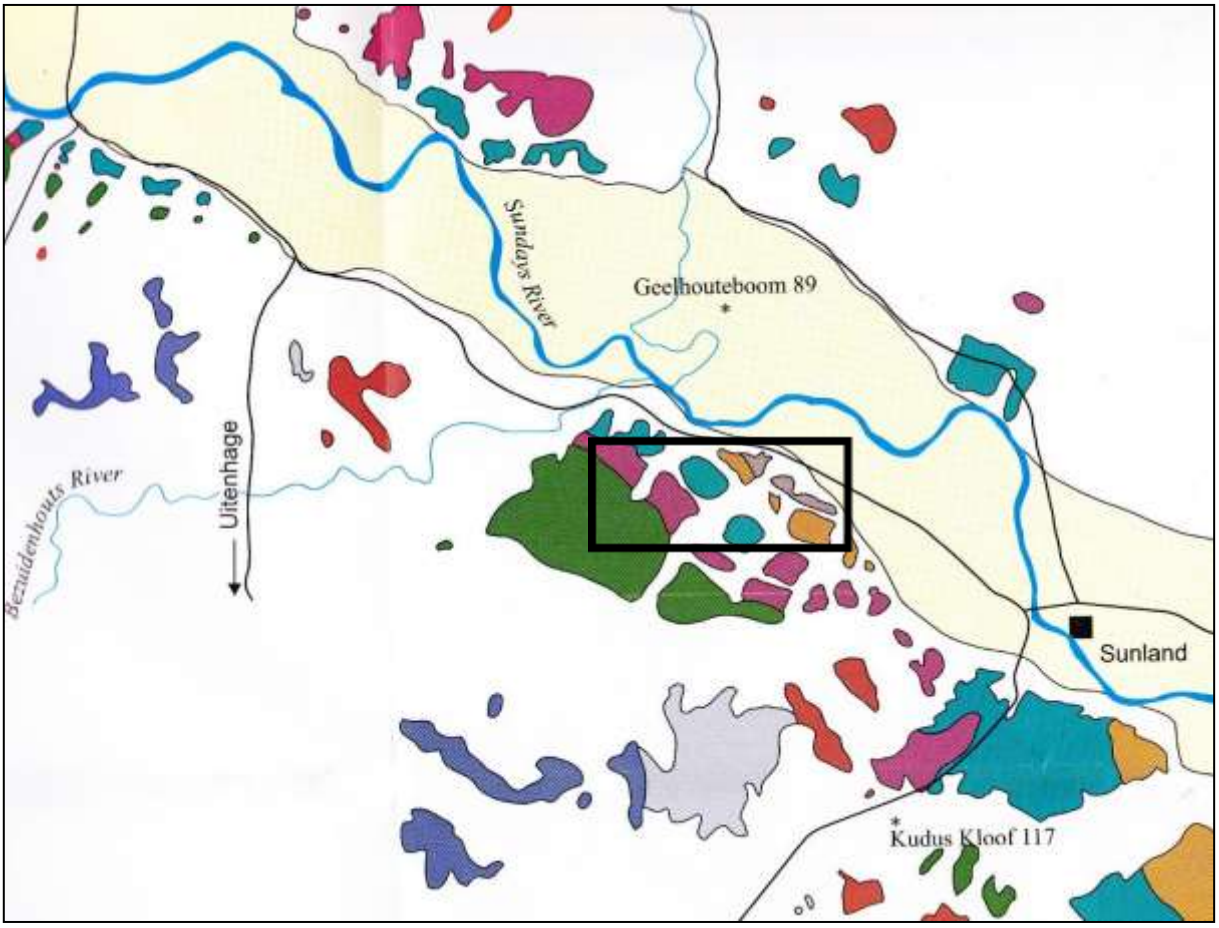

Figure 8: Extract from map of High Level Terrace Gravels of the Sundays River published by Hattingh (2001, Appendix 2) showing the representatives of Terrace 5 (dark green), Terrace 6 (purple), Terrace 7 (mid blue), Terrace 8 (orange) and Terrace 9 (grey) alluvial gravels within the Sontule Citrus study area (black rectangle). These terrace gravels of inferred Middle to Late Pliocene age are now grouped within the Kudus Kloof Formation whose type area on Kudus Kloof 117 lies some 5 km further to the SE (Hattingh 1994).

Figure 9: Small quarry excavated into gently dipping, purplish-brown and khaki sediments of the Sundays River Formation in the NW sector of the project area. The reddish to purplish hues seen here suggest a nearby continental influence and are more typical of the Kirkwood Formation which crops out just to the west; the two formations may inter-finger here.

Figure 10: The grey-green to khaki siltstones and thin sandstones within the upper part of the Sundays River Formation succession illustrated above are highly fossiliferous and contain many large-scale ferruginous concretions (hammer = 30 cm) (Locs. 924 to 929).

Figure 11: Thick unit of pale brown, well-sorted sandstone with darker, brownish, ferruginous carbonate concretions overlain by a several dm-thick shelly coquina (arrowed), Sundays River Formation (hammer = 30 cm) (Loc. 935) (See also Fig. 33).

Figure 12: Hillslope exposure of in situ and slightly displaced blocks of brownish calcareous sandstone of the Sundays River Formation that contain abundant fossil mollusc assemblages and coquinas (Loc. 946) (See also Figures 31 & 32).

Figure 13: Well-calcretized, poorly-sorted, quartzitic alluvial gravels capping a pediment surface incised into Uitenhage Group bedrocks at c. 115 m amsl – possibly Terrace 4 of the alluvial Kudusklоof Formation of inferred Early Pliocene age.

Figure 14: Extension of the same calcretised unit of the Kudusklоof Formation shown in the previous figure, here showing a calcrete hardpan directly overlying thin, tabular sandstones of the Sundays River Formation (hammer = 30 cm).

Figure 15: Coarse, poorly-sorted, quartzitic terrace gravels of the Kuduskloof Formation at c. 100 m amsl – possibly Terrace 5 of inferred Middle Pliocene age (hammer = 30 cm).

Figure 16: Thick sandy calcrete hardpan exposed on the margins of a shallow quarry in the central sector of the Remainder of Farm 632 and capped by dark brown soils with abundant calcrete rubble (hammer = 30 cm).

Figure 17: Well-developed calcrete hardpan beneath gravelly brown soils exposed in a shallow quarry area in the south-eastern sector of the project area (hammer = 30 cm).

Figure 18: Test pits within the proposed citrus plantation project areas often expose a clacrete hard pan 30 to 50 cm beneath the surface, capped by sparsely gravelly, orange-brown sandy soils (hammer = 30 cm).

Figure 19: Test pit into coarse alluvial gravels and sands that mantle large portions of the citrus plantation project areas, here at c. 126 m amsl and possibly derived from Terrace 4 of the Kuduskloof Formation.

Figure 20: Bright orange-brown, only sparsely gravelly sandy soils which cover parts of the plateau area might, at least in part, be derived from modified aeolianites such as the Nanaga Formation which is typically rubified in the coastal interior.

Figure 21: Readily gullied, khaki to grey-green silty soils on lower hillslopes are derived from the underlying Sundays River Formation mudrocks and grade downwards into saprolite.

4. PALAEONTOLOGICAL HERITAGE

The fossil record of the main sedimentary rock units represented within the study area on the Remainder of Farm 632 is outlined here, together with any new palaeontological data based on the recent site visit. GPS locality details of numbered fossil sites mentioned in the test and figure legends are tabulated in Appendix 1 of this chapter.

4.1. Fossils in the Sundays River Formation

In palaeontological terms the Sundays River Formation (Uitenhage Group) contains one of the most prolific and scientifically important marine biotas of Mesozoic age in southern Africa (See brief review by Almond 2010, from which the following section is largely abstracted). Fossils have been recorded from the Sundays River beds in the Algoa Basin since the early nineteenth century (1837). Cooper (1981) provides a good review of the earlier literature. Important collections were made, for example, by the famous Eastern Cape geologists W.G. Atherstone and A.G. Bain (see Sharpe 1856) and there has been a long history of palaeontological publications dealing with the Sundays River fauna since then. Among the key papers are those by Sharpe (1856), Kitchin (1908), Spath (1930), Du Toit (1954), Engelbrecht et al. (1962), Haughton (1969), McLachlan & McMillan (1976, 1979), Klinger & Kennedy (1979), Cooper (1981, 1991), Dingle et al. (1983), McMillan (2003) and Shone (1986, 2006). Well-illustrated accounts of Sundays River fossils have been given by MacRae (1999) and Cooper (2018). The ammonites and microfossils are of particular biostratigraphic (rock dating) importance, while the foraminiferans (a group of protozoans) are useful for palaeoenvironmental analysis (See extensive discussion in McMillan 2003). Despite the long history of palaeontological work on Sundays River fossils, there has been little systematic collection of fossils – especially macrofossils - from these beds in recent decades and most taxa remain poorly studied (e.g. most invertebrate groups, apart from the ammonites, trigoniid bivalves and foraminiferans). Much further research remains to be done here, however,

and a lot of palaeontologically valuable material is undoubtedly being destroyed in the currently active brick pits in the Algoa Basin region.

The main invertebrate macrofossils recorded from the Sundays River Formation are a rich variety of molluscs. These include several cephalopod subgroups - mainly ammonites, plus much rarer nautiloids and belemnites. The cephalopod fauna has been revised recently by Cooper (1981, 1983) and is dominated by a series (14 spp.) of strongly ribbed, coiled ammonites of the Genus Olcostephanus, also well-known from Early Cretaceous marine faunas elsewhere in the world. Interestingly, clear examples of well-developed sexual dimorphism (male and female shells of different size and form) are shown in this genus. Much rarer partially coiled ammonites (Distoloceras) and straight-shelled, obliquely ribbed forms (Bochianites) also occur.

The Sundays River molluscs include a number of mainly small-bodied gastropods (c. 6 genera, including limpets), and over forty genera of bivalves (mussels, clams etc). In terms of abundance as well as biodiversity the bivalve molluscs are also the dominant group. The commonest form is the thick-shelled “Devil’s toenail” oyster Aetostreon (previously known as Exogyra or Gryphaea) which is often preserved in dense coquinas (shell beds) at the base of storm sandstones. Some of the other bivalves, such as the strongly–ribbed or knobbed trigoniids (eleven species in seven genera, recently revised by Cooper 1979, 1991) and the elongate-shelled Gervillella – all shallow infaunal forms - are also quite substantial (20-30 cm long or more) with robust shells. Encrusting oysters cemented onto shells, rocks or hardgrounds are common (e.g. Amphidonte). Dense storm-transported accumulations of scaphopod molluscs (tusk shells) were discovered during a recent field study by Almond (2011). Most of these South African fossils are badly in need of taxonomic and palaeobiological revision along the lines of recent work on similar-aged South America molluscs by Lazo (2007 and earlier papers).

More minor invertebrates – including stenohaline as well as euryhaline taxa - from the Sundays River Formation are solitary and branching colonial corals, tube-dwelling serpulid polychaetes, bryozoans, echinoderms (usually fragmentary crinoids or sea lilies, ophiuroids or brittle stars, sea cucumbers, regular echinoids) and shrimp-like crustaceans. However, more intensive collecting from these beds is likely to reveal further invertebrate taxa. This is suggested by the recent discovery of two new crustaceans (including several specimens of strongly tuberculate crabs) within Sundays River concretions (Dr Billy de Klerk, pers. comm., 2010), the scaphopods or tusk shells mentioned earlier, and recent new records of beetle remains south of Addo (Mostovski & Muller 2010). Sundays River trace fossils are poorly studied, but are locally abundant. They range from dense banks of cylindrical intrasediment burrows to a range of borings into wood, shells and hardgrounds (i.e. cemented substrata on the sea floor including, for example, exhumed early diagenetic concretions). A spectrum of microfossils from this stratigraphic unit include foraminiferans, ostracods, dinoflagellates and land-derived pollens and spores (Dingle et al. 1983, McMillan 2003). Among the rarer microfossil groups recorded are radiolarians, seed shrimps, and fragments of echinoderms (ossicles of crinoids, ophiuroids, holothurians and echinoids).

The Sundays River beds contain sparse, often unidentifiable plant fossils such as fragments of driftwood (sometimes insect- or perhaps mollusc-bored), leaf and twig debris, amber (fossil resin), lignite, charcoal and the reproductive structures of charophyte algae (stoneworts). Fossil vertebrates from the Sundays River Formation are very rare indeed. The best-known example is the partial skeleton of a 3 m-long plesiosaur (an extinct group of large marine reptiles), Leptocleidus capensis. This comes from the famous, but poorly-localized, site of Picnic Bush on the Swartkops River near Port Elizabeth (Andrews 1910; see MacRae 1999 and Cooper 2018 for good illustrations). Isolated dinosaur bones and teeth have also been mentioned (e.g. a dinosaur vertebra from Barkly Bridge south of Addo; Engelbrecht et al. 1962), though several earlier records probably stem from the older Kirkwood Formation. Gess (undated report) recently reported small vertebrate remains associated with marine molluscs and drift-wood from a site in the Sundays River Valley.

Early records of Cretaceous fossil remains from the Sundays River Formation of the Algoa Basin near Addo – including several reports of fossil molluscs (ammonites, bivalves, gastropods) as well

as tubiculous serpulid worms - have been collated by McLachlan and Anderson (1976) (Fig. 32). They include records of various molluscan taxa along the low, north-facing riverine escarpment near Dunbrody, close to or within the present study area. Cretaceous fossils recorded during a recent field survey on Vissers Vale 96 some three kilometres to the east by Almond (2019) included a range of molluscan taxa associated with thin (20 cm or less thick), lenticular shelly coquinas within cliff and riverbank exposures of both siltstone and sandstone facies of the Sundays River Formation. The coquinas are made up of disarticulated and broken shells and are dominated by various oysters such as the encrusting Amphidonte / Ceratostreon, the toenail-shaped, free-living Aetostreon as well as rarer strongly-ornamented trigoniid bivalves.

Locally abundant, mollusc-dominated marine shelly fossil assemblages are recorded from a few small exposures of sandstone and mudrock facies along the Sundays River Formation escarpment in the north-central portion of the Sontule Citrus project area on the Remainder of Farm 632 (See fossil sites mapped in Figure A1 in Appendix 1). It is likely that fossils occur widely in this escarpment zone. Shelly coquinas in the higher portions of the Sundays River Formation succession here are commonly associated with thin, medium to coarse-grained, calcareous sandstone units, comprising comminuted shell debris, especially of various bivalve molluscs, as well as intact but usually disarticulated valves (Figs. 28, 31 & 32). Original shell material is usually preserved, but mouldic preservation within calcareous sandstone is also seen. Thin shell pavements are made of closely-packed, similarly orientated valves. Thin pebbly conglomeratic lenses contain shelly material as well as occasional fragments of ferruginized woody stem axes and subcylindrical rusty-brown bodies that possibly represent reworked, secondarily mineralized burrow casts (0.5 cm wide) (Figs. 29 & 30). Silty mudrock packages contain locally common, thick-shelled trigoniid bivalves (some specimens articulated and possibly in life position, others preserved within disgenetic nodules) and thin-shelled, irregularly shaped oysters (Amphidonte) (Figs. 23 & 26). The latter are variously preserved freely within the silty matrix, in compact clumps or stacks encrusting oyster or other shells, or affixed to hard substrates such as calcareous sandstones and carbonate concretions, some of which were exposed as hardgrounds on the sea floor. Impressive shelly coquinas up to a decimeter or so thick within siltstone packages contain myriads of loose to mutually consolidated mollusc valves (Amphidonte, trigoniids, Pinna, possible Mytiloperna, Isognomon etc) (Figs. 11, 33 to 35).

Local concentrations of angular blocks of pale greyish petrified wood preserving fibrous wood fabric (Fig. 36) are more typical of the Kirkwood Formation (“Wood Beds”). These fossils, as well as the purplish and reddy hues of some of the nearby siltstone exposures suggest that inter-tonguing of continental Kirkwood and marine Sundays River facies occurs in this area; the contact between these rock units is mapped just to the west of the Remainder of Farm 632 (Fig. 7).

5.2. Fossils in Late Caenozoic alluvial deposits

Neogene to Recent colluvial, alluvial and lag gravel, sand and clay deposits may also contain fossil remains of various types. In coarser sediments like river conglomerates these tend to be robust, highly disarticulated and abraded (e.g. rolled bones, teeth of vertebrates) but well-preserved skeletal remains of plants (e.g. wood, roots) and invertebrate animals (e.g. freshwater molluscs and crustaceans) as well as various trace fossils may be found within fine-grained alluvium. Embedded human artefacts such as stone tools that can be assigned to a specific interval of the archaeological time scale (e.g. Middle Stone Age) can be of value for constraining the age of Pleistocene to Recent drift deposits like alluvial terraces. Ancient to modern “High Level Gravels” tend to be coarse and to have suffered extensive reworking (e.g. winnowing and erosional downwasting), so they are generally unlikely to contain useful fossils. No fossils are reported from the Kudus Kloof Formation by Hattingh (1994, 2001); these fluvial terraces are dated by reference to correlated fossiliferous marine terraces along the coast. Fine-grained carbonaceous muds associated with vlei areas may contain peats, palynomorphs (pollens, spores) and other microfossils as well as the bones and teeth of mammals and other fauna that died in the area.

No gastropod shells or other body fossils were observed within the well-developed calcretes observed in elevated plateau areas on the Remainder of Farm 632. Narrow vermiform structures within dense calcrete might represent root traces (rhizoliths) (Fig. 37) while possible indications of possible meniscate back-filled burrows were also seen. Incipient calcretisation focused around subfossil plant roots is seen in road cuttings through older sandy soils (Fig. 38) while soils elsewhere occasionally contain subfossil shells of the large land snail Cochlitoma ("Achatina"), sometimes retaining faint colour markings.

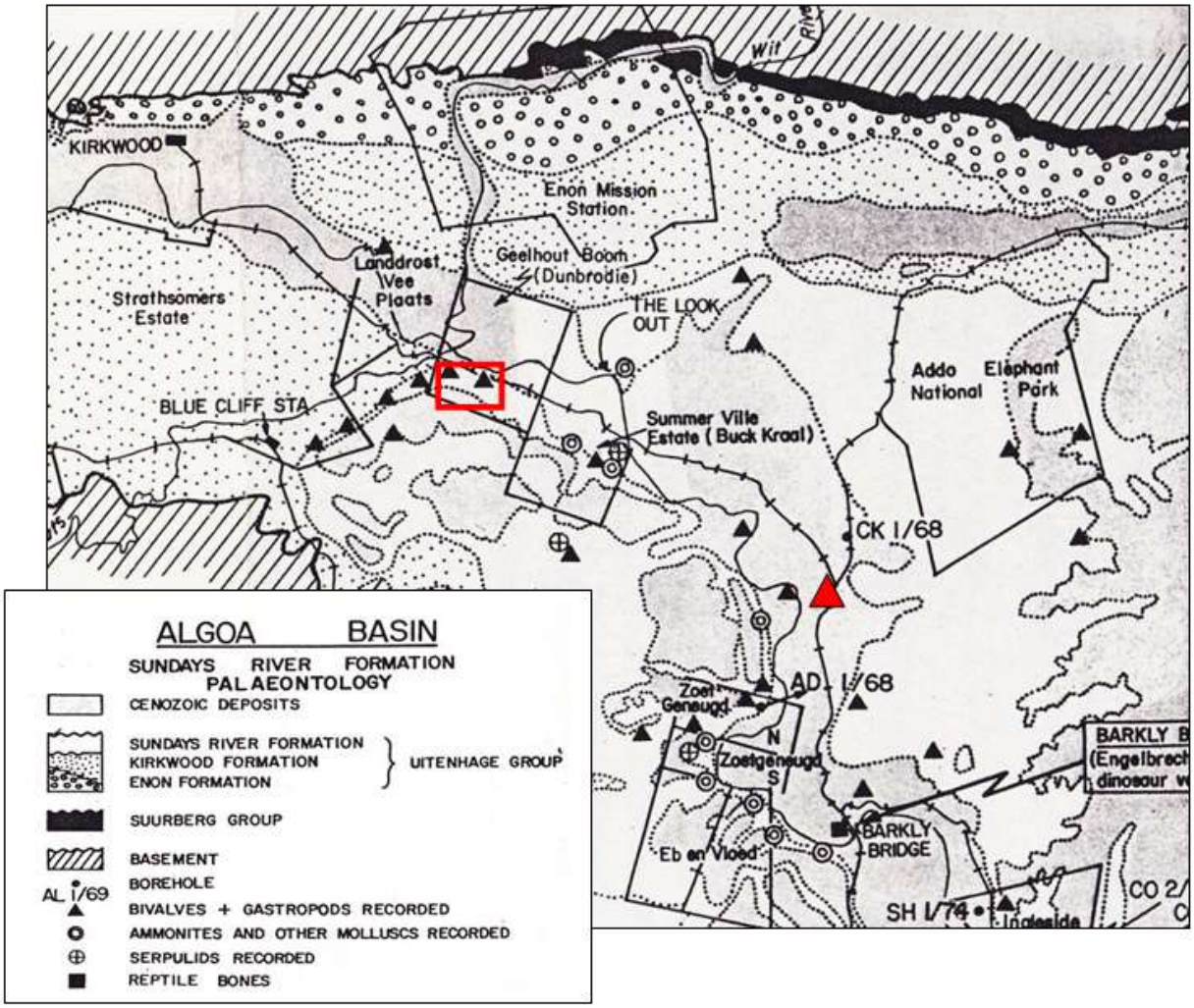

Figure 22: Fossil localities in the Sundays River Formation of the Algoa Basin near Addo (town marked by red triangle), with the present study area on the Remainder of Farm 632 near Dunbrody approximately indicated by a red rectangle. Several groups of marine invertebrates (molluscs, including bivalves, gastropods and ammonites, as well as serpulid worm tubes) are reported from Sundays River Formation beds on the flanks of the Sundays River Valley between Kirkwood and Addo, including the present study area, while various dinosaur and other vertebrate remains are recorded from Barclay Bridge to the south of Addo (Figure modified from McLachlan & Anderson 1976, their Fig. 8).

Figure 23: Concentration of thick-shelled, strongly ornamented, articulated and disarticulated trigoniid bivalves enclosed within a concretionary zone within siltstone facies of the Sundays River Formation (Loc. 928) (scale in cm and mm).

Figure 24: Articulated specimen of large, trigoniid bivalve apparently preserved in life position within siltstone facies (Loc. 929) (scale in cm).

Figure 25: Well-preserved valves of the small, thin-shelled oyster *Amphidonte* weathering out of siltstone facies of the Sundays River Formation. The largest shell seen here is 3.5 cm across (Loc. 929).

Figure 26: Stacks of superimposed *Amphidonte* oyster shells (scale in cm) (Loc. 929).

Figure 27: Dense cluster (c. 9 cm across) of *Amphidonte* oyster shells encrusting one another (Loc. 929).

Figure 28: Slab of brownish, gritty to pebbly calcareous sandstone containing comminuted shelly debris as well as probable reworked invertebrate burrow casts (see following figure for detail) (scale = 15 cm) (Loc. 926).

Figure 29: Close-up of rusty-brown, subcylindrical casts (0.5 cm wide, arrowed) of invertebrate burrows within the pebbly calcareous sandstone illustrated above (Loc. 926).

Figure 30: Small ferruginised woody stem axes preserved within pebbly calcareous sandstone facies (scale in cm and mm) (Loc. 925).

Figure 31: Thin pavement of wave-sorted, well-sorted, disarticulated bivalve shells preserved within brown-weathering calcareous sandstone (scale in cm and mm) (Loc. 947).

Figure 32: Comminuted shelly debris (largely bivalves) forming a shelly hash preserved within a brownish calcareous sandstone (scale in cm) (Loc. 946).

Figure 33: Thin, prominent weathering shelly bed within siltstone succession, with underlying apron of downwasted shells extending downslope (hammer = 30 cm) (Loc. 935).

Figure 34: Close-up of weathered-out bivalves from the shell bed illustrated above – mainly the thin-shelled oyster *Amphidonte* but also possible *Isognomon*, among other taxa (largest shell is c. 6 cm wide) (Loc. 935).

Figure 35a, b: Well-cemented cluster of intact and broken bivalve shells with detail of several shells seen in lower figure (scale in cm and mm) (Loc. 935).

Figure 36: Angular blocks of pale grey petrified log preserving fibrous woody fabric (scale in cm) (Loc. 930) (scale in cm and mm). These fossils suggest proximity to land and possible inter-tonguing of Kirkwood and Sundays River Formations in the study area.

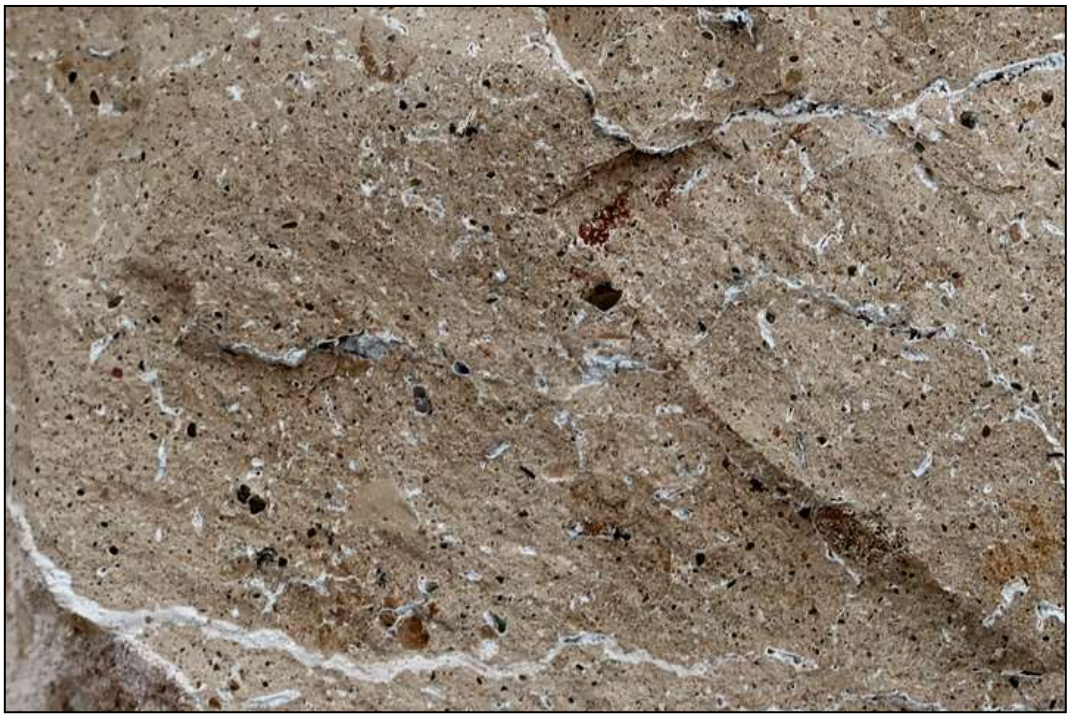

Figure 37: Close-up of dense, dark-speckled Late Caenozoic calcrete hardpan from quarry area showing pale vermiform structures that *might* be fine root traces, or perhaps abiogenic (field of view c. 6 cm across) (Loc. 951).

Figure 38: Road cutting through well-consolidated, orange-brown sandy sediment showing incipient pale calcretisation around subfossil plant roots (hammer = 30 cm) (Loc 957).

5. CONCLUSIONS & RECOMMENDATIONS

The Sontule Citrus agricultural project area on Remainder of Farm 632, situated between Kirkwood and Addo in the Sundays River Valley, Eastern Cape Province, is underlain at depth by fossiliferous marine sediments of the Sundays River Formation (Uitenhage Group) of Early Cretaceous age. Shelly invertebrate fossils have been previously recorded from the Cretaceous beds here in the scientific literature (e.g. McLachlan & McMillan 1976). During a recent one-day site visit several rich fossil sites yielding well-preserved bivalve molluscs as well as storm-generated coquinas (shell beds) of broken shelly remains and a few blocks of well-preserved petrified wood were recorded from small exposures of marine siltstones and calcareous sandstones along the low escarpment on the northern borders of the project area (See satellite locality map in Appendix 1 of this chapter). However, none of these fossil sites lies within the project footprint and therefore no mitigation measures are recommended in their regard.

The proposed agricultural development will be situated in an undulating, gently sloping plateau area which has already been partly disturbed by agriculture, farm tracks and quarrying and is largely vegetated by dense subtropical thicket. The Cretaceous bedrocks here are entirely mantled by deep (several meters) alluvial deposits of the Late Caenozoic Kudus Kloof Formation whose type area lies a few kilometres to the east. These sandy to gravelly sediments of inferred Pliocene age are often calcretised in the subsurface and have experienced erosional concentration through downwasting. They are generally unfossiliferous and no fossil remains, apart from possible calcretised plant root traces of low scientific interest, were recorded within them.

Given (1) the small (partially disturbed) footprint of the proposed agricultural developments, (2) the likely deeply weathered condition of the underlying Mesozoic bedrocks near-surface, as well as (3) the low palaeontological sensitivity of the overlying superficial sediments, the palaeontological heritage impact significance of all components of the proposed agricultural projects (i.e. new blocks of citrus plantation, new dam, internal roads, irrigation pipeline etc) is assessed as LOW (negative) without mitigation. Current impacts on palaeontological heritage within the wider project area

involve on-going destruction of newly exposed fossils by natural weathering and erosion processes (Impacts due to farming activities or illegal fossil collection here are likely to be negligible). This assessment applies to the individual project components as well as their anticipated cumulative impact. In the absence of full data regarding potential impacts of comparable proposed or authorised agricultural developments in the Addo – Kirkwood region, cumulative impacts on local fossil heritage cannot be realistically assessed. However, given the large outcrop areas of the sedimentary formations concerned, they are likely to fall within acceptable limits.

There are no objections on palaeontological heritage grounds to authorisation of the proposed Sontule Citrus agricultural development. No further palaeontological heritage studies or specialist mitigation are required for the proposed developments, pending the potential discovery or exposure of any significant fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, shelly fossil horizons) during the construction phase. The ECO responsible for these developments should be alerted to the possibility of important fossil remains being found either on the surface or exposed by fresh excavations during construction.

Should fossil remains such as bones, shells or petrified wood be discovered during construction, these should be safeguarded (preferably in situ) and the ECO should alert the Eastern Cape Provincial Heritage Resources Authority (ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist (See tabulated Chance Fossil Finds Procedure in Appendix 2 to this chapter). The specialist involved would require a collection permit from ECPHRA. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013).

6. ACKNOWLEDGEMENTS

Ms Sandra Wren of Public Process Consultants, Port Elizabeth, is thanked for commissioning this palaeontological study and for providing the necessary background information. I am very grateful to Ms Madelon Tusenius for logistical back-up, palaeontological input as well as companionship in the field.

Table 1: Assessment of anticipated impacts of the proposed Sontule Citrus agricultural project on scientifically valuable palaeontological heritage on the Remainder of Farm 632 (construction phase)

Nature of the Impact	Potential disturbance, damage or destruction of scientifically valuable and legally protected fossil heritage resources due to surface clearance and excavations during the construction phase (*e.g.* for farm dam, citrus orchards, internal roads, underground pipelines).
Extent	Site Specific - The impact will be limited to the proposed development footprint.
Duration	Permanent
Consequence/ Intensity	Low
Probability	Improbable - The proposed development area will be restricted to areas which are covered by thick unfossiliferous superficial sediments (alluvium, topsoils).
Degree of Confidence	Medium
Reversibility	Irreversible – Once the palaeontological material has been removed or destroyed this impact cannot be reversed.
Irreplaceable Loss of Resources	Unlikely. Similar fossils to those recorded here are known elsewhere from the extensive Sundays River Formation outcrop area.
Status and Significance (without mitigation)	Low Negative (-)
Mitigation	• The construction phase of the projects should be monitored by an Environmental Control Officer (ECO), who should monitor for potential fossil material on an ongoing basis. • Should substantial fossil remains be exposed during construction, however, the ECO should safeguard these, preferably *in situ*, and alert ECPHRA as soon as possible so that appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist. • In the event that fossilised material is uncovered, construction on the affected excavation should cease until a palaeontologist has assessed the material. • Fossilised material encountered at the site may only be removed or destroyed upon authorisation from the relevant Heritage Resources Authority (*i.e.* ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za) by the issuing of an appropriate permit. • A Chance Fossil Finds Protocol is to be appended to the Construction EMPr and implemented should any substantial fossil remains be uncovered. • Fossil material must be curated in an approved repository (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013).
Status and Significance (after mitigation)	Low Positive (+) - Providing appropriate palaeontological mitigation is carried out, the majority of developments involving bedrock excavation can make a positive contribution to our understanding of local palaeontological heritage.

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8. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest, Gauteng, KwaZulu-Natal, Mpumalanga and the Free State under the aegis of his Cape Town-based company Natura Viva cc. He has served as a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
Palaeontologist
Natura Viva cc

APPENDIX 1: FOSSIL SITE DATA – JANUARY 2022

All GPS readings were taken in the field using a hand-held Garmin GPSmap 64s instrument. The datum used is WGS 84. Please note that:

- Locality data for South African fossil sites is not for public release, due to conservation concerns.
- The table does *not* represent all potential fossil sites within the project area but only those sites recorded during the 1-day field survey. The absence of recorded fossil sites in any area therefore does not mean that no fossils are present there.

Loc	GPS data	Comments
924	S33° 28' 40.6" E25° 32' 55.0"	Remainder of Farm 632 near Addo. Sundays River Fm. Shelly coquinas (molluscan debris, occasional intact bivalve valves) within calcareous sandstone concretions. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
925	S33° 28' 40.7" E25° 32' 54.6"	Remainder of Farm 632 near Addo. Sundays River Fm. Shelly coquinas (molluscan debris) associated with small rusty-brown woody stem axes, possible ferruginised subcylindrical burrow casts (0.5 cm diam.) within calcareous pebbly sandstone. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
926	S33° 28' 40.2" E25° 32' 55.3"	Remainder of Farm 632 near Addo. Sundays River Fm. Ferruginous gritty sandstone with pebbly conglomerates, reworked cyclindrical burrow casts, shelly debris. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
927	S33° 28' 39.9" E25° 32' 55.0"	Remainder of Farm 632 near Addo. Sundays River Fm. Thin-shelled oysters (*cf Amphidonte*) encrusting ferruginous sandstone of possible hardground origin. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
928	S33° 28' 39.4" E25° 32' 54.7"	Remainder of Farm 632 near Addo. Sundays River Fm. Ferruginous diagenetic concretions containing thick-shelled trigoniid bivalves. Clusters of thin-shelled encrusting oysters (*cf Amphidonte*). Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
929	S33° 28' 39.3" E25° 32' 54.5"	Remainder of Farm 632 near Addo. Sundays River Fm. Upper siltstone portion of exposed succession (beneath thin-bedded sandstones) containing abundant trigoniid bivalves, thin-shelled oysters. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
930	S33° 28' 41.4" E25° 32' 54.2"	Remainder of Farm 632 near Addo. Sundays River Fm. Several angular float blocks of pale grey petrified logs up to 20 cm long with clear woody fabric. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
931	S33° 28' 42.8" E25° 32' 53.8"	Remainder of Farm 632 near Addo. Possible subfossil *Cochlitoma* ("*Achatina*") in soils overlying saprolitic Sundays River formation siltstones. Proposed Field Rating IIIC Local Resource. Site lies outside project footprint so no mitigation required.
935	S33° 28' 53.8" E25° 32' 54.0"	Remainder of Farm 632 near Addo. Sundays River Fm. Dense shelly coquinas up to dm or so thick associated with siltstone and thin sandstones overlying thick sandstone package. Range of shelly taxa dominated by oysters (*Amphidonte*), possible trigoniids, pectinoids, *Isognomon*. Shells mainly disarticulated, intact or broken, locally bound within concretionary lenses. Proposed Field Rating IIIB Local Resource. Proposed Field Rating

		IIIB Local Resource. Site lies outside project footprint so no mitigation required.
945	S33° 28' 49.8" E25° 33' 03.0"	Remainder of Farm 632 near Addo. Sundays River Fm. Downwasted blocks of pale brownish shelly calcareous sandstone (oysters *inter alia*) in shallow stream valley. Proposed Field Rating IIIB Local Resource. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
946	S33° 28' 49.9" E25° 33' 03.6"	Remainder of Farm 632 near Addo. Sundays River Fm. Downwasted blocks of pale brownish shelly calcareous sandstone (intact and broken shells of bivalves) in shallow stream valley. Proposed Field Rating IIIB Local Resource. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
947	S33° 28' 49.9" E25° 33' 03.7"	Remainder of Farm 632 near Addo. Sundays River Fm. Downwasted to nearly *in situ* blocks of pale brownish shelly calcareous sandstone (intact and broken shells of bivalves, locally forming thin pavements) in shallow stream valley. Proposed Field Rating IIIB Local Resource. Proposed Field Rating IIIB Local Resource. Site lies outside project footprint so no mitigation required.
951	S33° 28' 52.4" E25° 33' 09.0"	Remainder of Farm 632 near Addo. Extensive shallow quarry into dense calcrete showing narrow, vermiform plant root traces (rhizoliths and / or possible occasional invertebrate burrows (equivocal). Proposed Field Rating IIIC Local Resource. Site lies outside project footprint so no mitigation required.
957	S33° 29' 13.2" E25° 33' 23.4"	Remainder of Farm 632 near Addo. Farm road cutting into partially calcretised orange-brown, non-pebbly sandy sediments (alluvial / aeolian) with calcrete haloes around subfossil plant roots. Proposed Field Rating IIIC Local Resource. Site lies outside project footprint so no mitigation required.

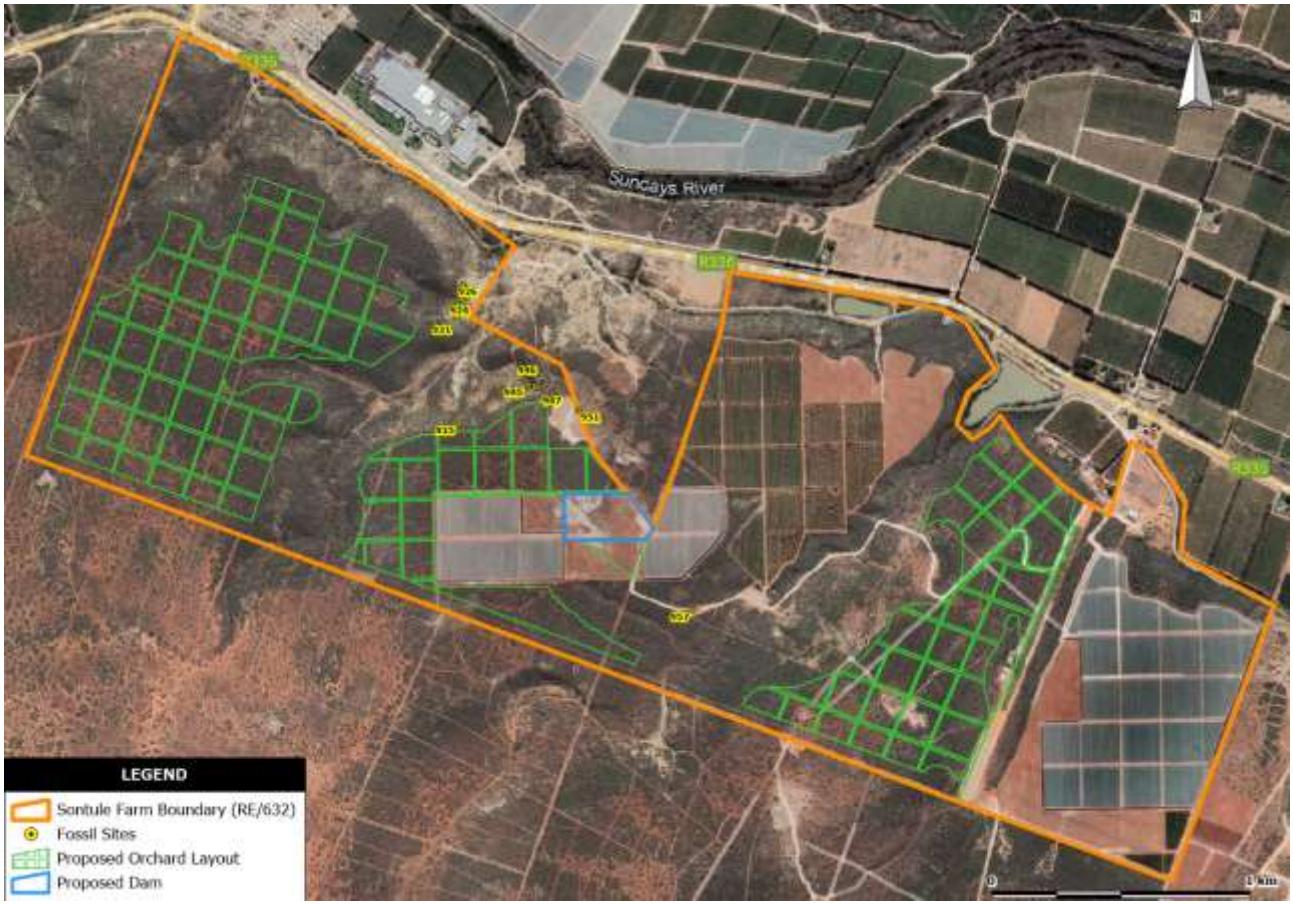

Figure A1.1: Google Earth© satellite image of the Sontule Citrus project area on the Remainder of Farm 632 near Addo showing location of recently recorded fossil and subfossil sites. None of the fossil sites lies within the footprint of the proposed agricultural development and no mitigation is required in their regard.

<table>
<tr><th colspan="3">APPENDIX 2: CHANCE FOSSIL FINDS PROCEDURE: Remainder of Farm 632 near Addo</th></tr>
<tr><td>Province & region:</td><td colspan="2">Eastern Cape, Sundays River Valley Municipality</td></tr>
<tr><td>Responsible Heritage Management Authority</td><td colspan="2">ECPHRA (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za).</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Early Cretaceous Sundays River Formation Uitenhage Group), Late Caenozoic Kudus Kloof Formation</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Shelly invertebrates, petrified wood, rare dinosaur bones and teeth, trace fossils in Sundays River beds.
Freshwater molluscs, calcretised trace fossils, possible bones and teeth of mammals in Caenozoic alluvium.</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):

Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Authority</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Authority minimum standards.</td></tr>
</table>

Chapter 11: Traffic Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

Traffic Specialist
Compiled by: Jared Charlton
Reviewed by: Cary Hastie
Engineering Advice and Services
P O Box 13867
HUMEWOOD
6013
Tel: 041 581 2421
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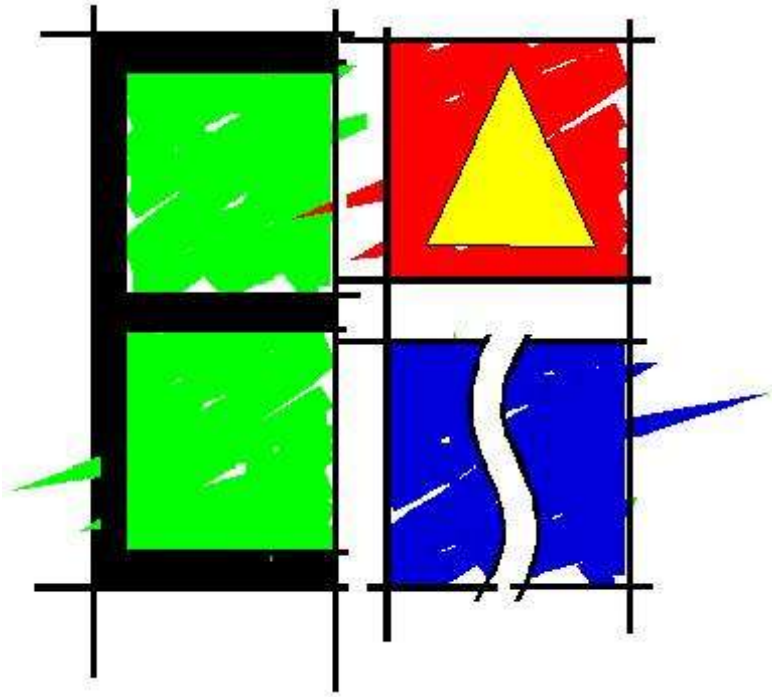
Public Process Consultants

TRAFFIC IMPACT ASSESSMENT

FOR THE PROPOSED DEVELOPMENT OF ADDITIONAL CITRUS ORCHARDS ON REMAINDER OF FARM 632, UITENHAGE SUNDAYS RIVER VALLEY MUNICIPALITY



November 2021

Prepared for: **Public Process Consultants cc**
obo Sun Orange Farms (Pty) Ltd

Prepared by: **Engineering Advice and Services (Pty) Ltd**
(041) 5812421

DOCUMENT CONTROL SHEET

CLIENT REF: **PUBLIC PROCESS CONSULTANTS**

PROJECT NAME: **PROPOSED DEVELOPMENT OF ADDITIONAL CITRUS ORCHARDS ON REMAINDER 632 OF FARM 42, UITENHAGE**

DOCUMENT TITLE: **TRAFFIC IMPACT ASSESSMENT**

DOCUMENT FILE REF: F:\1900-1999\1966\Reports\REP001 - TIA Sun Orange Citrus, SRVM.docx

Version	**1**		
Compiled by	JK Charlton Candidate Eng Technologist (201580304)	November 2021	
Reviewed by	CGA Hastie Pr Tech. Eng (200070122)	November 2021	
Amendments made by			

DISTRIBUTION:
1) Original : Client (Public Process Consultants – Ms Sandy Wren)
2) Copy : Client – Sun Orange Farms (Pty) Ltd
3) Copy : South African National Roads Agency SOC Limited
4) Copy : EAS File 1966

PREPARED BY: Engineering Advice and Services (Pty) Ltd
P O Box 13867
HUMEWOOD
6013

Telephone: 041 581 2421
Email: caryh@easpe.co.za

CONTENTS

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LIST OF ANNEXURES

1 INTRODUCTION

1.1 BACKGROUND

Engineering Advice & Services (Pty) Ltd was appointed by Public Process Consultants on behalf of Sun Orange Farms (Pty) Ltd during October 2021 to conduct a traffic impact assessment for proposed additional citrus orchards on remainder of Farm 632 situated in Sunlands in the Sundays River Valley Municipality.

1.2 METHODOLOGY

The approach followed in conducting the traffic impact assessment was in accordance with the guidelines contained in **TMH 16 Vol 1- South African Traffic Impact and Site Assessment Manual**[(1)].

Given the extent of the proposed development and in terms of the guidelines, the development is considered to be a medium-sized development and this assessment will thus consider impact for the development horizon (assumed to be 2025).

The methodology used was as follows:

- The expected trips that will be generated by the development were determined;
- The suitability of the access point to the public road network was determined; and
- The impacts on public roads that may be used to transport produce to packhouses were assessed in terms of operational safety taking into account road conditions and sight distances.

2 LAND USE RIGHTS, DEVELOPMENT AND ENVIRONS

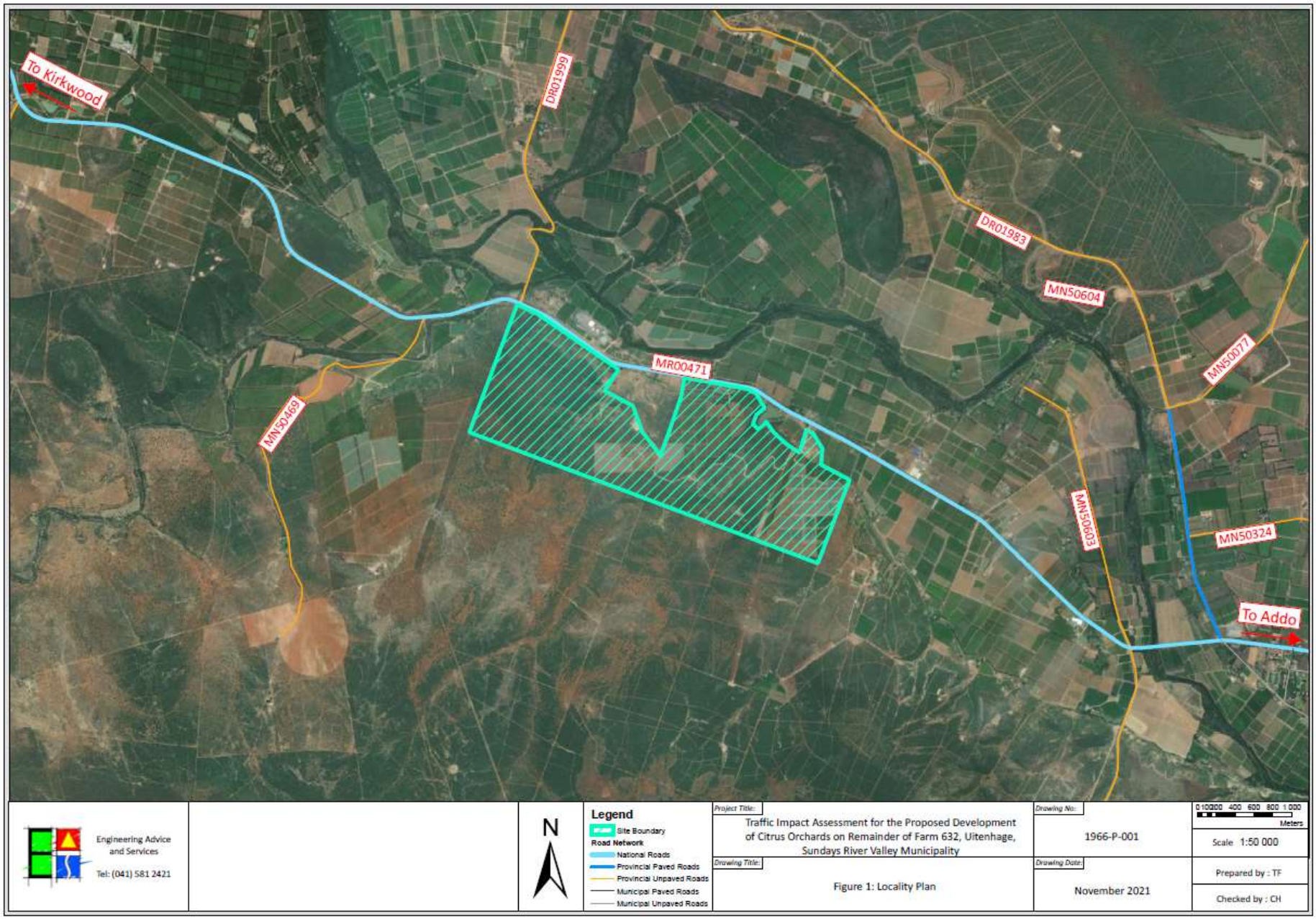
2.1 LAND USE RIGHTS

The site, which is zoned for Agricultural purposes, measures approximately 459 ha and is located south of the MR00471 (R336) as indicated on **Figure 1**. Approximately 133ha of the site is currently being used for the cultivation of citrus and associated infrastructure.

2.2 DEVELOPMENT OVERVIEW

It is proposed to use a portion of the undeveloped land for the cultivation of additional citrus trees and to construct a new storage dam and irrigation pipelines for irrigation purposes.

It is proposed that the additional infrastructure and citrus to be planted will amount to approximately 147 ha. Approximately 179 ha of the site will remain as natural vegetation.


To Kirkwood
DR01999
DR01983
MN50604
MN50077
MR00471
MN50469
MN50603
MN50324
To Addo
Engineering Advice and Services
Tel: (041) 581 2421
N
Legend
Site Boundary
Road Network
National Roads
Provincial Paved Roads
Provincial Unpaved Roads
Municipal Paved Roads
Municipal Unpaved Roads
Project Title:
Traffic Impact Assessment for the Proposed Development of Citrus Orchards on Remainder of Farm 632, Uitenhage, Sundays River Valley Municipality
Drawing No:
1966-P-001
0 100 200 400 600 800 1 000
Meters
Scale 1:50 000
Drawing Title:
Figure 1: Locality Plan
Drawing Date:
November 2021
Prepared by : TF
Checked by : CH

3 DATA COLLECTION

3.1 HISTORICAL DAILY TRAFFIC VOLUMES

Historical daily traffic volume data at count stations on MR471 (2122, 2134, 8211, 12104, 12106 & 12124), attached as **Annexure A** of this chapter, was sourced from the SANRAL database.

The data, summarised in **Table 1** below indicates that between 2016 and 2019, traffic growth on the R336 amounted to approximately 7.5% per annum with approximately 13% of vehicles travelling along the R336 comprising of heavy vehicles.

Table 1: ADT and Annual Growth Rates

Stn.	Description	ADT / ADTT	2015	2016	2017	2018	2019	2020	% p.a.
2122	ECDOT - MR00471 (R336) East of MR0047	ADT	4636	-	-	-	-	-	-
		ADTT	-	-	-	-	-	-	
12124	SANRAL - MR00471 (R336) East of MR0047	ADT	-	6905	-	-	-	-	-
		ADTT	-	801	-	-	-	-	
2134	ECDOT - MR00471 (R336) West of MR00470	ADT	4201	-	-	-	-	-	-
		ADTT	-	-	-	-	-	-	
8211	SANRAL - MR00471 (R336) West of MR00470	ADT	-	-	1578	1659	1773	1520	**6.00**
		ADTT	-	-	220	218	278	235	
12104	SANRAL - MR00471 (R336) West of Unifruiti	ADT	-	1433	-	1703	-	-	**9.01**
		ADTT	-	115	-	238	-	-	
12106	SANRAL - MR00471 (R336) East of Unifruiti	ADT	-	1480	-	-	-	-	-
		ADTT	-	170	-	-	-	-	
									7.51

Although traffic count data is available for 2020, this data was not used in the growth rate calculation given the COVID-19 pandemic and the countrywide level 5 lockdown that occurred during this period

View of MR00471 (R336) at the access

3.2 ROAD NETWORK

R336 (MR471) is a surfaced national road which links Addo with Kirkwood. In the vicinity of the site, the road comprises of a 3,7m wide traffic lane and narrow gravel shoulder in each direction. The posted speed limit is 80km/h.

The existing road network is indicated on **Figure 1.**

MR00471 is scheduled for upgrading in the near future with the proposed cross-section comprising of a 3.5m wide traffic lane and a 2.5m surfaced shoulder per direction.

4 TRIP GENERATION AND DISTRIBUTION

The proposed operation will include the harvesting of citrus and the transport of the fruit to a packhouse. Once the orchards are developed in 2-5 years' time and picking can commence it is estimated that approximately 9 060 tons will be produced and transported over the 100 day harvesting season.

Table 2: Summary of Generated Trips

Area	Operation	Season	Total Yield	Vehicle Type	Total Loads / Season	Trips per Day*
147ha	Delivery	April to Sept	9 060 tons	Tractor Trailer	378 loads	8 trips per day
	Collection			Interlink Truck	302 loads	6 trips per day

* Picking occurs over the entire harvesting season. Thus 378 loads over 100 week days which equates to 4 loaded trips delivering to the onsite sorting area and 4 empty trips returning to the orchard.
Similarly 3 empty interlinks arrive at the farm and 3 loaded depart to various destinations per day.

The duration of each pick is over the full harvesting season which equates to 4 tractor-trailer loads per day (8 one-way trips) delivering citrus to the onsite sorting area via the internal road network. Once the fruit has been sorted it is collected by 3 interlink truck loads per day (6 one-way trips) for delivery to a local packhouse or to a local warehouse for juicing.

Based on current daily volumes along MR00471 the use of the road by interlink trucks during the harvest season will result in a 1% increase in traffic per day (current volumes indicate under 1773 vehicles per day), a negligible impact when compared to the current traffic.

5 PROPOSED ACCESS ARRANGEMENTS

Access to the additional cultivated lands will be via the existing access road onto MR00471 (R336) located approximately 4.25km west of the MR00471 (R336) / MR0470 intersection as indicated on **Figure 2** below**.**

Shoulder sight distance at the MR00471 intersection with the access road was assessed in terms of **TRH 17: Geometric Design of Rural Roads** [(2)]. TRH17 recommends that a single unit and trailer vehicle entering a road with a design speed of 60kph turning left or right requires shoulder sight distance of 300m. The requirement for a passenger car is 150m.

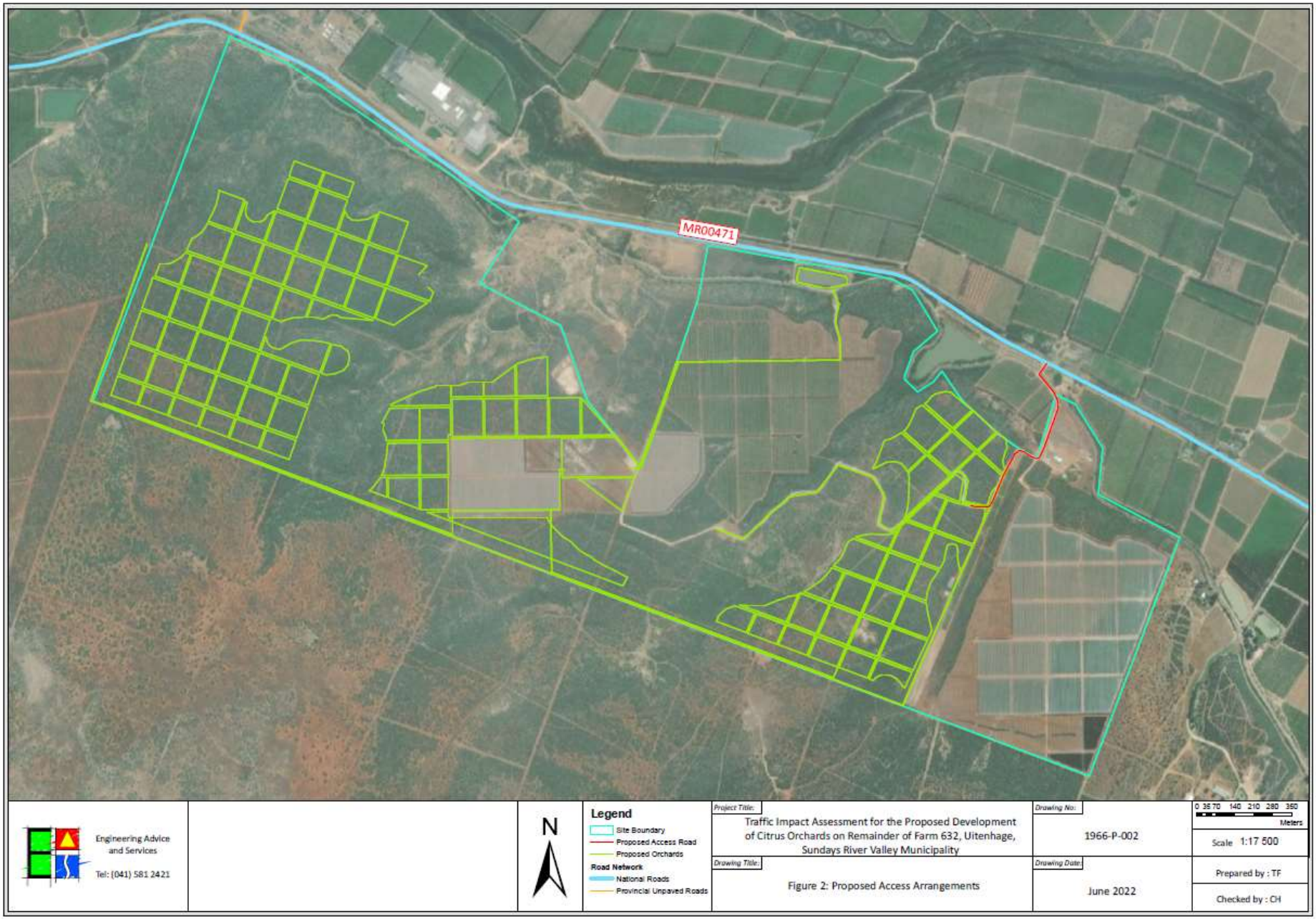
Shoulder sight distance (SSD) from the existing access road onto MR00471 to both the east and west are in excess of the minimum requirements.


Sight distance along MR00471 to the east


Sight distance along MR00471 to the west

As stated above MR00471 is scheduled for upgrading in the near future. Assessment of the upgrading proposals indicate that the existing access point at km 34.70 will be formalised as a minor access as part of the road upgrade.

This configuration safely accommodates the existing and proposed additional vehicle usage.


MR00471
Engineering Advice and Services
Tel: (041) 581 2421
N
Legend
Site Boundary
Proposed Access Road
Proposed Orchards
Road Network
National Roads
Provincial Unpaved Roads
Project Title:
Traffic Impact Assessment for the Proposed Development of Citrus Orchards on Remainder of Farm 632, Uitenhage, Sundays River Valley Municipality
Drawing No:
1966-P-002
0 35 70 140 210 280 360
Meters
Scale 1:17 500
Drawing Title:
Figure 2: Proposed Access Arrangements
Drawing Date:
June 2022
Prepared by : TF
Checked by : CH

6 POTENTIAL IMPACTS

6.1 IMPACTS

The following potential traffic related impacts relating to the proposed development have been identified. Note that the impacts will occur both in the short-term (i.e. during the construction phase) and medium- to long-term (as development is on-going) and once it is complete (operational phase).

- Road Capacity

  Additional interlink truck trips generated by the proposed development will have minimal impact in terms of road capacity given the daily volumes along the road links and at the affected intersections and low trips generated by the proposed development;

- Access

  Access to the development will be provided from MR00471 via an existing access point;

- Road Condition

  Given low operational traffic volumes – an average of up to 6 interlink truck loads per day over a 100 week day picking season - it is not anticipated that significant damage will be caused to the road network, provided that the loads are within legislated limits;

- Traffic Safety

  Safety issues may arise as a result of faster moving traffic on MR00471 encountering slower moving tractors and interlink trucks;

- Emissions

  The extent of exhaust emissions from interlink trucks is unknown, but will be a negative factor; and

- Dust

  The quantity of dust generated by a vehicle depends on its shape, speed and the properties of the road surfacing material. While difficult to predict, an increase in traffic volumes will no doubt result in an increase in the generation of dust along the gravel access road which may impact on the following:

  - Visibility, which will impact on safety, particularly with regard to passing and following conditions;
  - Damage to vehicle moving parts; and
  - Acceleration of road damage due to loss of fine material as dust.

6.2 IMPACT ASSESSMENT

As described in **Sections 4** and **5** above, there will be an impact on MR00471 as a result of interlink trucks using these roads during harvesting season.

A general assessment has been undertaken of impacts on various factors, as provided in the tables below. Note that this assessment does not deal with issues relating to noise, emissions, job creation or environmental matters, as the author is not qualified to comment on these. If necessary, such key issues have been addressed in separate specialist assessments.

Table 4 below indicates the impact rating system used for the study, as provided by the appointed Environmental Assessment Practitioners, Public Process Consultants.

The assessment has been conducted both during the construction/development and operational phases of the development.

Table 3: Generic Table for rating of impacts

Nature of the Impact	This should include a description of the proposed impact to indicate if the impact is a direct, indirect or a cumulative impact.
Extent	Site specific, local, regional or national
Duration	Temporary, short term, medium term, long term or permanent
Intensity	High, medium or low
Probability	Improbable, probable, highly probable, definite
Reversibility	Reversible, Partially Reversible, Irreversible
Degree of Confidence	Low, medium or High
Status and Significance (without mitigation)	Low, medium or High indicating whether Positive (+), Negative (-) or Neutral (o)
Mitigation	Overview of mitigatory measures to mitigate potentially negative impacts or enhance potential positive impacts indicating how this mitigatory measure impacts on the significance of the impact
Status and Significance (after mitigation)	Low, medium or High indicating whether the status of the impact is Positive (+), Negative (-) or Neutral (o)

6.2.1 Construction Phase

Table 4: Impact Assessment: Additional traffic volumes

Description	Impact	Comment / Reason
Extent	Local	5km radius from site
Duration	Short term	During construction period
Intensity	High	Local residents use roads on a daily basis and will be directly affected.
Probability	Definite	Development will generate construction / earth moving vehicles.
Reversibility	Partially Reversible	By reducing construction period and establishing a construction camp on the farm during construction, the impact of construction vehicles can be minimised
Degree of Confidence	High	
Status and Significance of impact (without mitigation)	Medium (negative)	
Mitigation		Construction traffic volumes can be reduced by establishing a construction camp on the farm. Reduce the construction period as far as possible.
Status and Significance of impact (with mitigation)	Low (negative)	Construction volumes are low.

Table 5: Impact Assessment: Traffic Safety Impact due to slow moving traffic

Description	Impact	Comment / Reason
Extent	Local	5km radius from site – at access with MR00471
Duration	Short term	Additional traffic generated by development during construction.
Intensity	High	Local residents – particularly vulnerable road users - who use roads on a daily basis and will be directly affected.
Probability	Probable	Construction traffic delivering materials – however volumes are unknown. Earth moving machinery to enable vegetation clearing and site preparation.
Reversibility	Partially Reversible	Impact partially reversible if suitable temporary warning signage is erected.
Degree of Confidence	High	
Status and Significance of impact (without mitigation)	High (negative)	Accidents could mean loss of life.
Mitigation		Additional warning signage, compliance with Health and Safety requirements. Establish a construction camp on the farm.
Status and Significance of impact (with mitigation)	Medium (negative)	Accidents could mean loss of life but mitigatory measures can minimise impact.

6.2.2 Operational Phase

Table 6: Impact Assessment: Road and Intersection capacity (additional traffic loading)

Description	Impact	Comment / Reason
Extent	Local	5km radius from site – at access with MR00471
Duration	Long term	
Intensity	Medium	Local residents use roads on a daily basis and may be directly affected.
Probability	Probable	Interlink trucks using public roads.
Reversibility	Irreversible	Impact will occur every harvesting season.
Degree of Confidence	High	Surveys of current daily traffic volumes conducted historically.
Status and Significance of impact (without mitigation)	Low (negative)	Traffic volumes generated are low.
Mitigation		None
Status and Significance of impact (with mitigation)	Low (negative)	Traffic volumes generated are low.

Table 7: Impact Assessment: Traffic Safety Impact due to additional traffic

Description	Impact	Comment / Reason
Extent	Local	5km radius from site – at access with MR00471
Duration	Long term	Additional traffic generated by development – 3 interlink truck trips per day equating to 6 trips (3 in and 3 out) over 100 days each year
Intensity	Medium	Local residents use roads on a daily basis and may be directly affected.
Probability	Definite	Delivery and distribution traffic using road.
Reversibility	Partially Reversible	Impact partially reversible if suitable warning signage is in place.
Degree of Confidence	High	
Status and Significance of impact (without mitigation)	High (negative)	Accidents could mean loss of life.
Mitigation		Erect additional warning signage.
Status and Significance of impact (with mitigation)	Medium (negative)	Accidents could mean loss of life but mitigatory measures can minimise impact.

Table 8: Impact Assessment: Deterioration of Public Road Network

Description	Impact	Comment / Reason
Extent	Local	5km radius from site – at access with MR00471
Duration	Long term	Additional traffic generated by development – 3 interlink truck trips per day equating to 6 trips (3 in and 3 out) over 100 days each year
Intensity	Low	Additional traffic generated equates to 1% of existing daily traffic volumes and is considered to be negligible.
Probability	Definite	Delivery and distribution traffic using road.
Reversibility	Reversible	Road can be kept in good condition if maintained regularly, particularly after harvest season.
Degree of Confidence	High	
Status and Significance of impact (without mitigation)	Medium (negative)	Damage to road surface
Mitigation		The road can be kept in good condition if maintained regularly, particularly after harvest season.
Status and Significance of impact (with mitigation)	Low (negative)	

Table 9: Impact Assessment: Generation of Dust on Gravel Access Road

Description	Impact	Comment / Reason
Extent	Local	Along the gravel access road from the MR00471 junction to the orchards
Duration	Long term	Additional traffic generated by development – 3 interlink truck trips per day equating to 6 trips (3 in and 3 out) over 100 days each year
Intensity	Medium	Local residents use roads on a daily basis and may be directly affected.
Probability	Definite	Interlink trucks will generate dust along the gravel access road
Reversibility	Reversible	By regular maintenance loss of dust can be reversed
Degree of Confidence	Medium	Subjective opinion - exact extent and impact can be assessed by detailed materials investigation
Status and Significance of impact (without mitigation)	Medium negative	Increased dust generation due to increased traffic volumes.
Mitigation		Regular maintenance of the gravel access road.
Status and Significance of impact (with mitigation)	Neutral	Dust generation can be negated should the road be regularly maintained.

7 PROPOSED MITIGATORY MEASURES

Measures to improve the safety of the existing road and to mitigate against the impact of the additional traffic volumes generated are listed below.

7.1 ROAD CONDITION MEASURES

As discussed in **Section 3.2** above MR00471 is a national road under the jurisdiction of SANRAL (previously ECDOT). As such, it is assumed that the road is designed to accommodate high volumes of traffic and a relatively high proportion of heavy vehicle traffic. Based on the visual assessments conducted during the site inspection, it appears that regular maintenance is being conducted. It is vital that the relevant road authority continue to conduct regular maintenance on the road. It is noted that the road will be upgraded by SANRAL in the near future.

Given the condition of the road, the addition of 6 interlink truck trips per day over the picking season will have a minimal impact on the condition of the road should regular maintenance be conducted.

7.2 TRAFFIC SAFETY MEASURES

Problems could occur at the proposed access point should advance warning signs not be in place on approaches.

8 MANAGEMENT ACTIONS

The following management actions should be implemented in order to minimise the impact of the development on the infrastructural environment and road users:

- Warning traffic signs

  Appropriate warning traffic signs (in accordance with the South African Road Traffic Signs Manual [(3)]) should be erected to warn road users.

9 CONCLUSIONS

The following conclusions can be drawn from the study:

- Access to the proposed orchard expansion can be provided directly from MR00471 (R336) via the existing access point at km 34.700 as indicated on Error! Reference source not found.; and
- A total of 604 trips per picking season (302 in and 302 out) equating to 6 per day generated at full development will have minimal impact on the operational capacity of the adjacent road network should regular maintenance be conducted.

10 RECOMMENDATIONS

In view of the findings of this study, it is recommended that:

- This TIA be approved by SANRAL SOC;
- Access to the proposed development be gained via the existing access point at km 34.700 on MR00471 (R336) as indicated on **Figure 2**Error! Reference source not found.**;** and
- Suitable warning signage be erected on the approaches to the access point as indicated on **Figure 2**.

11 REFERENCES

1. *Joubert, Sampson, et al*, **TMH 16 Volume 1- South African Traffic Impact and Site Assessment Manual**, COTO, September 2013.

2. NITRR, **TRH 17 -Geometric Design of Rural Roads,** CSRA, September 1984.

3. Department of Transport, **South African Road Traffic Signs Manual 3rd Edition**, May 2012

ANNEXURE
A Power of Attorney

ANNEXURE
B Historical
Traffic Data

Proposed Proposed Development of Citrus Orchards on Remainder of Farm 632, Uitenhage

24 Hr Historical - Count Volumes

Count Station	Location	ADT / ADTT	2015	2016	2017	2018	2019	2020	Total Growth (%)	Average Growth Per Annum (from 2001)
2122	ECDOT - MR00471 (R336) - East of MR0047	ADT	4636	-	-	-	-	-		%
		ADTT	-	-	-	-	-	-		
12124	SANRAL - MR00471 (R336) - East of MR0047	ADT	-	6905	-	-	-	-		
		ADTT	-	801	-	-	-	-		
2134	ECDOT - MR00471 (R336) - West of MR00470	ADT	4201	-	-	-	-	-		
		ADTT	-	-	-	-	-	-		
8211	SANRAL - MR00471 (R336) - West of MR00470	ADT	-	-	1578	1659	1773	1520	12.36	6.00 %
		ADTT	-	-	220	218	278	235		
12104	SANRAL - MR00471 (R336) - West of Unifruiti	ADT	-	1433	-	1703	-	-	18.84	9.01 %
		ADTT	-	115	-	238	-	-		
12106	SANRAL - MR00471 (R336) - East of Unifruiti	ADT	-	1480	-	-	-	-		
		ADTT	-	170	-	-	-	-		
						AVERAGE (All stations)				7.51 %

Station Information

Site Number	02122	**Site Identifier**	22449
Site Name	R336/MR00472 E		
Site Description	East of R336/MR00472 junction		
Site Type	Secondary (Temp)	**Owner**	EC DOT
Physical Lanes	4	**Responsibility**	NON-TOLL
Logical Lanes	4	**Installation Date**	2006-06-12
GPS Longitude	25.4469	**Termination Date**	
GPS Latitude	-33.430780	**Status**	Discontinued
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	100
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	20.90

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Addo			East	2	1
2	To Kirkwood			West	1	1

Station Traffic Highlights

Traffic Highlights of Site 02122

1.1	Site No			02122
1.2	Site Name			R336/MR00472 E
1.3	Site Description			East of R336/MR00472 junction
1.4	Road Description			Route : R336 Section 01 Distance : 20.90 km
1.5	GPS Position			-33.430780 25.4469
1.6	Number of Lanes			4
1.7	Station Type			Secondary (Temp)
1.8	Requested Period			01 Jan 2015 - 31 Dec 2015
1.9	Length of Records Requested (hours)			8,760
1.10	Actual First & Last Dates			11 Aug 2015 - 14 Aug 2015
1.11	Actual Available Data (hours)			98
1.12	Percentage Data Available for Requested Period			0.8%
		To Addo	**To Kirkwood**	**Total**
2.1	Total Number of Vehicles	6,244	6,506	12,750
2.2	Average Daily Traffic (ADT)	2,271	2,366	4,636
2.3	Average Daily Truck Traffic (ADTT)	0	0	0
2.4	Percentage of Trucks	0.0%	0.0%	0.0%
2.5	Truck Split % (short:medium:long)	0 : 0 : 0	0 : 0 : 0	0 : 0 : 0
2.6	Percentage of Night Traffic [20h00 - 6h00)	6.1%	7.7%	6.9%
3.1	Speed Limit (km/hr)			100
3.2	Average Speed (km/hr)	0.0	0.0	0.0
3.3	Average Speed - Light Vehicles (km/hr)	0.0	0.0	0.0
3.4	Average Speed - Heavy Vehicles (km/hr)	0.0	0.0	0.0
3.5	Average Night Speed (km/hr)	0.0	0.0	0.0
3.6	15th Centile Speed (km/hr)	0.0	0.0	0.0
3.7	85th Centile Speed (km/hr)	0.0	0.0	0.0
3.8	Percentage of Vehicles in Excess of Speed Limit	0.0%	0.0%	0.0%
4.1	Percentage Vehicles in Flows Over 600 (veh/hr)	0.0%	0.0%	0.0%
4.2	Highest Volume on the Road (veh/hr)		13 Aug 2015 (07:00 - 08:00)	442
4.3	Highest Volume in the East (veh/hr)		11 Aug 2015 (17:00 - 18:00)	262
4.4	Highest Volume in the West (veh/hr)		12 Aug 2015 (07:00 - 08:00)	260
4.5	Highest Volume in a Lane (veh/hr)		11 Aug 2015 (17:00 - 18:00)	262
4.6	15th Highest Volume on the Road (veh/hr)		13 Aug 2015 (09:00 - 10:00)	374
4.7	15th Highest Volume in the East Direction (veh/hr)		12 Aug 2015 (09:00 - 10:00)	184
4.8	15th Highest Volume in the West Direction (veh/hr)		12 Aug 2015 (12:00 - 13:00)	184
4.9	30th Highest Volume on the Road (veh/hr)		11 Aug 2015 (18:00 - 19:00)	210
4.10	30th Highest Volume in the East Direction (veh/hr)		13 Aug 2015 (06:00 - 07:00)	84
4.11	30th Highest Volume in the West Direction (veh/hr)		12 Aug 2015 (16:00 - 17:00)	124
5.1	Percentage of Vehicles less than 2s behind vehicle ahead	0.0%	0.0%	0.0%
6.1	Total Number of Heavy Vehicles	0	0	0
6.2	Estimated Average Number of axles per Truck	0.0	0.0	0.0
6.3	Estimated Truck Mass (Ton/Truck)	0.0	0.0	0.0

6.4	Estimated Average E80 / Truck	0.0	0.0	0.0
6.5	Estimated Daily E80 on the Road			0
6.6	Estimated Daily E80 in the East Direction			0
6.7	Estimated Daily E80 in the West Direction			0
6.8	Estimated Daily E80 in the Worst East Lane			0
6.9	Estimated Daily E80 in the Worst West Lane			0
6.10	ASSUMPTION on Adea/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mesa/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80a/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Station Typical Flow Graphs

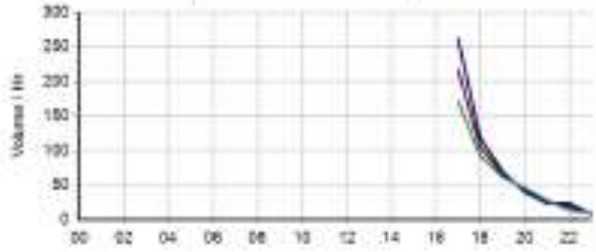
Site	02122 - R336/MR00472 E
Region	South
Actual Period	11 Aug 2015 - 14 Aug 2015
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

Total
To Addo
To Kirkwood
Total
Light
Heavy

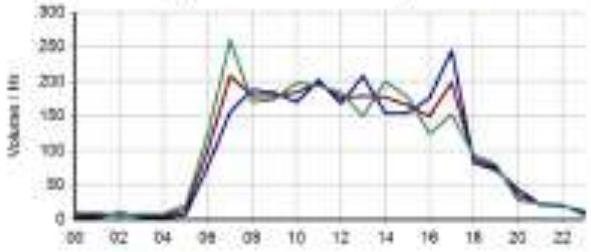
Typical Flow for a Monday

No Data Available

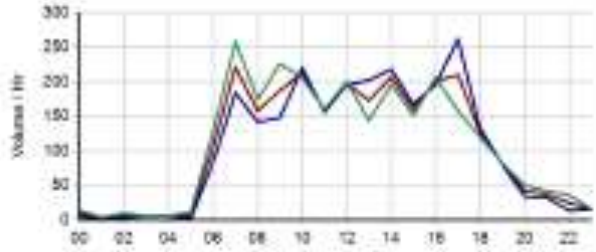
Typical Flow for a Tuesday



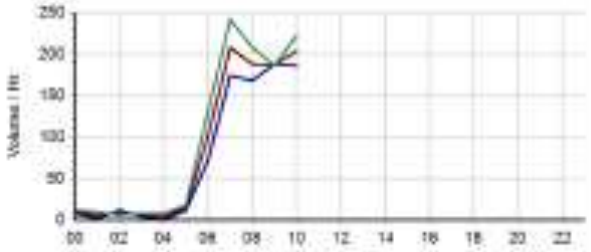
Typical Flow for a Wednesday



Typical Flow for a Thursday



Typical Flow for a Friday



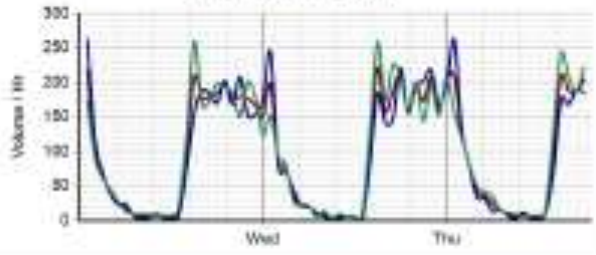
Typical Flow for a Saturday

No Data Available

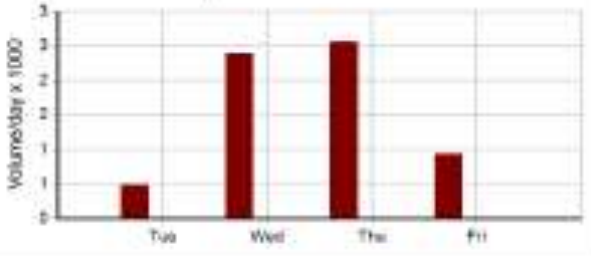
Typical Flow for a Sunday

No Data Available

Typical Flow for a Week



Typical Flow for a Week



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Station Data - 13

Station Light/Heavy Volume by Lane

Site:	02122 R396/MR00472 E

Date	Dur. (Hr)	To Addo		
		Lane 1		
		Light	Heavy	Total
Jan 2015				
Feb 2015				
Mar 2015				
Apr 2015				
May 2015				
Jun 2015				
Jul 2015				
Aug 2015	132	6,244		6,244
Sep 2015				
Oct 2015				
Nov 2015				
Dec 2015				
	Total	6,244		6,244

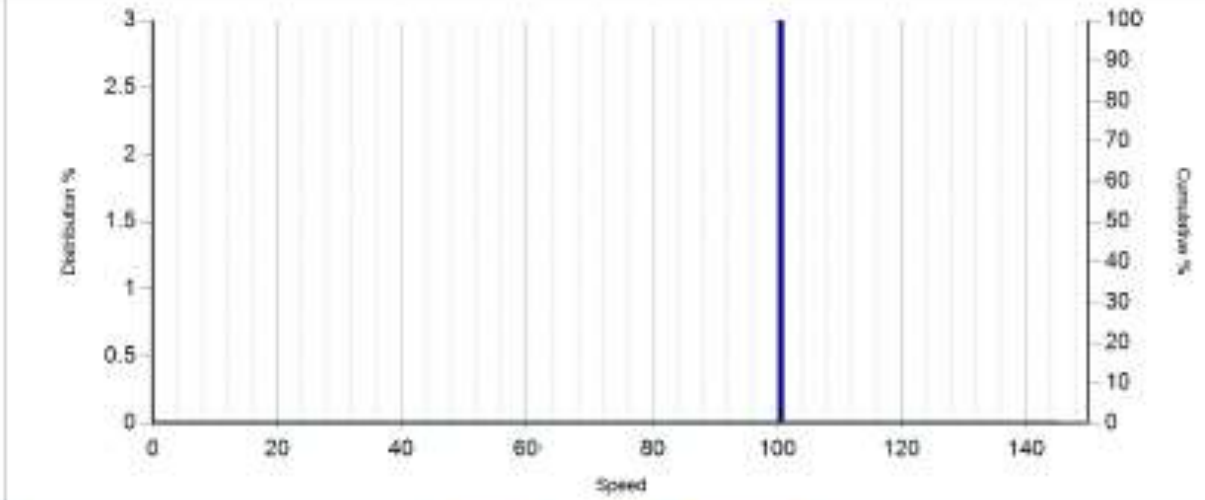
Date	Dur. (Hr)	To Kirkwood		
		Lane 2		
		Light	Heavy	Total
Jan 2015				
Feb 2015				
Mar 2015				
Apr 2015				
May 2015				
Jun 2015				
Jul 2015				
Aug 2015	132	6,506		6,506
Sep 2015				
Oct 2015				
Nov 2015				
Dec 2015				
	Total	6,506		6,506

Station Speed Distribution

Site	02122 - R336/MR00472 E
Speed Limit	100 km/hr
Period	01 Jan 2015 - 31 Dec 2015

Distribution
Cumulative
Speed Limit

Lane 1 - To Addo

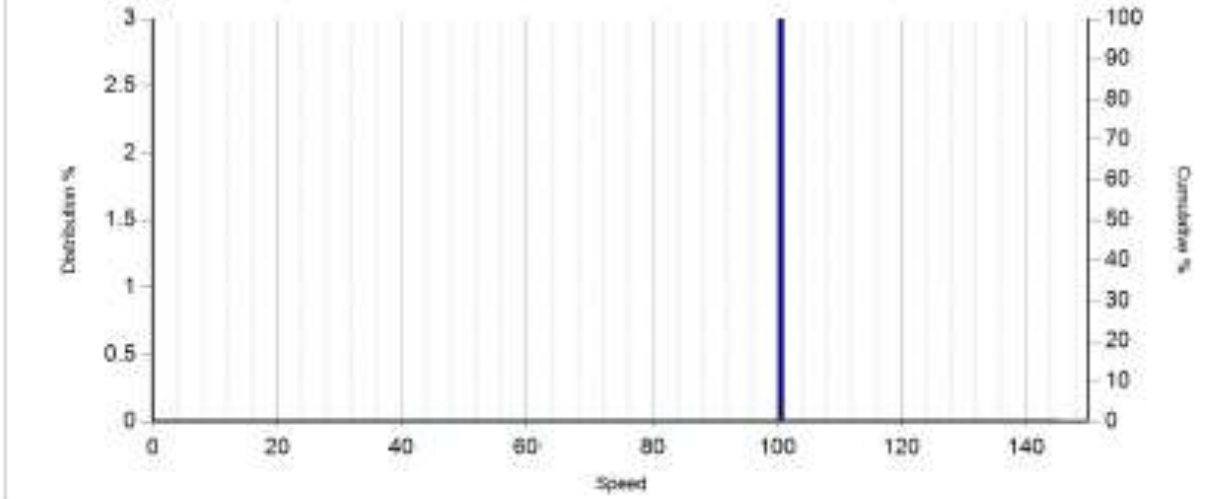


Station Speed Distribution

Site	02122 - R336/MR00472 E
Speed Limit	100 km/hr
Period	01 Jan 2015 - 31 Dec 2015

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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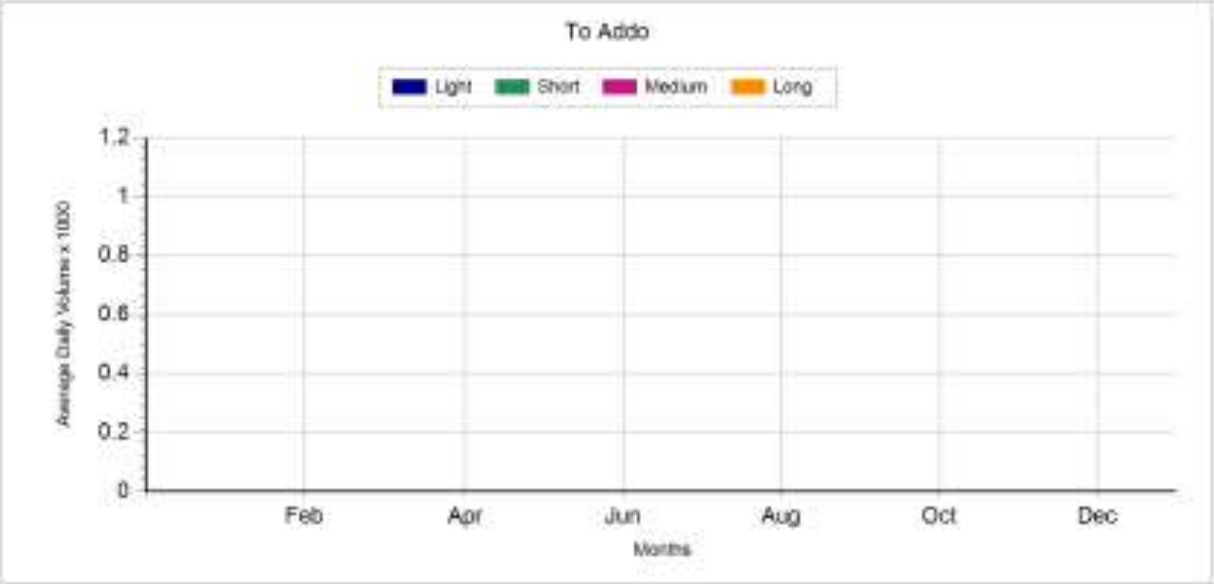
Station Data - 15

Station Extended Light/Heavy Class

Site	02122 R396/MR00472 E

To Addo

Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	0.0						
Jul 2015	0.0						
Aug 2015	17.7	6,244				0	6,244
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.5	6,244				0	6,244

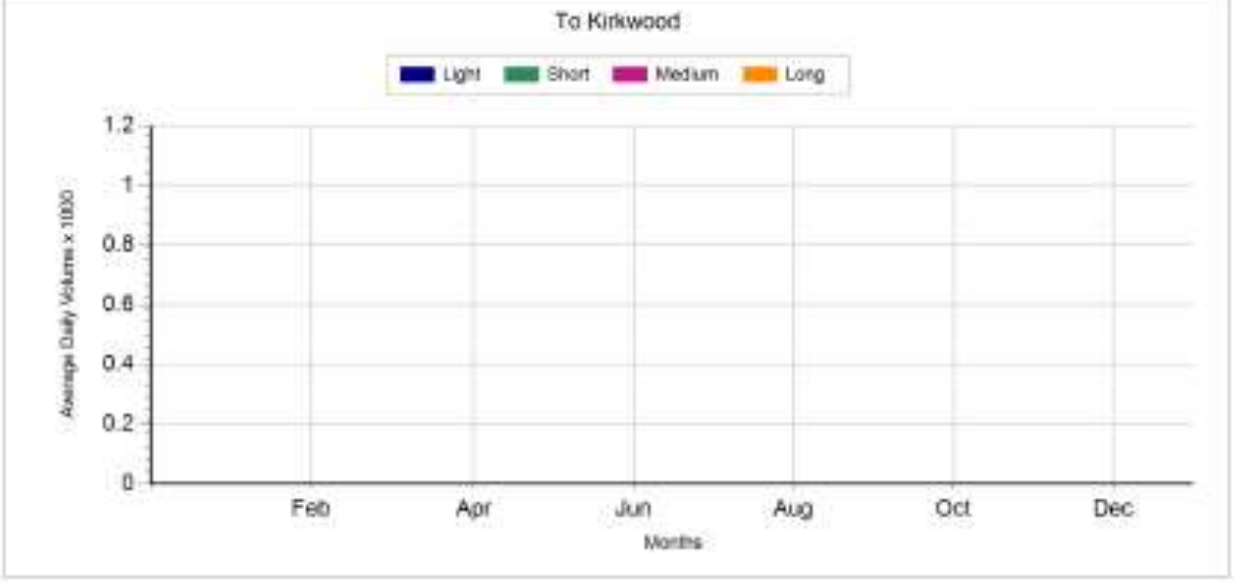


Station Extended Light/Heavy Class

Site	02122 R336/MR00472 E

To Kirkwood

Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	0.0						
Jul 2015	0.0						
Aug 2015	17.7	6,506				0	6,506
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.5	6,506				0	6,506



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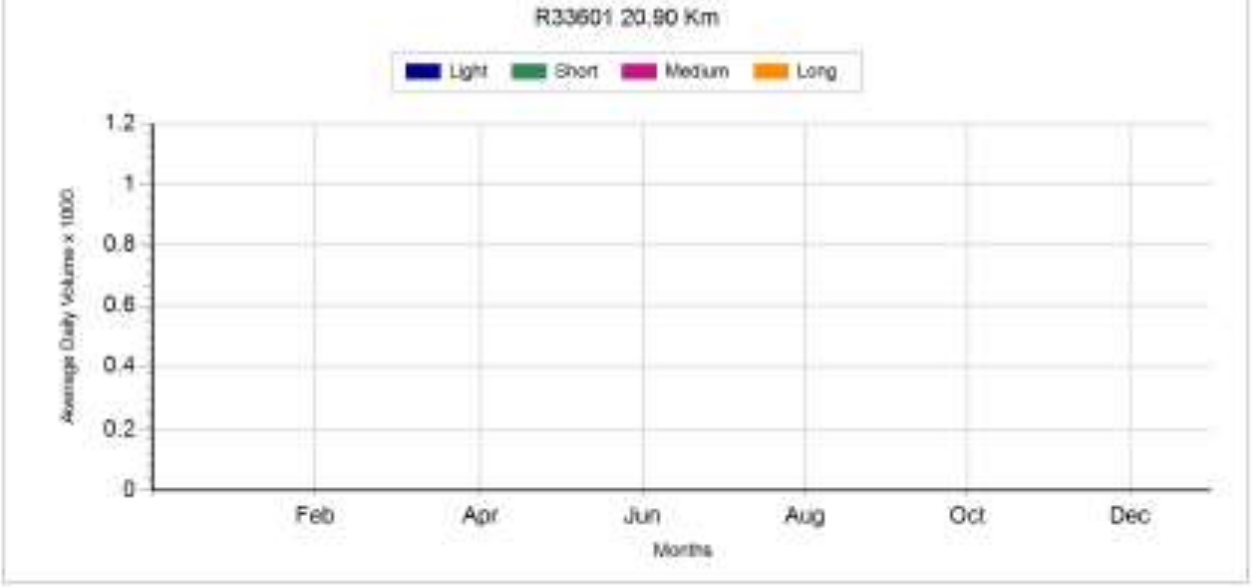
Station Data - 17

Site	02122 R336/MR00472 E

R33601 20.90 Km							
Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	0.0						
Jul 2015	0.0						
Aug 2015	17.7	12,750				0	12,750
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.5	12,750				0	12,750



Station Information

Site Number	02134	**Site Identifier**	22357
Site Name	MR00471 / MR00470 W		
Site Description	West of MR00471 / MR00470 junction		
Site Type	Secondary (Temp)	**Owner**	EC DOT
Physical Lanes	4	**Responsibility**	NON-TOLL
Logical Lanes	4	**Installation Date**	2006-09-18
GPS Longitude	25.6075	**Termination Date**	
GPS Latitude	-33.502220	**Status**	Discontinued
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	100
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	38.64

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Addo			East	1	1
2	To Kirkwood			West	2	1

Station Traffic Highlights

Traffic Highlights of Site 02134

1.1	Site No			02134
1.2	Site Name			MR00471 / MR00470 W
1.3	Site Description			West of MR00471 / MR00470 junction
1.4	Road Description			Route : R336 Section : 01 Distance : 38.64 km
1.5	GPS Position			-33.502220 25.6075
1.6	Number of Lanes			4
1.7	Station Type			Secondary (Temp)
1.8	Requested Period			01 Jan 2015 - 31 Dec 2015
1.9	Length of Records Requested (hours)			8,760
1.10	Actual First & Last Dates			08 Jun 2015 - 11 Jun 2015
1.11	Actual Available Data (hours)			70
1.12	Percentage Data Available for Requested Period			0.8%
		To Addo	**To Kirkwood**	**Total**
2.1	Total Number of Vehicles	6,374	5,878	12,252
2.2	Average Daily Traffic (ADT)	2,185	2,015	4,201
2.3	Average Daily Truck Traffic (ADTT)	0	0	0
2.4	Percentage of Trucks	0.0%	0.0%	0.0%
2.5	Truck Split % (short:medium:long)	0 : 0 : 0	0 : 0 : 0	0 : 0 : 0
2.6	Percentage of Night Traffic [20h00 - 6h00]	4.7%	5.5%	5.1%
3.1	Speed Limit (km/hr)			100
3.2	Average Speed (km/hr)	0.0	0.0	0.0
3.3	Average Speed - Light Vehicles (km/hr)	0.0	0.0	0.0
3.4	Average Speed - Heavy Vehicles (km/hr)	0.0	0.0	0.0
3.5	Average Night Speed (km/hr)	0.0	0.0	0.0
3.6	15th Centile Speed (km/hr)	0.0	0.0	0.0
3.7	85th Centile Speed (km/hr)	0.0	0.0	0.0
3.8	Percentage of Vehicles in Excess of Speed Limit	0.0%	0.0%	0.0%
4.1	Percentage Vehicles in Flows Over 600 (veh/hr)	0.0%	0.0%	0.0%
4.2	Highest Volume on the Road (veh/hr)		08 Jun 2015 (17:00 - 18:00)	416
4.3	Highest Volume in the East (veh/hr)		09 Jun 2015 (17:00 - 18:00)	298
4.4	Highest Volume in the West (veh/hr)		10 Jun 2015 (08:00 - 09:00)	198
4.5	Highest Volume in a Lane (veh/hr)		09 Jun 2015 (17:00 - 18:00)	298
4.6	15th Highest Volume on the Road (veh/hr)		09 Jun 2015 (16:00 - 17:00)	344
4.7	15th Highest Volume in the East Direction (veh/hr)		09 Jun 2015 (08:00 - 09:00)	174
4.8	15th Highest Volume in the West Direction (veh/hr)		10 Jun 2015 (12:00 - 13:00)	160
4.9	30th Highest Volume on the Road (veh/hr)		09 Jun 2015 (15:00 - 16:00)	272
4.10	30th Highest Volume in the East Direction (veh/hr)		10 Jun 2015 (13:00 - 14:00)	138
4.11	30th Highest Volume in the West Direction (veh/hr)		08 Jun 2015 (13:00 - 14:00)	118
5.1	Percentage of Vehicles less than 2s behind vehicle ahead	0.0%	0.0%	0.0%
6.1	Total Number of Heavy Vehicles	0	0	0
6.2	Estimated Average Number of axles per Truck	0.0	0.0	0.0
6.3	Estimated Truck Mass (Ton/Truck)	0.0	0.0	0.0

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Station Data - 20

6.4	Estimated Average E80 / Truck	0.0	0.0	0.0
6.5	Estimated Daily E80 on the Road			0
6.6	Estimated Daily E80 in the East Direction			0
6.7	Estimated Daily E80 in the West Direction			0
6.8	Estimated Daily E80 in the Worst East Lane			0
6.9	Estimated Daily E80 in the Worst West Lane			0
6.10	ASSUMPTION on Adea/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
6.11	ASSUMPTION on Mesa/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
6.12	ASSUMPTION on E80a/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

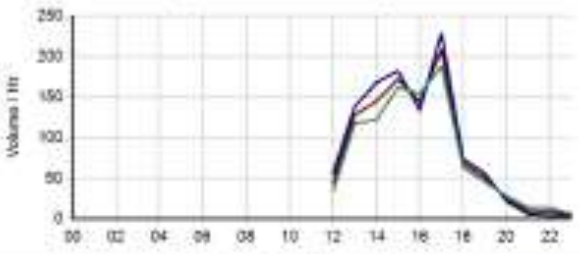
Station Typical Flow Graphs

Site	02134 - MR00471 / MR00470 W
Region	South
Actual Period	08 Jun 2015 - 11 Jun 2015
Classification	RSA Ed Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday*

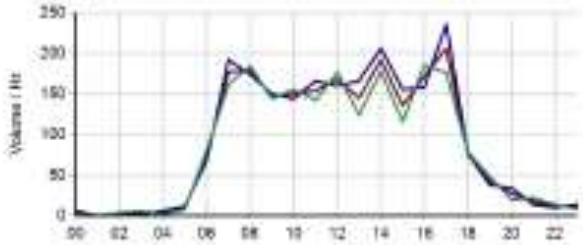
Total
To Addo
To Kirkwood

Total
Light
Heavy

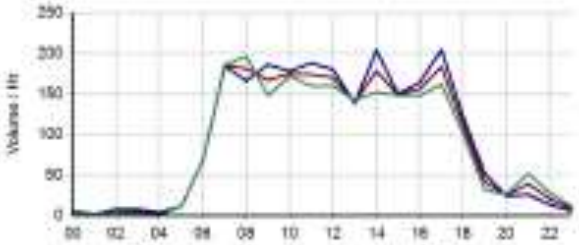
Typical Flow for a Monday



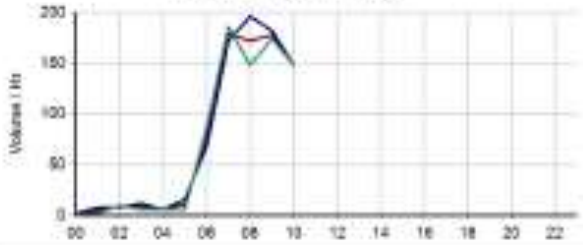
Typical Flow for a Tuesday



Typical Flow for a Wednesday



Typical Flow for a Thursday



Typical Flow for a Friday

No Data Available

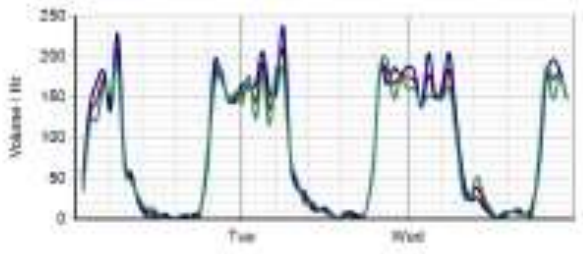
Typical Flow for a Saturday

No Data Available

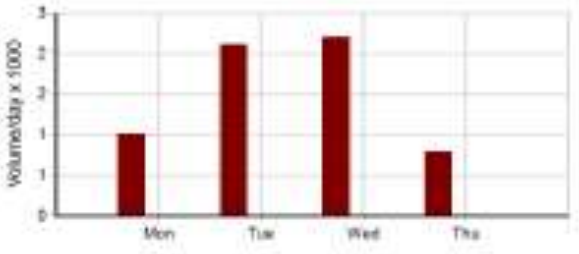
Typical Flow for a Sunday

No Data Available

Typical Flow for a Week



Typical Flow for a Week



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Station Data - 22

Station Light/Heavy Volume by Lane

Site	02134 MR00471 / MR00470 W

Date	Dur. (Hr)	To Addo		
		Lane 1		
		Light	Heavy	Total
Jan 2015				
Feb 2015				
Mar 2015				
Apr 2015				
May 2015				
Jun 2015	141	6,374		6,374
Jul 2015				
Aug 2015				
Sep 2015				
Oct 2015				
Nov 2015				
Dec 2015				
Total		6,374		6,374

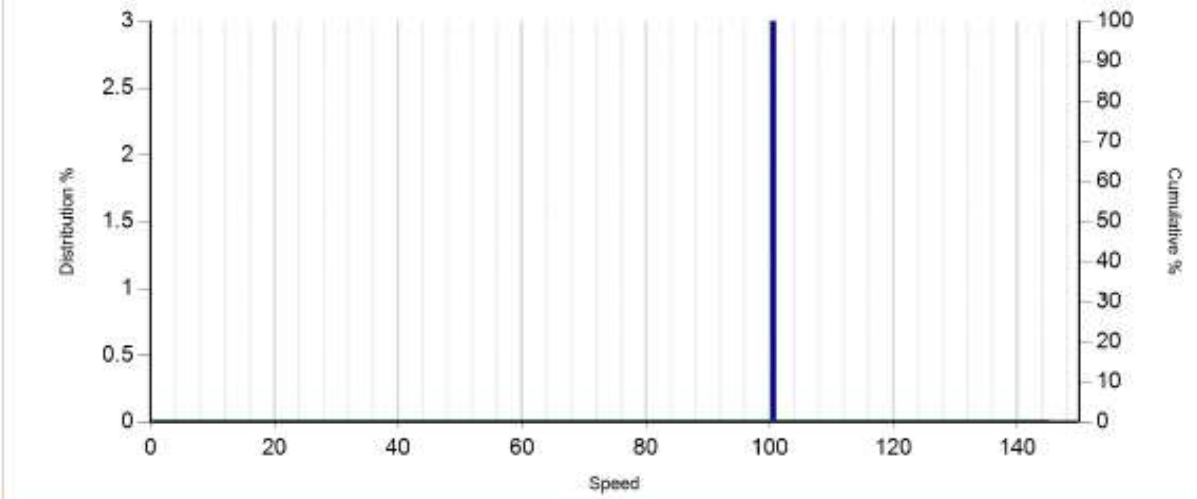
Date	Dur. (Hr)	To Kirkwood		
		Lane 2		
		Light	Heavy	Total
Jan 2015				
Feb 2015				
Mar 2015				
Apr 2015				
May 2015				
Jun 2015	141	5,878		5,878
Jul 2015				
Aug 2015				
Sep 2015				
Oct 2015				
Nov 2015				
Dec 2015				
Total		5,878		5,878

Station Speed Distribution

Site	02134 - MR00471 / MR00470 W
Speed Limit	100 km/hr
Period	01 Jan 2015 - 31 Dec 2015

Distribution
Cumulative
Speed Limit

Lane 1 - To Addo

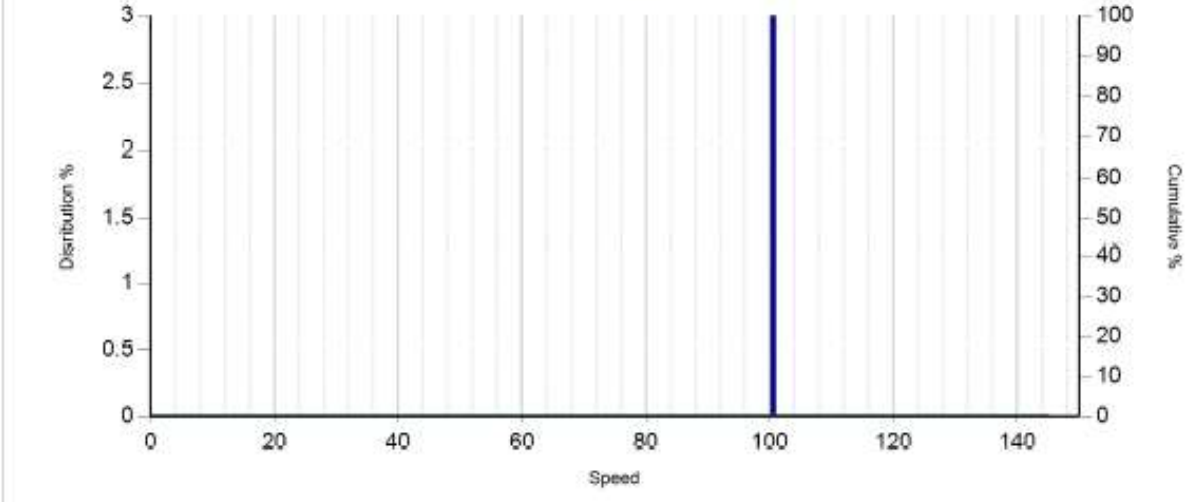


Station Speed Distribution

Site	02134 - MR00471 / MR00470 W
Speed Limit	100 km/hr
Period	01 Jan 2015 - 31 Dec 2015

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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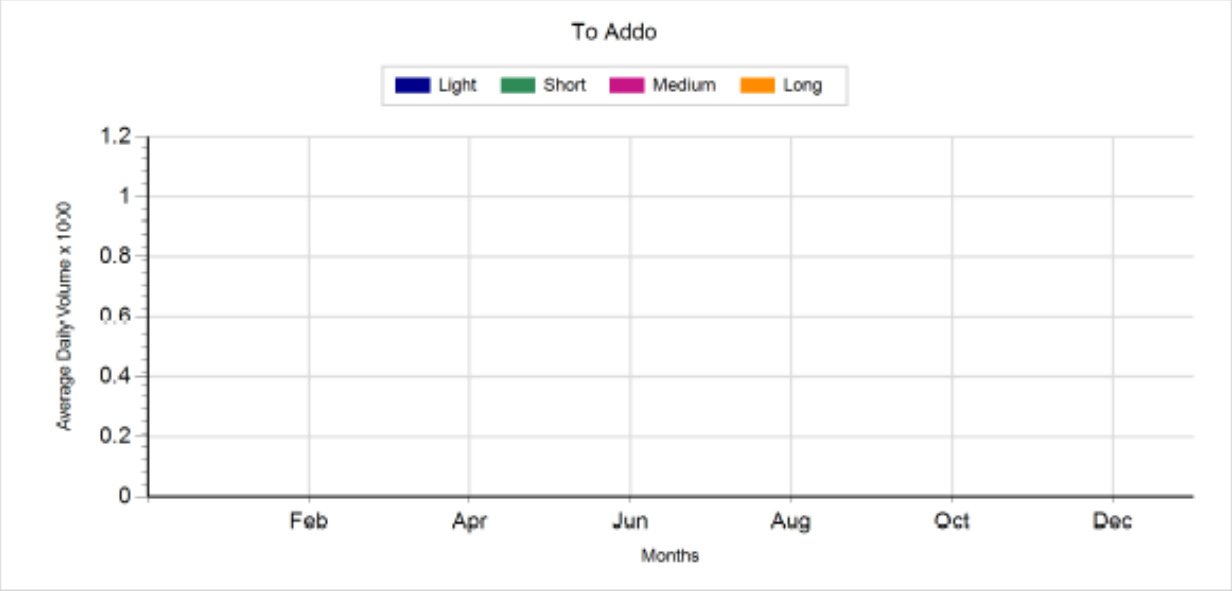
Station Extended Light/Heavy Class

Site	02134 MR00471 / MR00470 W

To Addo

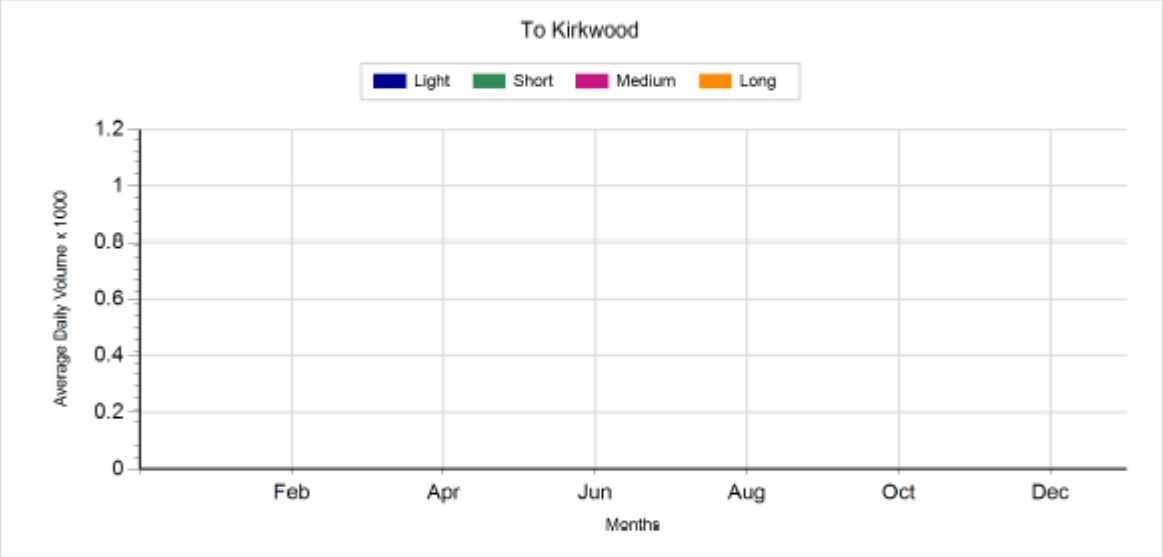
Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	19.5	6,374				0	6,374
Jul 2015	0.0						
Aug 2015	0.0						
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.6	6,374				0	6,374



Station Extended Light/Heavy Class

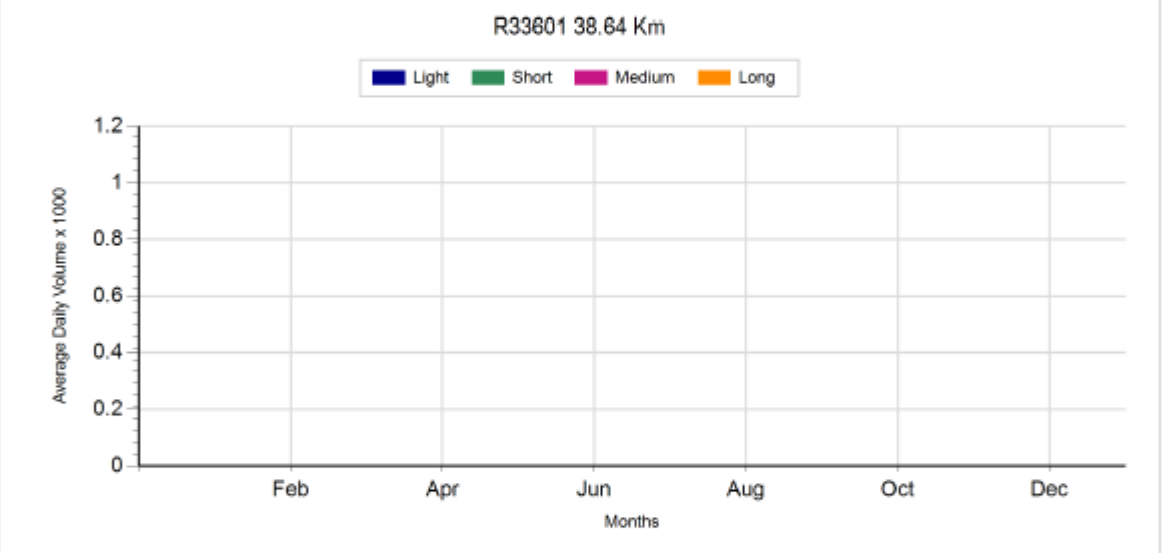
Site	02134 MR00471 / MR00470 W

To Kirkwood							
Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	19.5	5,878				0	5,878
Jul 2015	0.0						
Aug 2015	0.0						
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.6	5,878				0	5,878



Site	02134 MR00471 / MR00470 W

R33601 38.64 Km							
Month	% Data	Light	Short	Medium	Long	Heavy Total	Total
Jan 2015	0.0						
Feb 2015	0.0						
Mar 2015	0.0						
Apr 2015	0.0						
May 2015	0.0						
Jun 2015	19.5	12,252				0	12,252
Jul 2015	0.0						
Aug 2015	0.0						
Sep 2015	0.0						
Oct 2015	0.0						
Nov 2015	0.0						
Dec 2015	0.0						
Total	1.6	12,252				0	12,252



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For queries, contact:
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Station Data - 27

Station Information

Site Number	12124	**Site Identifier**	27683
Site Name	EC_R336_01_20.5		
Site Description	Between Kirkwood and Paterson		
Site Type	Secondary (Temp)	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2016-11-04
GPS Longitude	25.446417	**Termination Date**	
GPS Latitude	-33.430637	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	100
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	20.65
Authority	SANRAL	**Contract No**	NRA 53000/2016/1
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Paterson	1	To Paterson	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

PHOTO

Direction 1

To Paterson

PHOTO

Direction 2

To Kirkwood

PHOTO

As Built

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Station Data - 11

Traffic Highlights of Site: EC_R336_01_20.5 (12124)	
Site No	12124
Site Name	EC_R336_01_20.5
Site Description	Between Kirkwood and Paterson
Road Description	Route : R336 Section : 01E Distance : 20.85 km
GPS Position	Latitude: -33.430637 Longitude: 25.446417
Number of Lanes	2
Station Type	Secondary (Temp)

Requested Data Period	01 Jan 2016 - 31 Dec 2016
First and Last Data Dates	06 Nov 2016 - 14 Nov 2016
Data Available for Requested Period as Percentage	2%

Last Full Day Count for ADT and ADTT	13 Nov 2016
Number of Full Days in Requested Period	8

	Highlights per Stream	Str 1: To Paterson	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	3,610	3,295	6,905
1.2	Average Daily Traffic (ADT)	420	381	801
1.3	Average Daily Truck Traffic (ADTT)	58	67	125
1.4	Percentage of Trucks	13.5 %	17.8 %	15.6 %
1.5	Truck Split % (Short : Medium : Long)	50 : 27 : 23	28 : 35 : 37	39 : 31 : 30
1.6	Percentage of Night Traffic [20h00 - 6h00)	7.8 %	9.5 %	8.6 %
2.1	Speed Limit			100
2.2	Average Speed (km/hr)	92.9	85.3	89.1
2.3	Average Speed - Light Vehicles (km/hr	93.8	85.5	89.7
2.4	Average Speed - Heavy Vehicles (km/hr)	85.0	80.9	83.0
2.5	Average Night Speed (km/hr)	96.4	87.3	91.9
2.6	15th Centile Speed (km/hr)	75.8	70.6	73.2
2.7	85th Centile Speed (km/hr)	108.9	101.7	105.3
2.8	Percentage of Vehicles in Excess of Speed Limit	57.7 %	53.2 %	55.4 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 12

4.1	Total Number of Heavy Vehicles	489	586	1,075
4.2	Estimated Average Number of axles per Truck	4.0	4.9	4.5
4.3	Estimated Truck Mass (Ton/Truck)	23.1	28.8	26.0
4.4	Estimated Average E80 / Truck	1.7	2.3	2.00
4.5	Estimated Daily E80 on the Road			298.0
4.6	Estimated Daily E80 in the East Direction			407.0
4.7	Estimated Daily E80 in the West Direction			488.0
4.8	Estimated Daily E80 in the Worst East Lane			488.0
4.9	Estimated Daily E80 in the Worst West Lane			407.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	11 Nov 2016 (16:00 - 17:00)	112
6.2	Highest Volume in the East (vehs/hr)	11 Nov 2016 (16:00 - 17:00)	78
6.3	Highest Volume in the West (vehs/hr)	10 Nov 2016 (12:00 - 13:00)	48
6.4	Highest Volume in a Lane (vehs/hr)	11 Nov 2016 (16:00 - 17:00)	78
6.5	15th Highest Volume on the Road (vehs/hr)	08 Nov 2016 (08:00 - 09:00)	77
6.6	15th Highest Volume in the East Direction (vehs/hr)	11 Nov 2016 (14:00 - 15:00)	42
6.7	15th Highest Volume in the West Direction (vehs/hr)	07 Nov 2016 (07:00 - 08:00)	36
6.8	30th Highest Volume on the Road (vehs/hr)	07 Nov 2016 (07:00 - 08:00)	72
6.9	30th Highest Volume in the East Direction (vehs/hr)	08 Nov 2016 (09:00 - 10:00)	37
6.10	30th Highest Volume in the West Direction (vehs/hr)	14 Nov 2016 (09:00 - 10:00)	32

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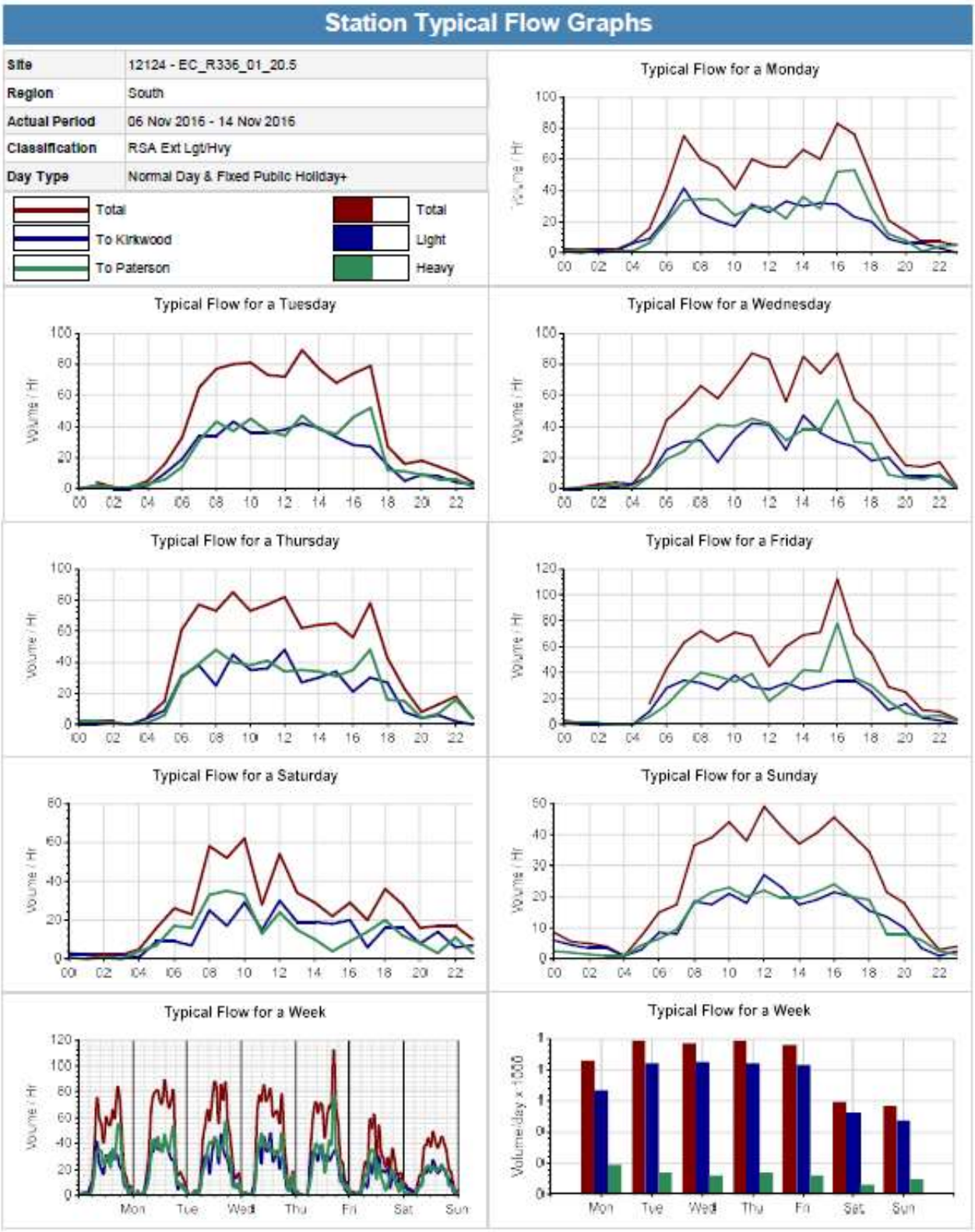
Station Data - 13



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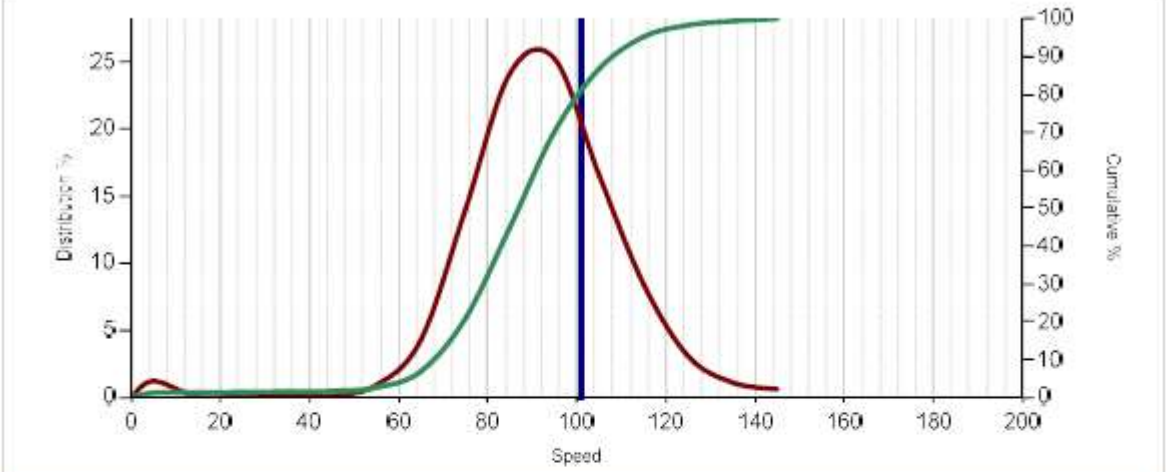
Station Data - 14

Station Speed Distribution

Site	12124 - EC_R336_01_20.5
Speed Limit	100 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 1 - To Paterson

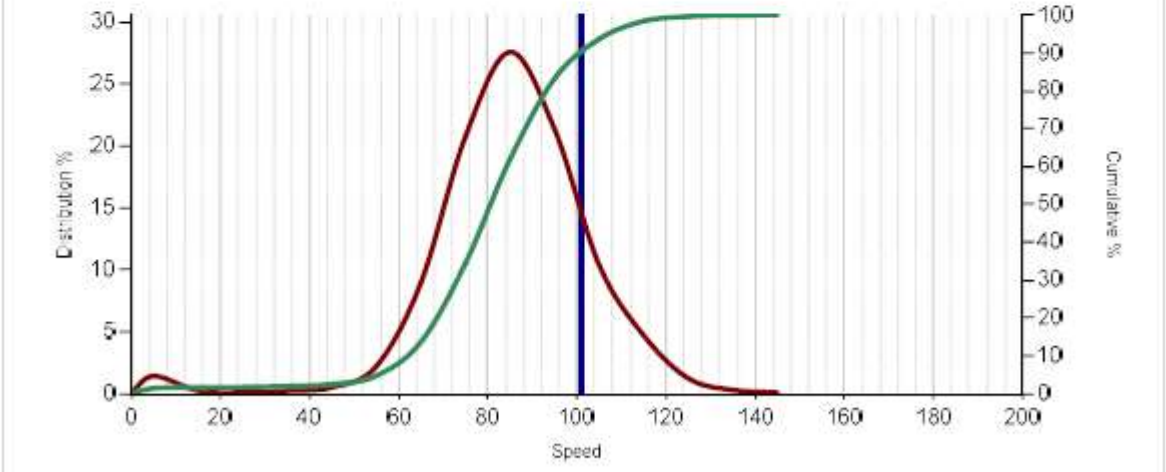


Station Speed Distribution

Site	12124 - EC_R336_01_20.5
Speed Limit	100 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 15

Station Information

Site Number	12104	**Site Identifier**	27879
Site Name	EC_R336_01_30.4		
Site Description	Between Kirkwood and Paterson		
Site Type	Secondary (Temp)	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2016-11-04
GPS Longitude	25.530251	**Termination Date**	
GPS Lattitude	-33.471416	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	30.37
Authority	SANRAL	**Contract No**	NRA 53000/2016/1
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Paterson	1	To Paterson	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

PHOTO

Direction 1

To Paterson

PHOTO

Direction 2

To Kirkwood

PHOTO

As Built

Traffic Highlights of Site: EC_R336_01_30.4 (12104)	
Site No	12104
Site Name	EC_R336_01_30.4
Site Description	Between Kirkwood and Paterson
Road Description	Route : R336 Section : 01E Distance : 30.37 km
GPS Position	Latitude: -33.471416 Longitude: 25.530251
Number of Lanes	2
Station Type	Secondary (Temp)

Requested Data Period	01 Jan 2016 - 31 Dec 2016
First and Last Data Dates	04 Nov 2016 - 14 Nov 2016
Data Available for Requested Period as Percentage	3%

Last Full Day Count for ADT and ADTT	13 Nov 2016
Number of Full Days in Requested Period	9

Highlights per Stream		Str 1: To Paterson	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	7,153	7,073	14,226
1.2	Average Daily Traffic (ADT)	717	716	1,433
1.3	Average Daily Truck Traffic (ADTT)	61	54	115
1.4	Percentage of Trucks	8.6 %	7.5 %	8.1 %
1.5	Truck Split % (Short : Medium : Long)	70 : 18 : 12	70 : 17 : 13	70 : 18 : 12
1.6	Percentage of Night Traffic [20h00 - 6h00)	7.5 %	8.7 %	8.1 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	91.5	91.4	91.5
2.3	Average Speed - Light Vehicles (km/hr	92.1	92.3	92.2
2.4	Average Speed - Heavy Vehicles (km/hr)	82.5	77.2	79.9
2.5	Average Night Speed (km/hr)	90.5	91.9	91.2
2.6	15th Centile Speed (km/hr)	74.5	74.7	74.6
2.7	85th Centile Speed (km/hr)	110.0	108.5	109.3
2.8	Percentage of Vehicles in Excess of Speed Limit	86.4 %	86.6 %	86.5 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 17

4.1	Total Number of Heavy Vehicles	617	533	1,150
4.2	Estimated Average Number of axles per Truck	3.1	3.2	3.2
4.3	Estimated Truck Mass (Ton/Truck)	18.1	18.2	18.2
4.4	Estimated Average E80 / Truck	1.2	1.2	1.20
4.5	Estimated Daily E80 on the Road			264.0
4.6	Estimated Daily E80 in the East Direction			425.0
4.7	Estimated Daily E80 in the West Direction			367.0
4.8	Estimated Daily E80 in the Worst East Lane			425.0
4.9	Estimated Daily E80 in the Worst West Lane			367.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	14 Nov 2016 (07:00 - 08:00)	174
6.2	Highest Volume in the East (vehs/hr)	08 Nov 2016 (07:00 - 08:00)	101
6.3	Highest Volume in the West (vehs/hr)	11 Nov 2016 (16:00 - 17:00)	95
6.4	Highest Volume in a Lane (vehs/hr)	08 Nov 2016 (07:00 - 08:00)	101
6.5	15th Highest Volume on the Road (vehs/hr)	08 Nov 2016 (09:00 - 10:00)	145
6.6	15th Highest Volume in the East Direction (vehs/hr)	08 Nov 2016 (13:00 - 14:00)	70
6.7	15th Highest Volume in the West Direction (vehs/hr)	11 Nov 2016 (13:00 - 14:00)	77
6.8	30th Highest Volume on the Road (vehs/hr)	10 Nov 2016 (10:00 - 11:00)	136
6.9	30th Highest Volume in the East Direction (vehs/hr)	08 Nov 2016 (14:00 - 15:00)	67
6.10	30th Highest Volume in the West Direction (vehs/hr)	08 Nov 2016 (07:00 - 08:00)	69

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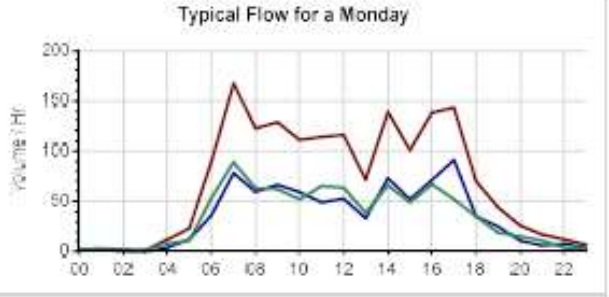
Station Data - 18

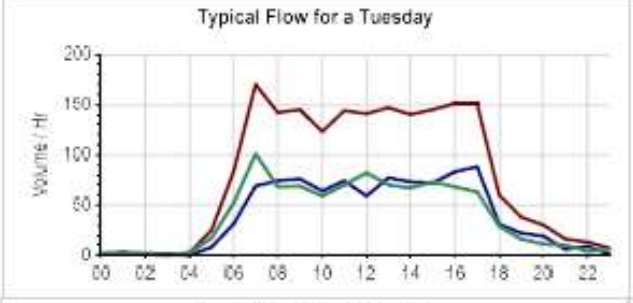
Station Typical Flow Graphs

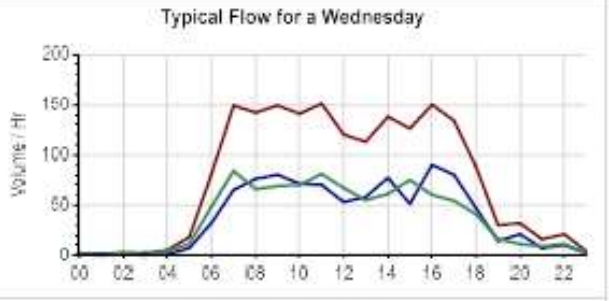
Site	12104 - EC_R336_01_30.4
Region	South
Actual Period	04 Nov 2016 - 14 Nov 2016
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

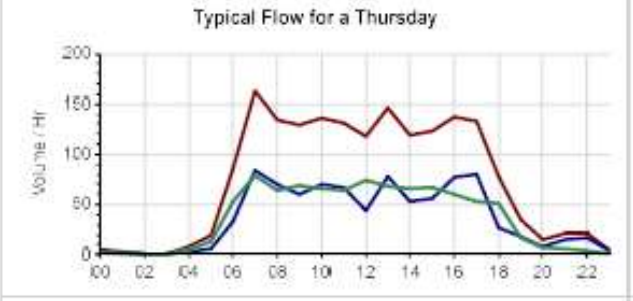
Total
To Kirkwood
To Paterson

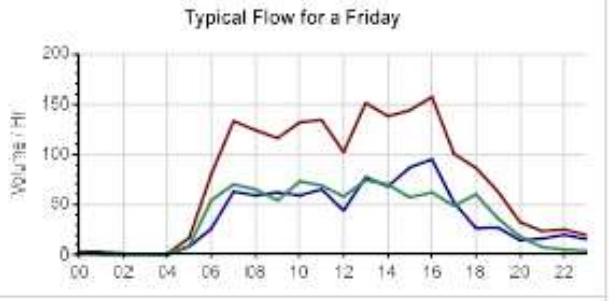
Total
Light
Heavy

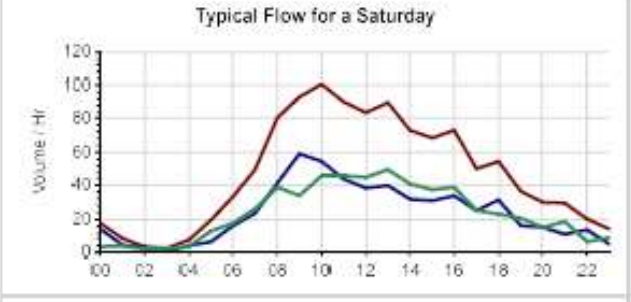


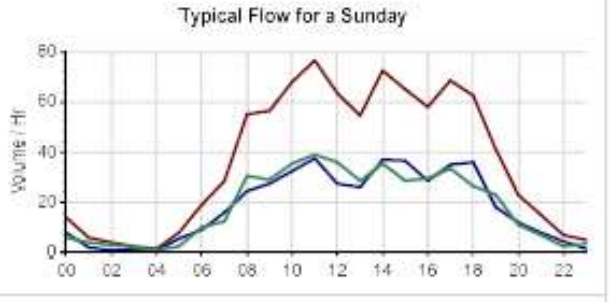


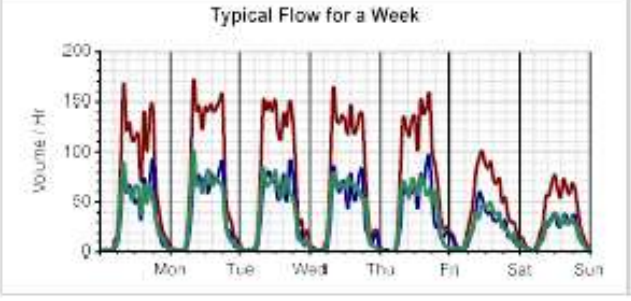


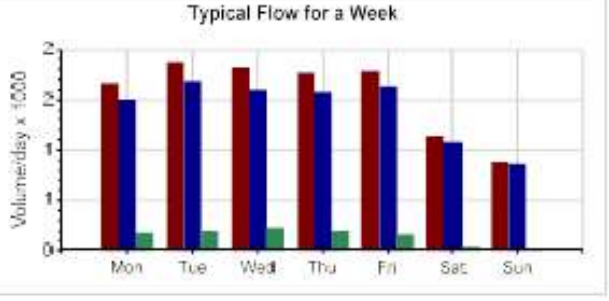












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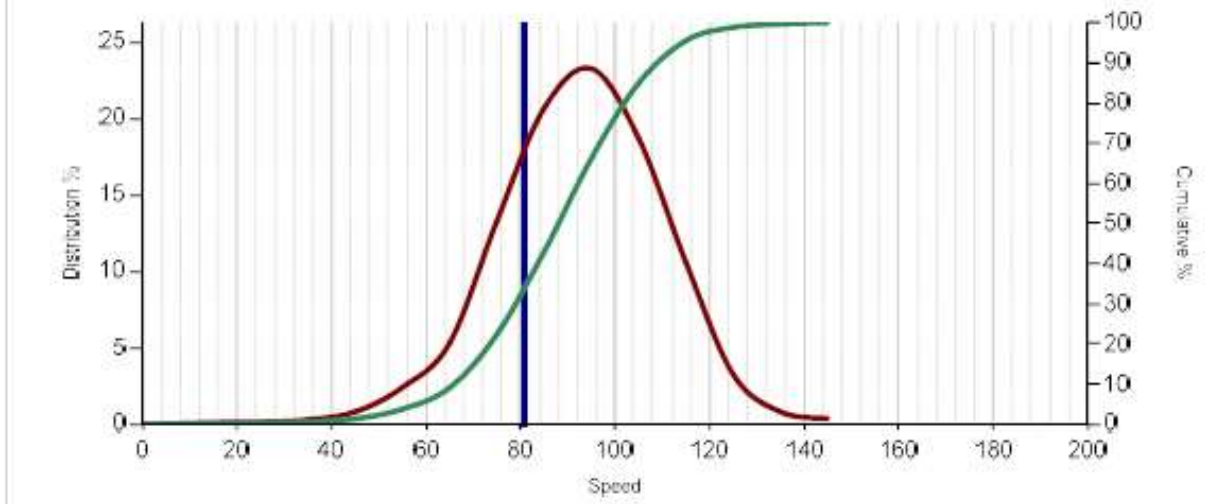
Station Data - 19

Station Speed Distribution

Site	12104 - EC_R336_01_30.4
Speed Limit	80 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 1 - To Paterson

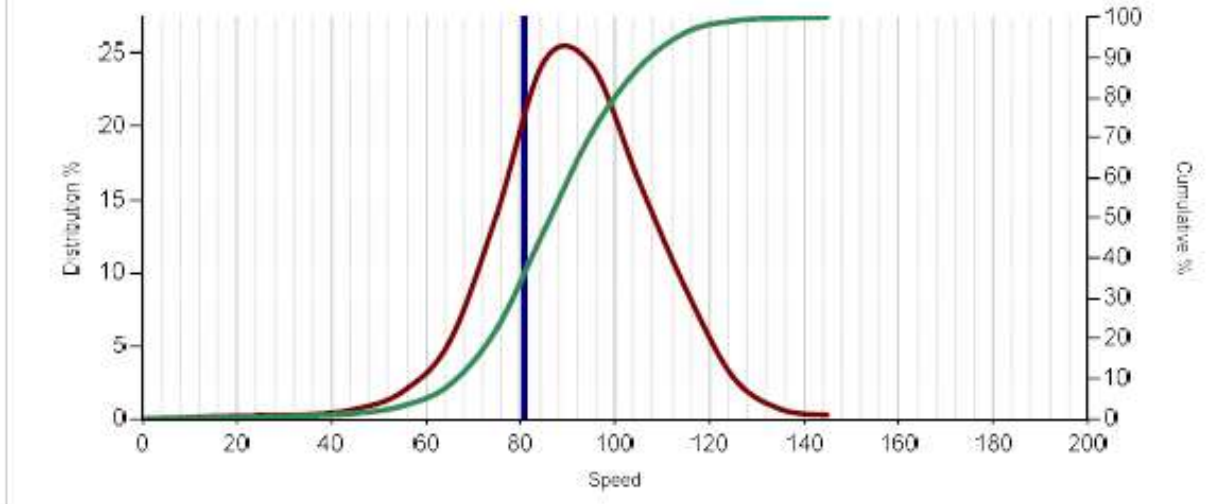


Station Speed Distribution

Site	12104 - EC_R336_01_30.4
Speed Limit	80 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 20

Station Information

Site Number	12106	**Site Identifier**	27880
Site Name	EC_R336_01_33.7		
Site Description	Between Kirkwood and Paterson		
Site Type	Secondary (Temp)	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2016-10-27
GPS Longitude	25.564453	**Termination Date**	
GPS Latitude	-33.477962	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	120
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	33.79
Authority	SANRAL	**Contract No**	NRA 53000/2016/1
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Paterson	1	To Paterson	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

PHOTO

Direction 1

To Paterson

PHOTO

Direction 2

To Kirkwood

PHOTO

As Built

Traffic Highlights of Site: EC_R336_01_33.7 (12106)	
Site No	12106
Site Name	EC_R336_01_33.7
Site Description	Between Kirkwood and Paterson
Road Description	Route : R336 Section : 01E Distance : 33.79 km
GPS Position	Latitude: -33.477962 Longitude: 25.564453
Number of Lanes	2
Station Type	Secondary (Temp)

Requested Data Period	01 Jan 2016 - 31 Dec 2016
First and Last Data Dates	27 Oct 2016 - 04 Nov 2016
Data Available for Requested Period as Percentage	2%

Last Full Day Count for ADT and ADTT	03 Nov 2016
Number of Full Days in Requested Period	7

Highlights per Stream		Str 1: To Paterson	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	6,207	6,258	12,465
1.2	Average Daily Traffic (ADT)	741	739	1,480
1.3	Average Daily Truck Traffic (ADTT)	82	88	170
1.4	Percentage of Trucks	11.4 %	11.9 %	11.6 %
1.5	Truck Split % (Short : Medium : Long)	66 : 18 : 16	69 : 17 : 14	68 : 18 : 15
1.6	Percentage of Night Traffic [20h00 - 6h00)	6.5 %	7.1 %	6.8 %
2.1	Speed Limit			120
2.2	Average Speed (km/hr)	91.4	88.6	90.0
2.3	Average Speed - Light Vehicles (km/hr	92.1	89.4	90.8
2.4	Average Speed - Heavy Vehicles (km/hr)	84.2	81.8	83.0
2.5	Average Night Speed (km/hr)	90.4	87.3	88.9
2.6	15th Centile Speed (km/hr)	76.2	73.8	75.0
2.7	85th Centile Speed (km/hr)	109.1	106.7	107.9
2.8	Percentage of Vehicles in Excess of Speed Limit	38.9 %	39.0 %	39.0 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 22

4.1	Total Number of Heavy Vehicles	705	747	1,452
4.2	Estimated Average Number of axles per Truck	3.3	3.2	3.3
4.3	Estimated Truck Mass (Ton/Truck)	19.2	18.4	18.8
4.4	Estimated Average E80 / Truck	1.3	1.2	1.25
4.5	Estimated Daily E80 on the Road			421.0
4.6	Estimated Daily E80 in the East Direction			613.0
4.7	Estimated Daily E80 in the West Direction			650.0
4.8	Estimated Daily E80 in the Worst East Lane			613.0
4.9	Estimated Daily E80 in the Worst West Lane			650.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	01 Nov 2016 (17:00 - 18:00)	176
6.2	Highest Volume in the East (vehs/hr)	02 Nov 2016 (07:00 - 08:00)	86
6.3	Highest Volume in the West (vehs/hr)	01 Nov 2016 (17:00 - 18:00)	97
6.4	Highest Volume in a Lane (vehs/hr)	01 Nov 2016 (17:00 - 18:00)	97
6.5	15th Highest Volume on the Road (vehs/hr)	02 Nov 2016 (14:00 - 15:00)	145
6.6	15th Highest Volume in the East Direction (vehs/hr)	02 Nov 2016 (11:00 - 12:00)	76
6.7	15th Highest Volume in the West Direction (vehs/hr)	01 Nov 2016 (07:00 - 08:00)	76
6.8	30th Highest Volume on the Road (vehs/hr)	03 Nov 2016 (16:00 - 17:00)	131
6.9	30th Highest Volume in the East Direction (vehs/hr)	01 Nov 2016 (10:00 - 11:00)	65
6.10	30th Highest Volume in the West Direction (vehs/hr)	28 Oct 2016 (07:00 - 08:00)	67

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Station Data - 23

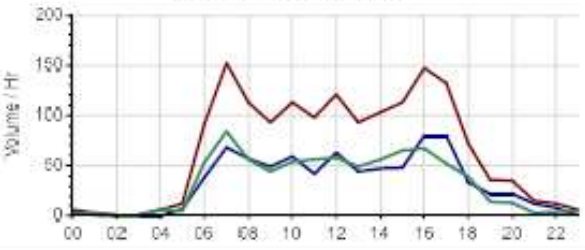
Station Typical Flow Graphs

Site	12106 - EC_R336_01_33.7
Region	South
Actual Period	27 Oct 2016 - 04 Nov 2016
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

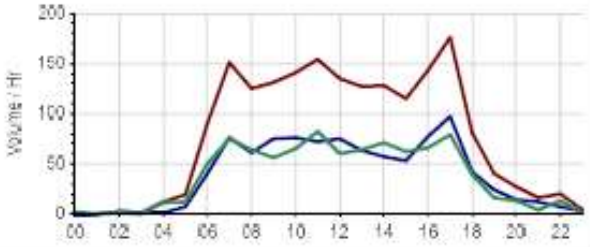
Total
To Kirkwood
To Paterson

Total
Light
Heavy

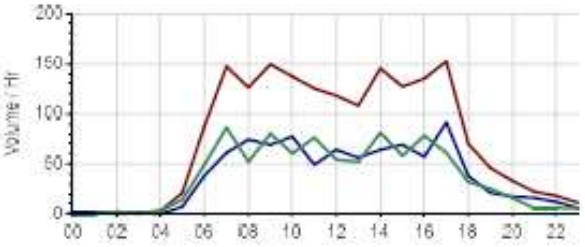
Typical Flow for a Monday



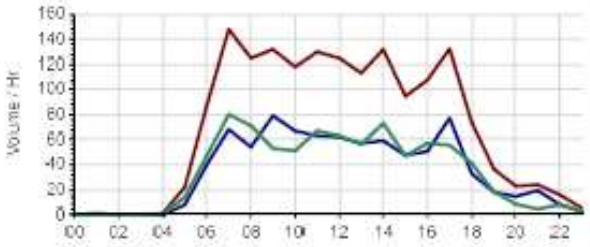
Typical Flow for a Tuesday



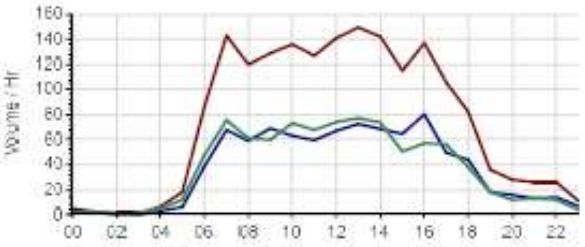
Typical Flow for a Wednesday



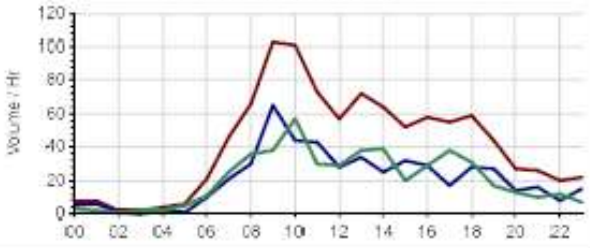
Typical Flow for a Thursday



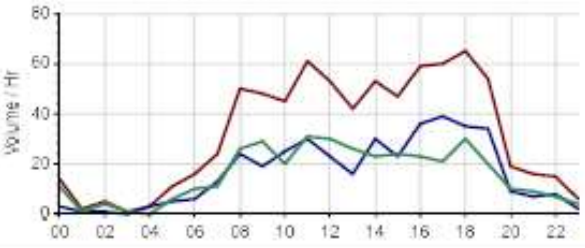
Typical Flow for a Friday



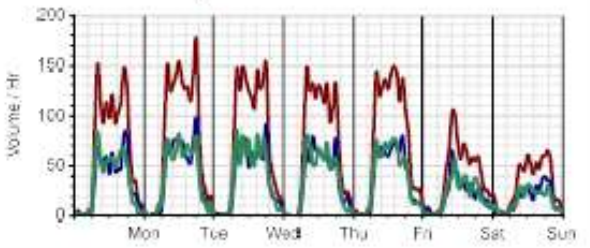
Typical Flow for a Saturday



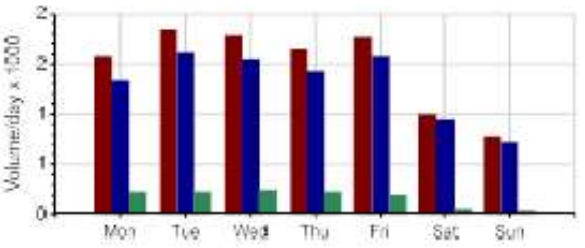
Typical Flow for a Sunday



Typical Flow for a Week



Typical Flow for a Week



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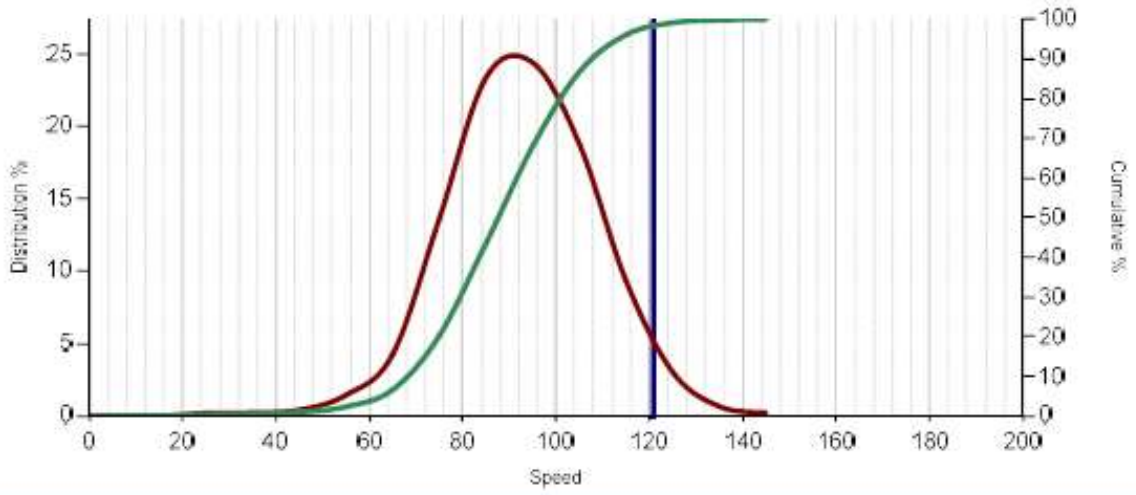
Station Data - 24

Station Speed Distribution

Site	12106 - EC_R336_01_33.7
Speed Limit	120 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 1 - To Paterson

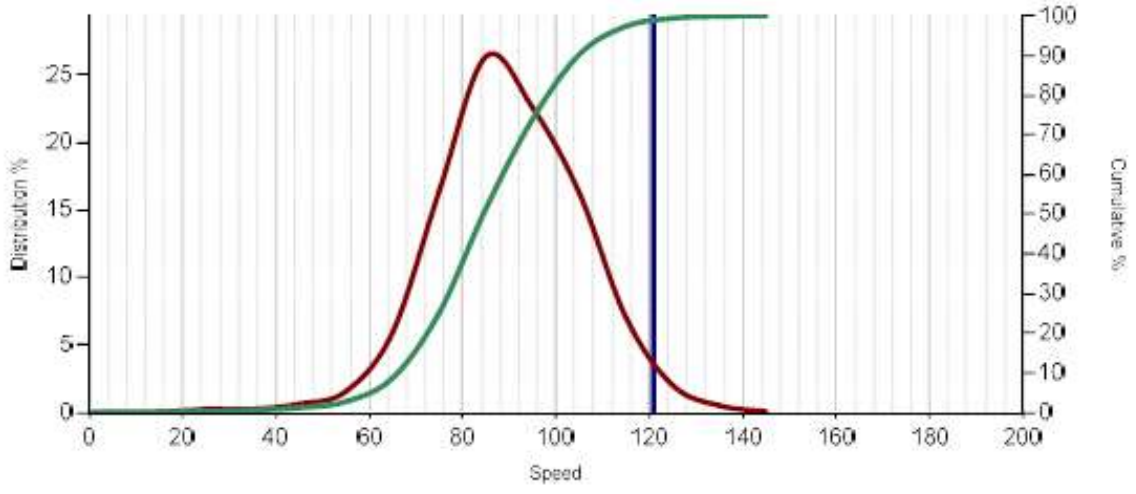


Station Speed Distribution

Site	12106 - EC_R336_01_33.7
Speed Limit	120 km/hr
Period	01 Jan 2016 - 31 Dec 2016

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 25

Station Information

Site Number	8211	**Site Identifier**	27127
Site Name	R336 Sunland		
Site Description	Between Kirkwood & R335 Addo Intersection		
Site Type	Permanent	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2017-06-05
GPS Longitude	25.575787	**Termination Date**	
GPS Lattitude	-33.48296	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	34.98
Authority	SANRAL	**Contract No**	NRA 53000/141/2
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To R335 Addo	1	To R335 Addo	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

NO PHOTO AVAILABLE.

NO PHOTO AVAILABLE.

PHOTO

Direction 1

NO DATA FOUND.

Direction 2

NO DATA FOUND.

As Built

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Station Data - 1

Traffic Highlights of Site: R336 Sunland (8211)	
Site No	8211
Site Name	R336 Sunland
Site Description	Between Kirkwood & R335 Addo Intersection
Road Description	Route : R336 Section : 01E Distance : 34.98 km
GPS Position	Latitude: -33.48296 Longitude: 25.575787
Number of Lanes	2
Station Type	Permanent

Requested Data Period	01 Jan 2017 - 31 Dec 2017
First and Last Data Dates	09 Jun 2017 - 31 Dec 2017
Data Available for Requested Period as Percentage	55%

Last Full Day Count for ADT and ADTT	31 Dec 2017
Number of Full Days in Requested Period	197

Highlights per Stream		Str 1: To R335 Addo	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	160,569	157,826	318,395
1.2	Average Daily Traffic (ADT)	796	782	1,578
1.3	Average Daily Truck Traffic (ADTT)	112	108	220
1.4	Percentage of Trucks	14.3 %	14.1 %	14.2 %
1.5	Truck Split % (Short : Medium : Long)	48 : 21 : 31	49 : 21 : 30	48 : 21 : 30
1.6	Percentage of Night Traffic [20h00 - 6h00)	7.0 %	6.9 %	6.9 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	92.8	91.6	92.2
2.3	Average Speed - Light Vehicles (km/hr	94.6	93.8	94.2
2.4	Average Speed - Heavy Vehicles (km/hr)	79.4	78.7	79.1
2.5	Average Night Speed (km/hr)	92.6	91.6	92.1
2.6	15th Centile Speed (km/hr)	74.3	73.3	73.8
2.7	85th Centile Speed (km/hr)	112.8	111.3	112.1
2.8	Percentage of Vehicles in Excess of Speed Limit	86.2 %	85.3 %	85.8 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 2

4.1	Total Number of Heavy Vehicles	23,021	22,223	45,244
4.2	Estimated Average Number of axles per Truck	4.2	4.1	4.2
4.3	Estimated Truck Mass (Ton/Truck)	24.2	23.9	24.1
4.4	Estimated Average E80 / Truck	1.9	1.9	1.90
4.5	Estimated Daily E80 on the Road			529.0
4.6	Estimated Daily E80 in the East Direction			807.0
4.7	Estimated Daily E80 in the West Direction			779.0
4.8	Estimated Daily E80 in the Worst East Lane			807.0
4.9	Estimated Daily E80 in the Worst West Lane			779.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	30 Jun 2017 (16:00 - 17:00)	278
6.2	Highest Volume in the East (vehs/hr)	02 Jul 2017 (16:00 - 17:00)	136
6.3	Highest Volume in the West (vehs/hr)	01 Jul 2017 (10:00 - 11:00)	212
6.4	Highest Volume in a Lane (vehs/hr)	01 Jul 2017 (10:00 - 11:00)	212
6.5	15th Highest Volume on the Road (vehs/hr)	14 Jun 2017 (12:00 - 13:00)	221
6.6	15th Highest Volume in the East Direction (vehs/hr)	27 Jun 2017 (12:00 - 13:00)	112
6.7	15th Highest Volume in the West Direction (vehs/hr)	07 Jul 2017 (16:00 - 17:00)	120
6.8	30th Highest Volume on the Road (vehs/hr)	15 Jun 2017 (16:00 - 17:00)	206
6.9	30th Highest Volume in the East Direction (vehs/hr)	23 Jun 2017 (10:00 - 11:00)	107
6.10	30th Highest Volume in the West Direction (vehs/hr)	14 Jun 2017 (17:00 - 18:00)	107

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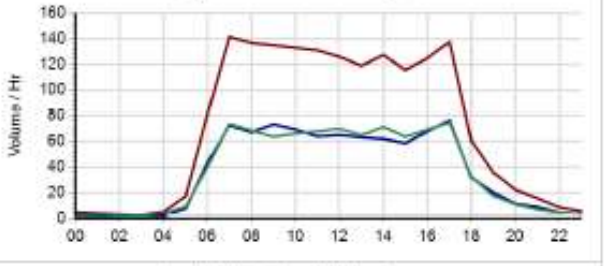
Station Data - 3

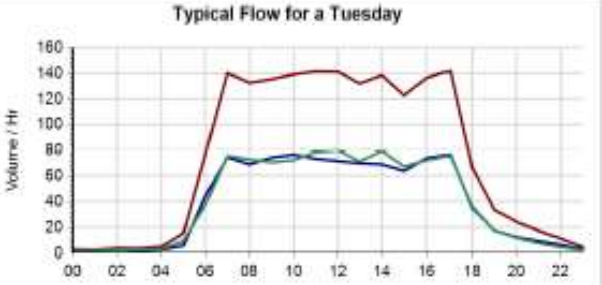
Station Typical Flow Graphs

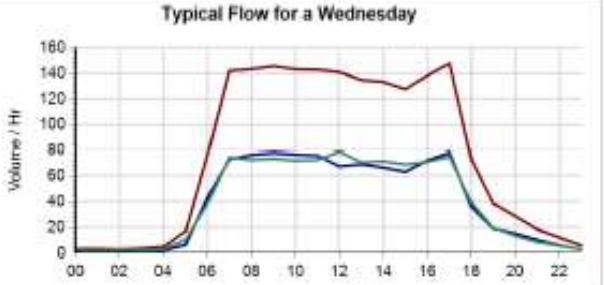
Site	8211 - R336 Sunland
Region	South
Actual Period	09 Jun 2017 - 31 Dec 2017
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

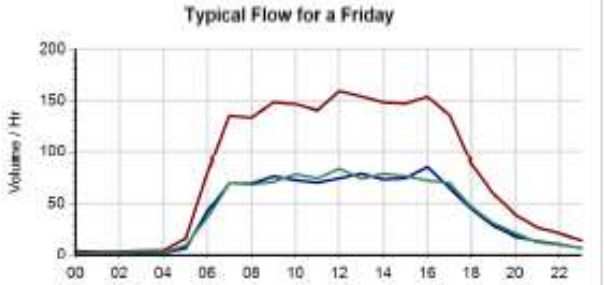
Total
To Kirkwood
To R335 Addo

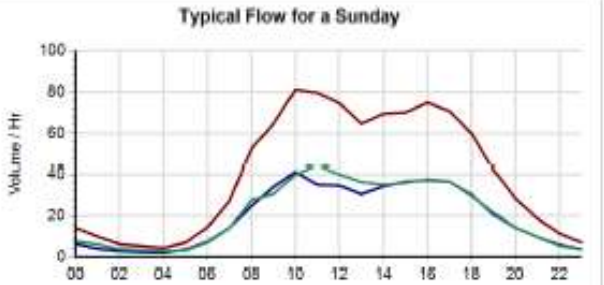
Total
Light
Heavy

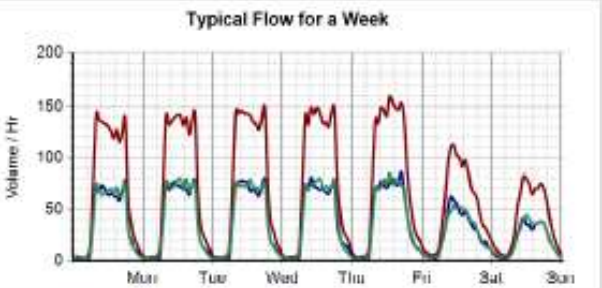


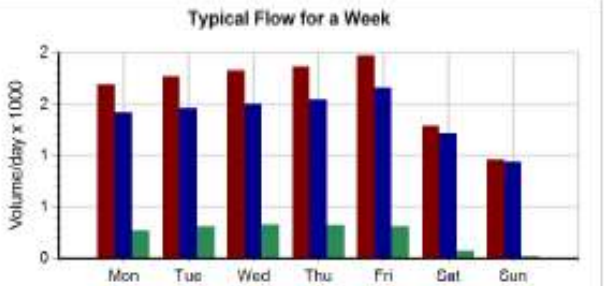












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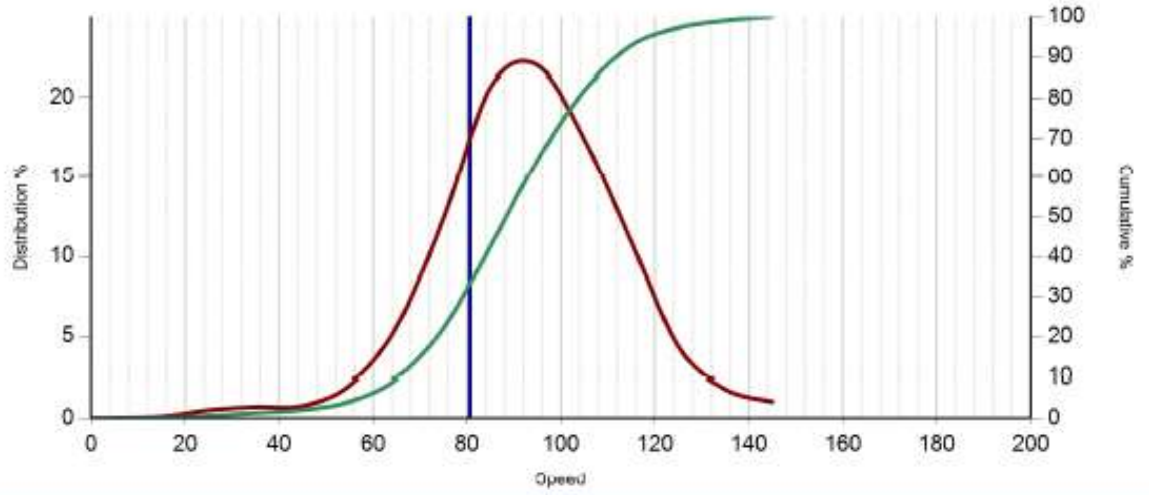
Station Data - 4

Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2017 - 31 Dec 2017

Distribution
Cumulative
Speed Limit

Lane 1 - To R335 Addo

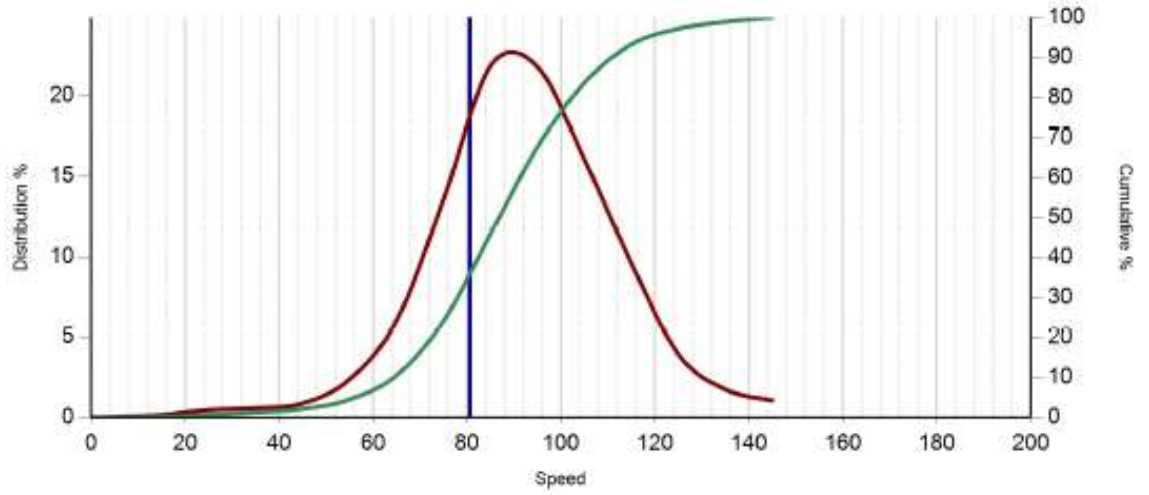


Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2017 - 31 Dec 2017

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 5

Station Information

Site Number	12104	**Site Identifier**	27879
Site Name	EC_R336_01_30.4		
Site Description	Between Kirkwood and Paterson		
Site Type	Secondary (Temp)	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2016-11-04
GPS Longitude	25.530251	**Termination Date**	
GPS Lattitude	-33.471416	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	30.37
Authority	SANRAL	**Contract No**	NRA 53000/2016/1
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To Paterson	1	To Paterson	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

PHOTO

Direction 1

To Paterson

PHOTO

Direction 2

To Kirkwood

PHOTO

As Built

Traffic Highlights of Site: EC_R336_01_30.4 (12104)	
Site No	12104
Site Name	EC_R336_01_30.4
Site Description	Between Kirkwood and Paterson
Road Description	Route : R336 Section : 01E Distance : 30.37 km
GPS Position	Latitude: -33.471416 Longitude: 25.530251
Number of Lanes	2
Station Type	Secondary (Temp)

Requested Data Period	01 Jan 2018 - 31 Dec 2018
First and Last Data Dates	23 Jan 2018 - 01 Nov 2018
Data Available for Requested Period as Percentage	21%

Last Full Day Count for ADT and ADTT	01 Nov 2018
Number of Full Days in Requested Period	72

Highlights per Stream		Str 1: To Paterson	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	64,741	64,516	129,257
1.2	Average Daily Traffic (ADT)	853	850	1,703
1.3	Average Daily Truck Traffic (ADTT)	119	119	238
1.4	Percentage of Trucks	14.1 %	14.1 %	14.1 %
1.5	Truck Split % (Short : Medium : Long)	54 : 16 : 30	55 : 16 : 29	54 : 16 : 30
1.6	Percentage of Night Traffic [20h00 - 6h00)	6.6 %	6.6 %	6.6 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	87.7	88.5	88.1
2.3	Average Speed - Light Vehicles (km/hr	89.9	90.7	90.3
2.4	Average Speed - Heavy Vehicles (km/hr)	76.1	76.0	76.1
2.5	Average Night Speed (km/hr)	86.5	87.8	87.2
2.6	15th Centile Speed (km/hr)	71.6	71.9	71.8
2.7	85th Centile Speed (km/hr)	106.7	106.7	106.7
2.8	Percentage of Vehicles in Excess of Speed Limit	83.2 %	83.7 %	83.4 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 17

4.1	Total Number of Heavy Vehicles	9,123	9,105	18,228
4.2	Estimated Average Number of axles per Truck	4.0	3.9	4.0
4.3	Estimated Truck Mass (Ton/Truck)	22.9	22.6	22.8
4.4	Estimated Average E80 / Truck	1.8	1.7	1.75
4.5	Estimated Daily E80 on the Road			544.0
4.6	Estimated Daily E80 in the East Direction			817.0
4.7	Estimated Daily E80 in the West Direction			815.0
4.8	Estimated Daily E80 in the Worst East Lane			817.0
4.9	Estimated Daily E80 in the Worst West Lane			815.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	27 Jul 2018 (13:00 - 14:00)	227
6.2	Highest Volume in the East (vehs/hr)	08 Aug 2018 (07:00 - 08:00)	131
6.3	Highest Volume in the West (vehs/hr)	24 Jul 2018 (17:00 - 18:00)	138
6.4	Highest Volume in a Lane (vehs/hr)	24 Jul 2018 (17:00 - 18:00)	138
6.5	15th Highest Volume on the Road (vehs/hr)	26 Jul 2018 (17:00 - 18:00)	202
6.6	15th Highest Volume in the East Direction (vehs/hr)	08 Aug 2018 (14:00 - 15:00)	110
6.7	15th Highest Volume in the West Direction (vehs/hr)	03 Aug 2018 (10:00 - 11:00)	109
6.8	30th Highest Volume on the Road (vehs/hr)	25 Jul 2018 (08:00 - 09:00)	193
6.9	30th Highest Volume in the East Direction (vehs/hr)	12 Apr 2018 (17:00 - 18:00)	103
6.10	30th Highest Volume in the West Direction (vehs/hr)	26 Apr 2018 (07:00 - 08:00)	103

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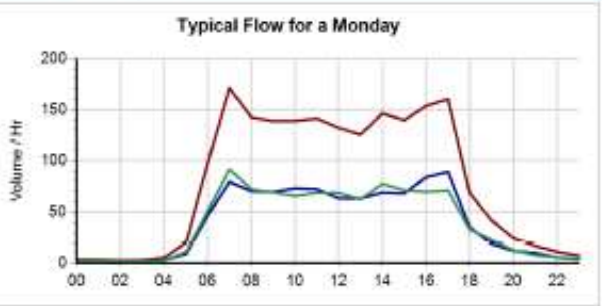
SANRAL Yearbook Station Data - 18

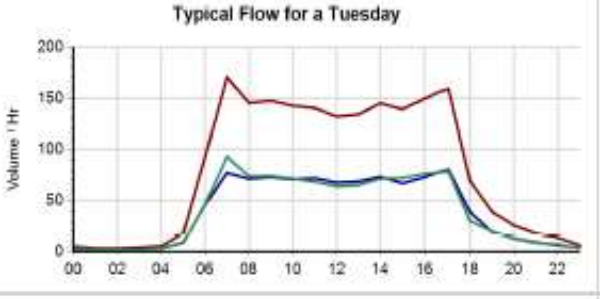
Station Typical Flow Graphs

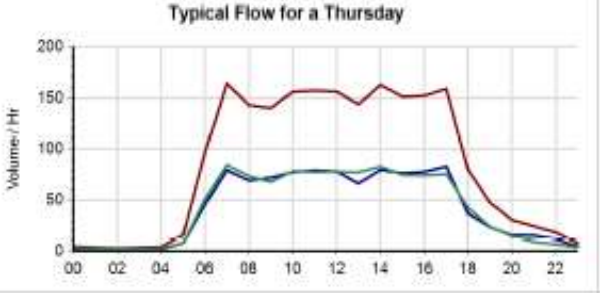
Site	12104 - EC_R336_01_30.4
Region	South
Actual Period	23 Jan 2018 - 01 Nov 2018
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

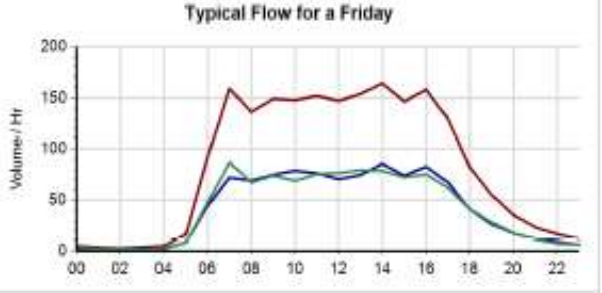
Total
To Kirkwood
To Paterson

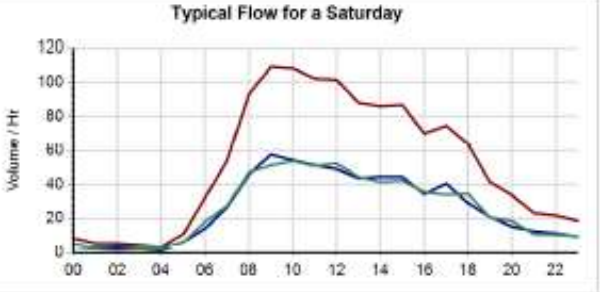
Total
Light
Heavy

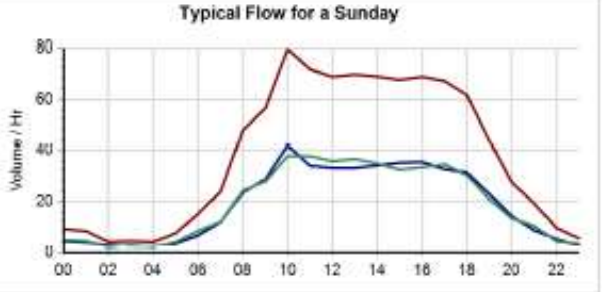


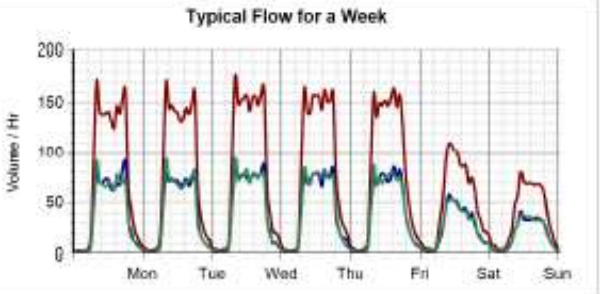


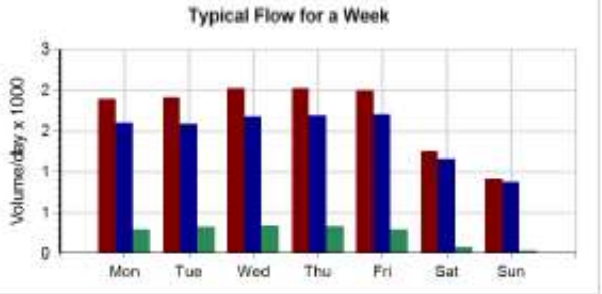












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For queries, contact:
Michelle van der Walt (012) 844 8029 vdwaltm@nra.co.za

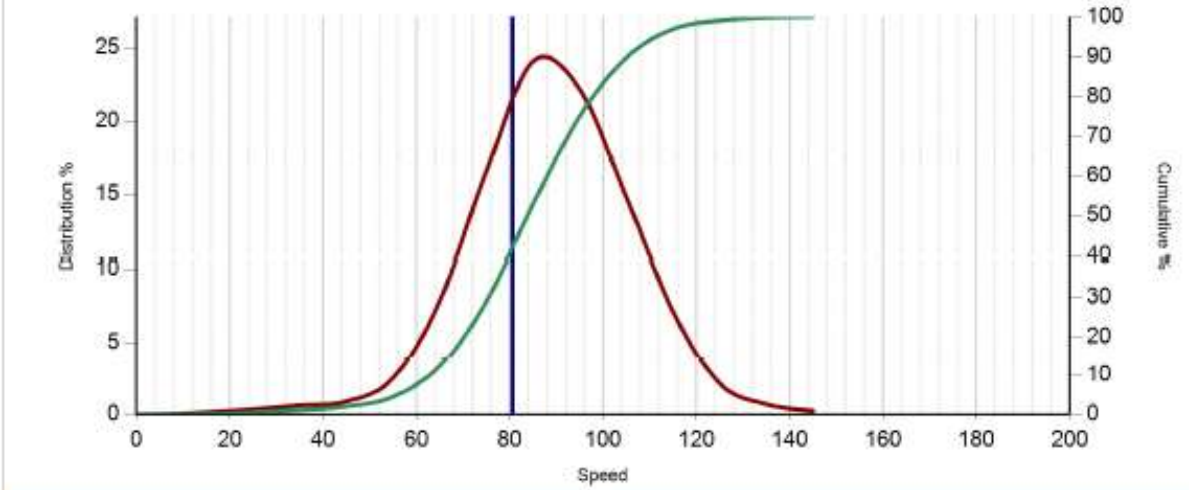
Station Data - 19

Station Speed Distribution

Site	12104 - EC_R336_01_30.4
Speed Limit	80 km/hr
Period	01 Jan 2018 - 31 Dec 2018

Distribution
Cumulative
Speed Limit

Lane 1 - To Paterson

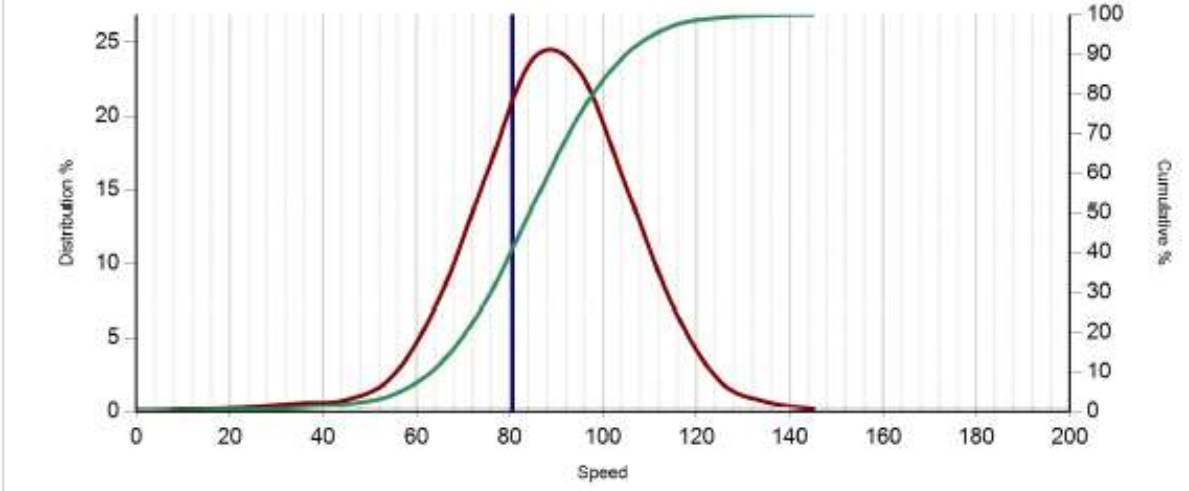


Station Speed Distribution

Site	12104 - EC_R336_01_30.4
Speed Limit	80 km/hr
Period	01 Jan 2018 - 31 Dec 2018

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 20

Station Information

Site Number	8211	**Site Identifier**	27127
Site Name	R336 Sunland		
Site Description	Between Kirkwood & R335 Addo Intersection		
Site Type	Permanent	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2017-06-05
GPS Longitude	25.575787	**Termination Date**	
GPS Lattitude	-33.48296	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	34.98
Authority	SANRAL	**Contract No**	NRA 53000/141/2
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To R335 Addo	1	To R335 Addo	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

NO PHOTO AVAILABLE.

NO PHOTO AVAILABLE.

PHOTO

Direction 1

NO DATA FOUND.

Direction 2

NO DATA FOUND.

As Built

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Station Data - 21

Traffic Highlights of Site: R336 Sunland (8211)	
Site No	8211
Site Name	R336 Sunland
Site Description	Between Kirkwood & R335 Addo Intersection
Road Description	Route : R336 Section : 01E Distance : 34.98 km
GPS Position	Latitude: -33.48296 Longitude: 25.575787
Number of Lanes	2
Station Type	Permanent

Requested Data Period	01 Jan 2018 - 31 Dec 2018
First and Last Data Dates	01 Jan 2018 - 31 Dec 2018
Data Available for Requested Period as Percentage	100%

Last Full Day Count for ADT and ADTT	31 Dec 2018
Number of Full Days in Requested Period	365

Highlights per Stream		Str 1: To R335 Addo	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	304,506	301,002	605,508
1.2	Average Daily Traffic (ADT)	834	825	1,659
1.3	Average Daily Truck Traffic (ADTT)	111	107	218
1.4	Percentage of Trucks	13.3 %	13.0 %	13.1 %
1.5	Truck Split % (Short : Medium : Long)	45 : 24 : 31	46 : 23 : 31	46 : 24 : 31
1.6	Percentage of Night Traffic [20h00 - 6h00)	6.9 %	6.9 %	6.9 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	93.8	92.8	93.3
2.3	Average Speed - Light Vehicles (km/hr	96.2	95.2	95.7
2.4	Average Speed - Heavy Vehicles (km/hr)	78.9	78.5	78.7
2.5	Average Night Speed (km/hr)	93.2	92.7	93.0
2.6	15th Centile Speed (km/hr)	75.8	74.8	75.3
2.7	85th Centile Speed (km/hr)	113.1	111.6	112.4
2.8	Percentage of Vehicles in Excess of Speed Limit	87.3 %	86.5 %	86.9 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 22

4.1	Total Number of Heavy Vehicles	40,359	39,096	79,455
4.2	Estimated Average Number of axles per Truck	4.3	4.2	4.3
4.3	Estimated Truck Mass (Ton/Truck)	24.8	24.6	24.7
4.4	Estimated Average E80 / Truck	1.9	1.9	1.90
4.5	Estimated Daily E80 on the Road			491.0
4.6	Estimated Daily E80 in the East Direction			748.0
4.7	Estimated Daily E80 in the West Direction			725.0
4.8	Estimated Daily E80 in the Worst East Lane			748.0
4.9	Estimated Daily E80 in the Worst West Lane			725.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	30 Jun 2018 (10:00 - 11:00)	293
6.2	Highest Volume in the East (vehs/hr)	29 Jun 2018 (15:00 - 16:00)	140
6.3	Highest Volume in the West (vehs/hr)	30 Jun 2018 (10:00 - 11:00)	223
6.4	Highest Volume in a Lane (vehs/hr)	30 Jun 2018 (10:00 - 11:00)	223
6.5	15th Highest Volume on the Road (vehs/hr)	08 Aug 2018 (07:00 - 08:00)	217
6.6	15th Highest Volume in the East Direction (vehs/hr)	08 Aug 2018 (07:00 - 08:00)	114
6.7	15th Highest Volume in the West Direction (vehs/hr)	30 Jun 2018 (13:00 - 14:00)	119
6.8	30th Highest Volume on the Road (vehs/hr)	26 Jul 2018 (17:00 - 18:00)	210
6.9	30th Highest Volume in the East Direction (vehs/hr)	07 Aug 2018 (15:00 - 16:00)	108
6.10	30th Highest Volume in the West Direction (vehs/hr)	21 Sep 2018 (16:00 - 17:00)	114

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For queries, contact:
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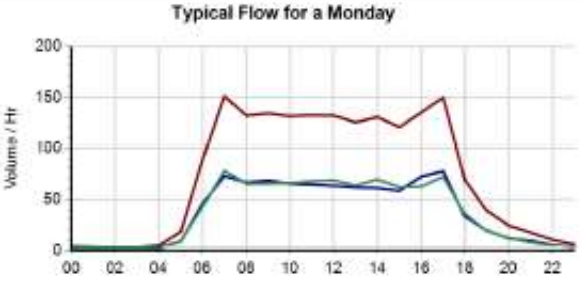
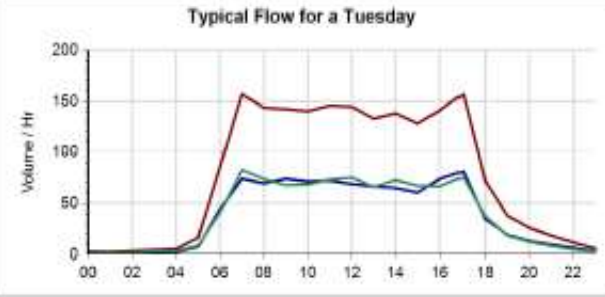
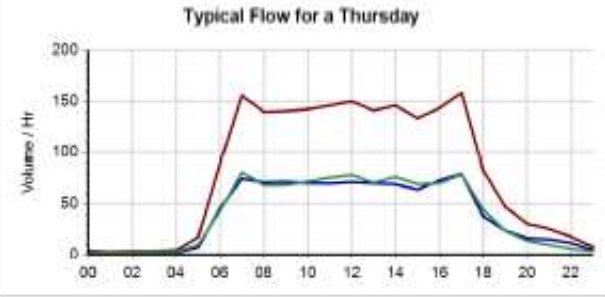
Station Data - 23

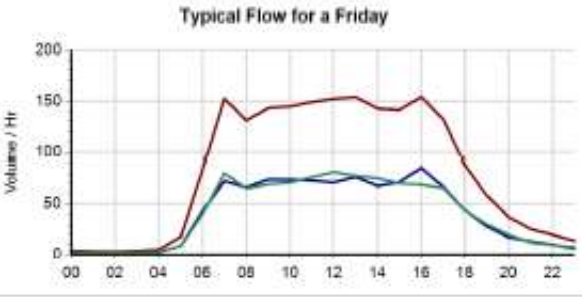
Station Typical Flow Graphs

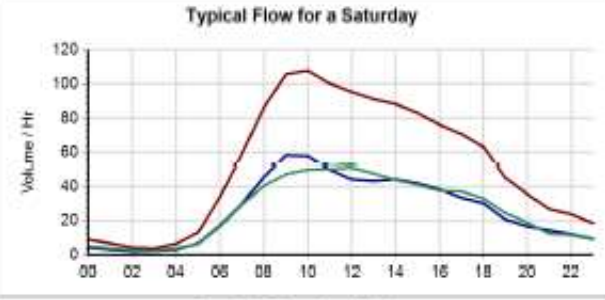
Site	8211 - R336 Sunland
Region	South
Actual Period	01 Jan 2018 - 31 Dec 2018
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

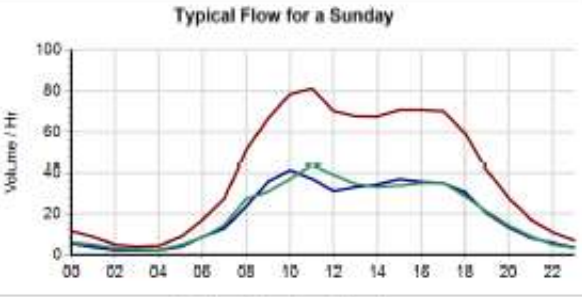


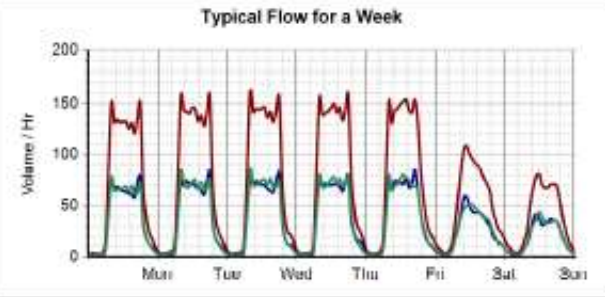


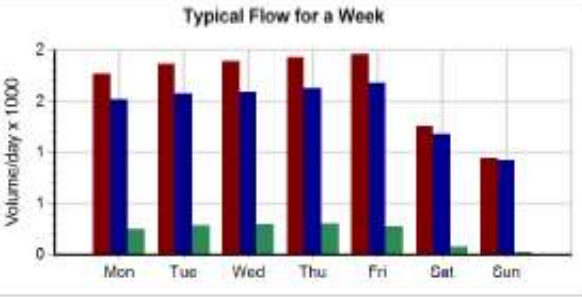












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For queries, contact:
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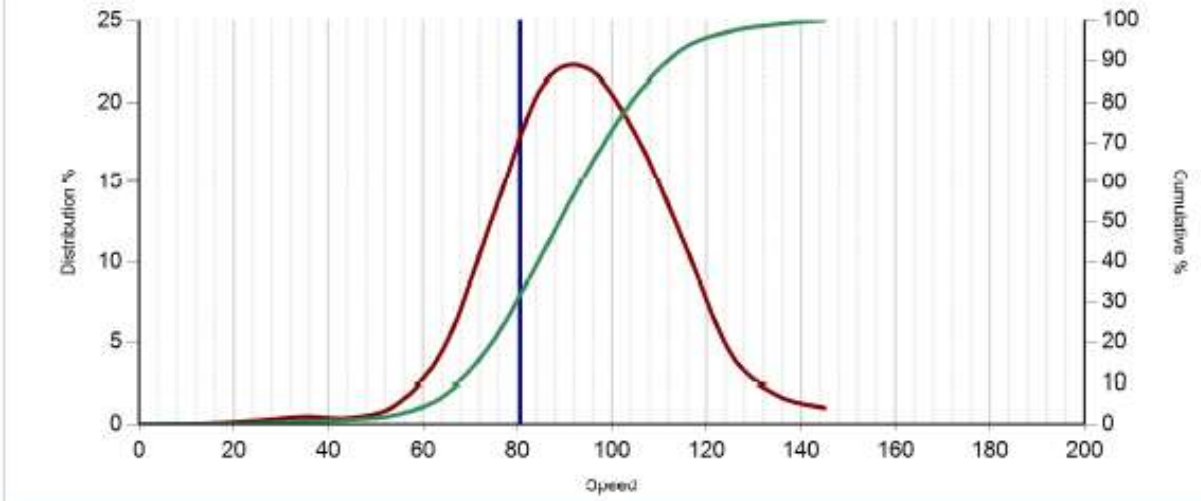
Station Data - 24

Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2018 - 31 Dec 2018

Distribution
Cumulative
Speed Limit

Lane 1 - To R335 Addo

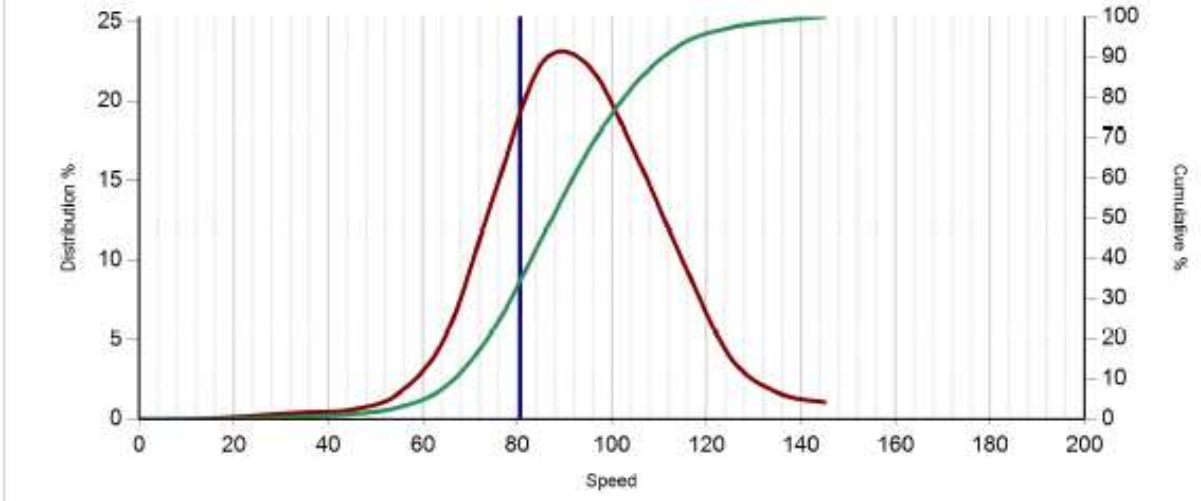


Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2018 - 31 Dec 2018

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 25

Station Information

Site Number	8211	**Site Identifier**	27127
Site Name	R336 Sunland		
Site Description	Between Kirkwood & R335 Addo Intersection		
Site Type	Permanent	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2017-06-05
GPS Longitude	25.575787	**Termination Date**	
GPS Lattitude	-33.46296	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	34.98
Authority	SANRAL	**Contract No**	NRA 53000/141/2
Contract Org	Mikros Traffic Monitoring (Pty) Ltd	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To R335 Addo	1	To R335 Addo	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

NO PHOTO AVAILABLE.

NO PHOTO AVAILABLE.

PHOTO

Direction 1

NO DATA FOUND.

Direction 2

NO DATA FOUND.

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For queries, contact:
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Station Data - 1

Traffic Highlights of Site: R336 Sunland (8211)	
Site No	8211
Site Name	R336 Sunland
Site Description	Between Kirkwood & R335 Addo Intersection
Road Description	Route : R336 Section : 01E Distance : 34.98 km
GPS Position	Latitude: -33.48296 Longitude: 25.575787
Number of Lanes	2
Station Type	Permanent

Requested Data Period	01 Jan 2019 - 31 Dec 2019
First and Last Data Dates	01 Jan 2019 - 31 Oct 2019
Data Available for Requested Period as Percentage	83%

Last Full Day Count for ADT and ADTT	31 Oct 2019
Number of Full Days in Requested Period	304

	Highlights per Stream	Str 1: To R335 Addo	Str 2: To Kirkwood	Value
1.1	Total Number of Vehicles	270,876	268,127	539,003
1.2	Average Daily Traffic (ADT)	891	882	1,773
1.3	Average Daily Truck Traffic (ADTT)	141	137	278
1.4	Percentage of Trucks	15.9 %	15.6 %	15.7 %
1.5	Truck Split % (Short : Medium : Long)	40 : 23 : 37	39 : 22 : 39	40 : 22 : 38
1.6	Percentage of Night Traffic [20h00 - 6h00)	6.5 %	6.7 %	6.6 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	92.5	91.3	91.9
2.3	Average Speed - Light Vehicles (km/hr	95.4	94.1	94.8
2.4	Average Speed - Heavy Vehicles (km/hr)	78.2	77.4	77.8
2.5	Average Night Speed (km/hr)	91.5	89.9	90.7
2.6	15th Centile Speed (km/hr)	74.6	73.9	74.3
2.7	85th Centile Speed (km/hr)	111.9	110.8	111.4
2.8	Percentage of Vehicles in Excess of Speed Limit	85.9 %	85.4 %	85.6 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 2

4.1	Total Number of Heavy Vehicles	42,945	41,748	84,693
4.2	Estimated Average Number of axles per Truck	4.5	4.6	4.6
4.3	Estimated Truck Mass (Ton/Truck)	26.3	26.7	26.5
4.4	Estimated Average E80 / Truck	2.1	2.2	2.15
4.5	Estimated Daily E80 on the Road			627.0
4.6	Estimated Daily E80 in the East Direction			953.0
4.7	Estimated Daily E80 in the West Direction			927.0
4.8	Estimated Daily E80 in the Worst East Lane			953.0
4.9	Estimated Daily E80 in the Worst West Lane			927.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Value
6.1	Highest Volume on the Road (vehs/hr)	29 Jun 2019 (09:00 - 10:00)	283
6.2	Highest Volume in the East (vehs/hr)	08 Aug 2019 (13:00 - 14:00)	157
6.3	Highest Volume in the West (vehs/hr)	29 Jun 2019 (10:00 - 11:00)	212
6.4	Highest Volume in a Lane (vehs/hr)	29 Jun 2019 (10:00 - 11:00)	212
6.5	15th Highest Volume on the Road (vehs/hr)	25 Jul 2019 (17:00 - 18:00)	226
6.6	15th Highest Volume in the East Direction (vehs/hr)	02 Aug 2019 (12:00 - 13:00)	118
6.7	15th Highest Volume in the West Direction (vehs/hr)	08 Aug 2019 (16:00 - 17:00)	122
6.8	30th Highest Volume on the Road (vehs/hr)	04 Jul 2019 (17:00 - 18:00)	215
6.9	30th Highest Volume in the East Direction (vehs/hr)	16 Aug 2019 (13:00 - 14:00)	115
6.10	30th Highest Volume in the West Direction (vehs/hr)	29 Jun 2019 (13:00 - 14:00)	114

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For queries, contact:
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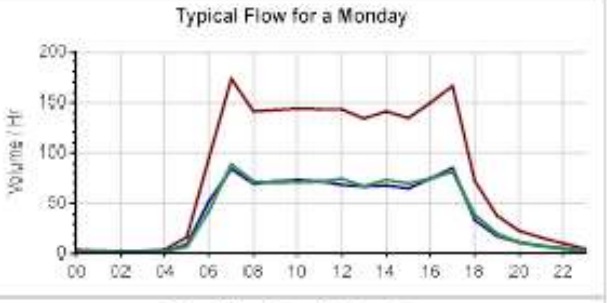
Station Data - 3

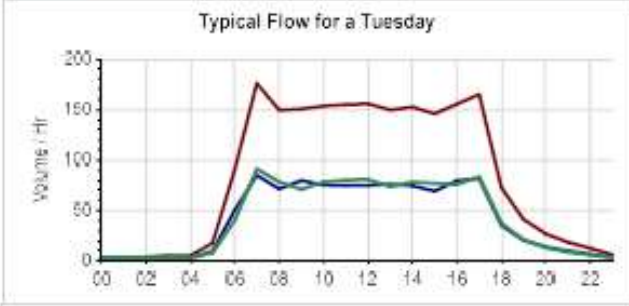
Station Typical Flow Graphs

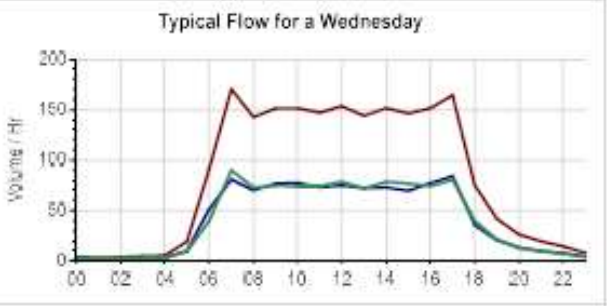
Site	8211 - R336 Sunland
Region	South
Actual Period	01 Jan 2019 - 31 Oct 2019
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

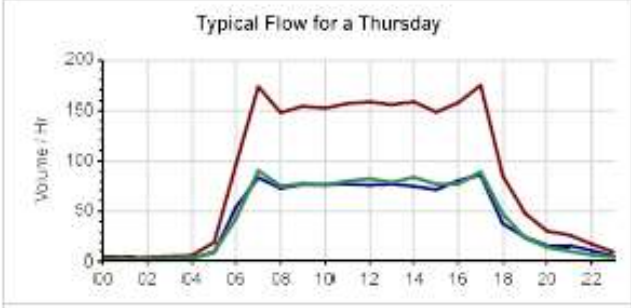
Total
To Kirkwood
To R335 Addo

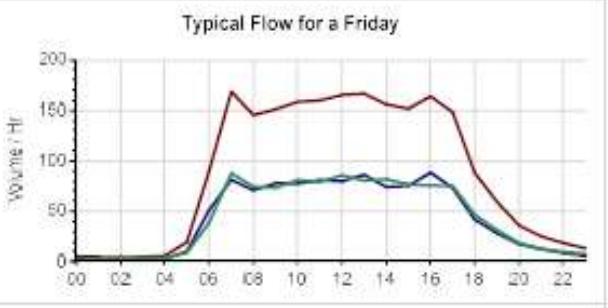
Total
Light
Heavy

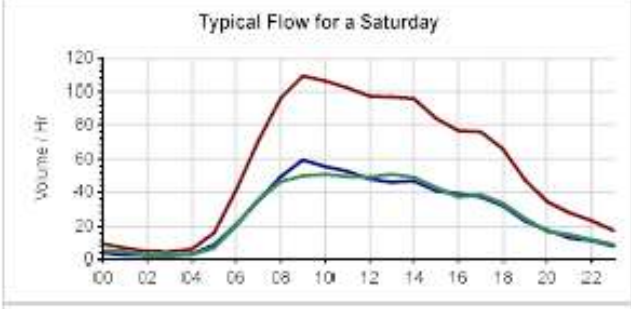


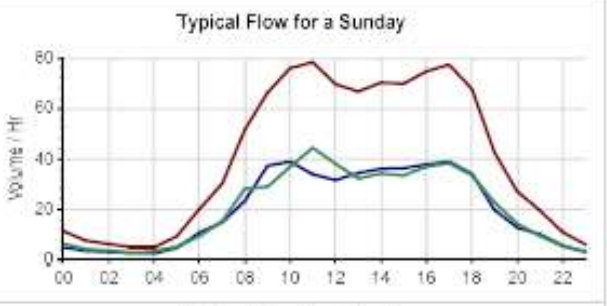


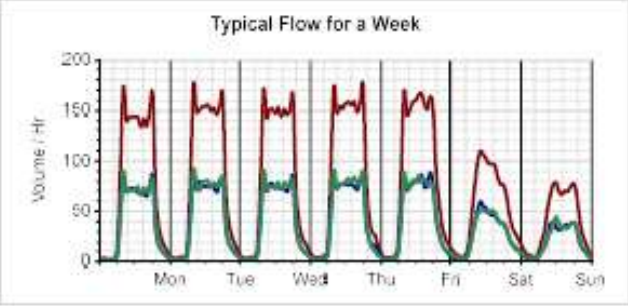


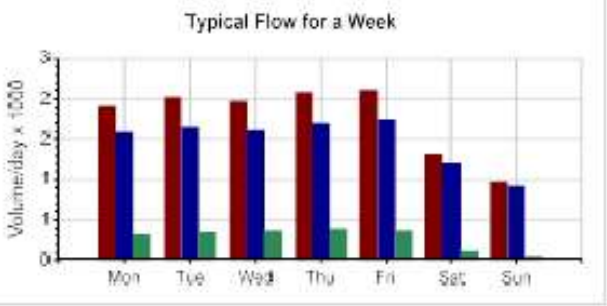












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For queries, contact:
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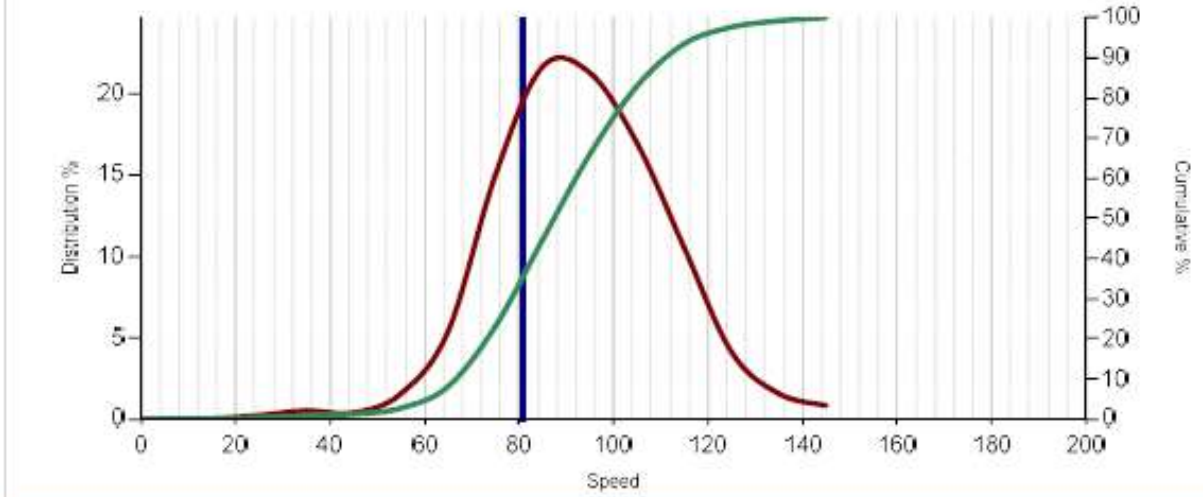
Station Data - 4

Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2019 - 31 Dec 2019

Distribution
Cumulative
Speed Limit

Lane 1 - To R335 Addo

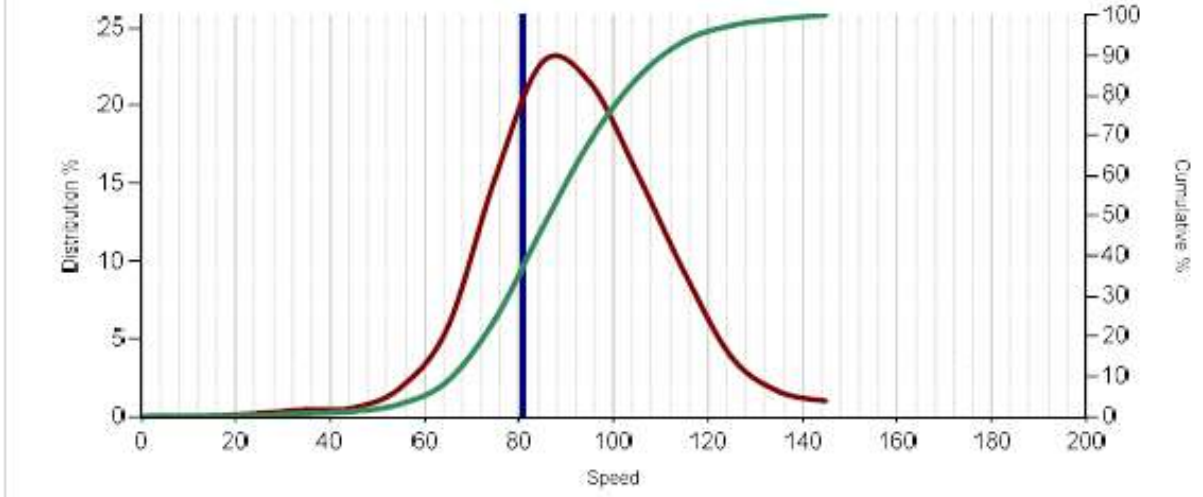


Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2019 - 31 Dec 2019

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 5

Station Information

Site Number	8211	**Site Identifier**	27127
Site Name	R336 Sunland		
Site Description	Between Kirkwood & R335 Addo Intersection		
Site Type	Permanent	**Owner**	SANRAL
Physical Lanes	2	**Responsibility**	NON-TOLL
Logical Lanes	2	**Installation Date**	2017-06-05
GPS Longitude	25.575787	**Termination Date**	
GPS Latitude	-33.46296	**Status**	In Use
Region	South	**Companion Site**	
Road	R336	**Speed Limit**	80
Route	R336	**Count Type**	Normal Traffic Counting Station
Section	01	**Distance**	34.98
Authority	SANRAL	**Contract No**	NRA 53000/2017/TOLL/2
Contract Org	Mikros Traffic Monitoring KZN	**Station History Type**	Full Site
System Type	C1		

Lane No	Lane Description	Stream No	Stream Description	Direction	Reverse Lane No	Pos
1	To R335 Addo	1	To R335 Addo	East	2	1
2	To Kirkwood	2	To Kirkwood	West	1	1

NO PHOTO AVAILABLE.

NO PHOTO AVAILABLE.

PHOTO

Direction 1

NO DATA FOUND.

Direction 2

NO DATA FOUND.

As Built

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Station Data - 1

Traffic Highlights of Site: R336 Sunland (8211)	
Site No	8211
Site Name	R336 Sunland
Site Description	Between Kirkwood & R335 Addo Intersection
Road Description	Route : R336 Section : 01E Distance : 34.98 km
GPS Position	Latitude: -33.48296 Longitude: 25.575787
Number of Lanes	2
Station Type	Permanent

Requested Data Period	01 Jan 2020 - 31 Dec 2020
First and Last Data Dates	01 Jan 2020 - 23 Jun 2020
Data Available for Requested Period as Percentage	48%

Last Full Day Count for ADT and ADTT	22 Jun 2020
Number of Full Days in Requested Period	174

Highlights per Stream		Str 1: To R335 Addo	Str 2: To Kirkwood	Total
1.1	Total Number of Vehicles	133,485	131,064	264,549
1.2	Average Daily Traffic (ADT)	767	753	1,520
1.3	Average Daily Truck Traffic (ADTT)	120	115	235
1.4	Percentage of Trucks	15.6 %	15.2 %	15.4 %
1.5	Truck Split % (Short : Medium : Long)	42 : 20 : 38	41 : 19 : 40	42 : 20 : 39
1.6	Percentage of Night Traffic [20h00 - 6h00)	6.1 %	6.2 %	6.1 %
2.1	Speed Limit			80
2.2	Average Speed (km/hr)	92.6	91.8	92.2
2.3	Average Speed - Light Vehicles (km/hr	95.4	94.6	95.0
2.4	Average Speed - Heavy Vehicles (km/hr)	78.2	77.4	77.8
2.5	Average Night Speed (km/hr)	91.7	90.0	90.9
2.6	15th Centile Speed (km/hr)	74.3	73.9	74.1
2.7	85th Centile Speed (km/hr)	112.6	112.8	112.7
2.8	Percentage of Vehicles in Excess of Speed Limit	85.5 %	85.3 %	85.4 %
3.1	Percentage Vehicles in Flows Over 600 (vehs/hr)	0 %	0 %	0.00%
3.2	Percentage of Vehicles less than 2s behind vehicle ahead	0 %	0 %	0 %

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Station Data - 2

4.1	Total Number of Heavy Vehicles	20,810	19,972	40,782
4.2	Estimated Average Number of axles per Truck	4.5	4.6	4.6
4.3	Estimated Truck Mass (Ton/Truck)	26.0	26.4	26.2
4.4	Estimated Average E80 / Truck	2.1	2.2	2.15
4.5	Estimated Daily E80 on the Road			531.0
4.6	Estimated Daily E80 in the East Direction			812.0
4.7	Estimated Daily E80 in the West Direction			779.0
4.8	Estimated Daily E80 in the Worst East Lane			812.0
4.9	Estimated Daily E80 in the Worst West Lane			779.0
5.1	ASSUMPTION on Axles/Truck (Short:Medium:Long)			(2.0 : 5.0 : 7.0)
5.2	ASSUMPTION on Mass/Truck (Short:Medium:Long)			(10.9 : 31.5 : 39.8)
5.3	ASSUMPTION on E80s/Truck (Short:Medium:Long)			(0.5 : 2.1 : 3.9)

Traffic Volumes		Date and Time	Total
6.1	Highest Volume on the Road (vehs/hr)	13 May 2020 (17:00 - 18:00)	218
6.2	Highest Volume in the East (vehs/hr)	05 Jun 2020 (17:00 - 18:00)	123
6.3	Highest Volume in the West (vehs/hr)	05 Jun 2020 (16:00 - 17:00)	129
6.4	Highest Volume in a Lane (vehs/hr)	05 Jun 2020 (16:00 - 17:00)	129
6.5	15th Highest Volume on the Road (vehs/hr)	26 May 2020 (17:00 - 18:00)	207
6.6	15th Highest Volume in the East Direction (vehs/hr)	03 Jun 2020 (16:00 - 17:00)	105
6.7	15th Highest Volume in the West Direction (vehs/hr)	04 Jun 2020 (16:00 - 17:00)	108
6.8	30th Highest Volume on the Road (vehs/hr)	03 Mar 2020 (14:00 - 15:00)	197
6.9	30th Highest Volume in the East Direction (vehs/hr)	10 Jun 2020 (08:00 - 09:00)	102
6.10	30th Highest Volume in the West Direction (vehs/hr)	01 Jun 2020 (17:00 - 18:00)	101

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Station Data - 3

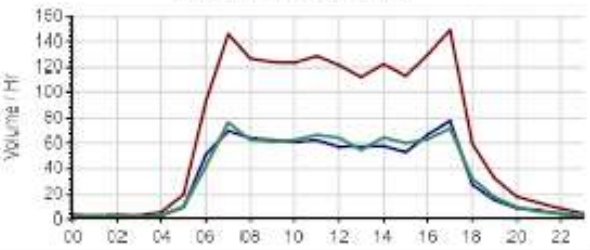
Station Typical Flow Graphs

Site	8211 - R336 Sunland
Region	South
Actual Period	01 Jan 2020 - 23 Jun 2020
Classification	RSA Ext Lgt/Hvy
Day Type	Normal Day & Fixed Public Holiday+

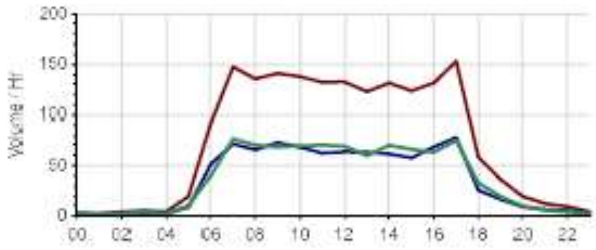
Total
To Kirkwood
To R335 Addo

Total
Light
Heavy

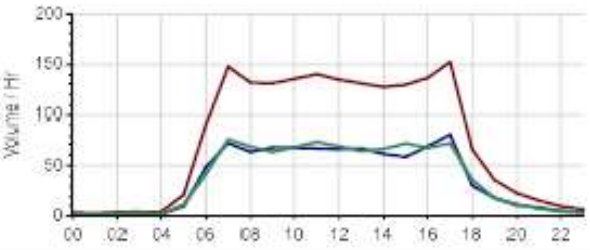
Typical Flow for a Monday



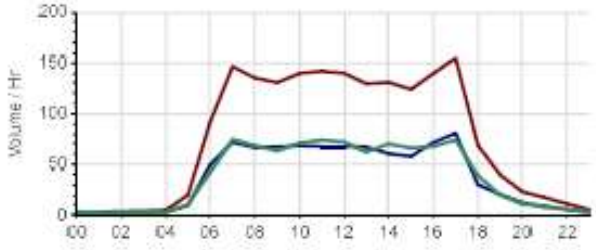
Typical Flow for a Tuesday



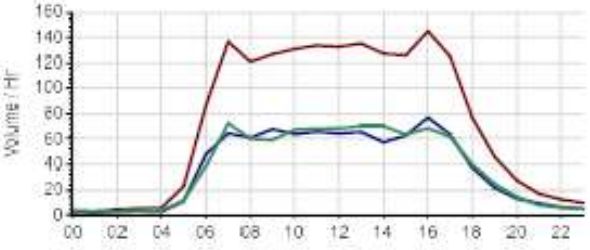
Typical Flow for a Wednesday



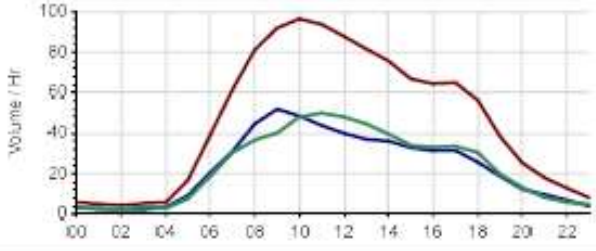
Typical Flow for a Thursday



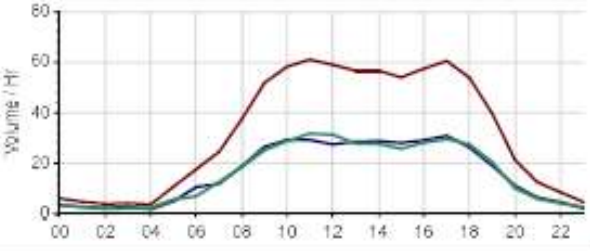
Typical Flow for a Friday



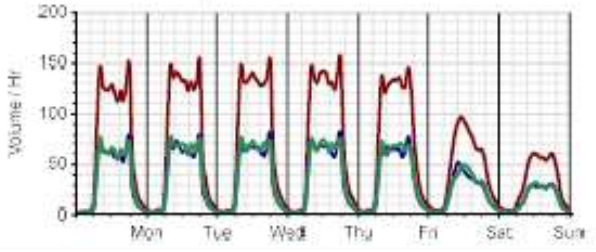
Typical Flow for a Saturday



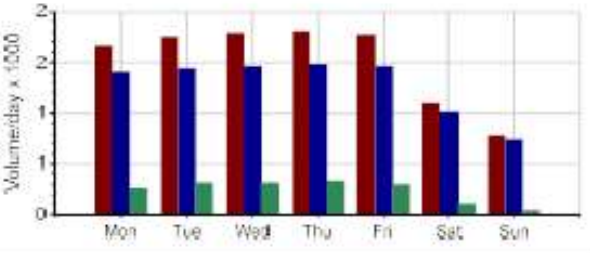
Typical Flow for a Sunday



Typical Flow for a Week



Typical Flow for a Week



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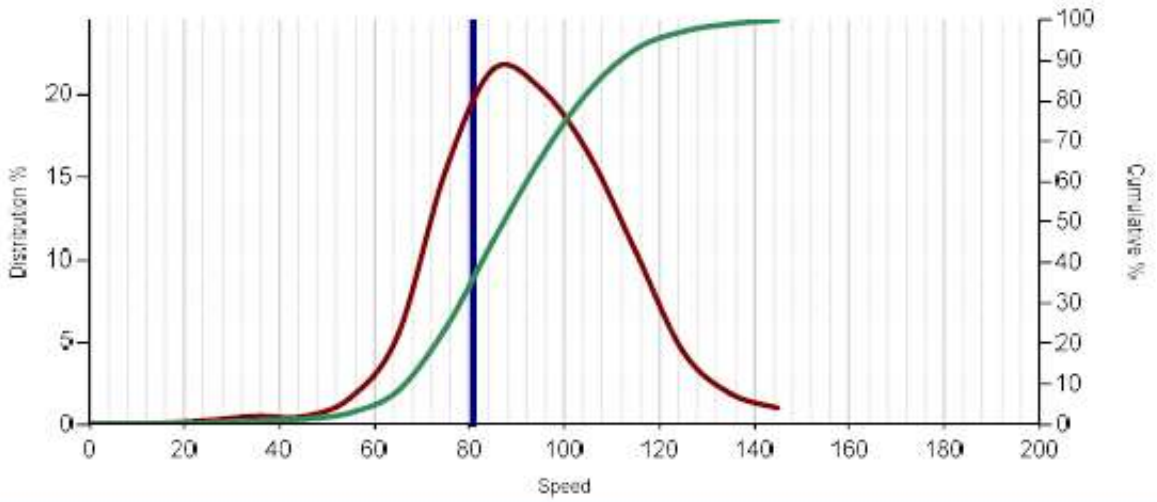
Station Data - 4

Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2020 - 31 Dec 2020

Distribution
Cumulative
Speed Limit

Lane 1 - To R335 Addo

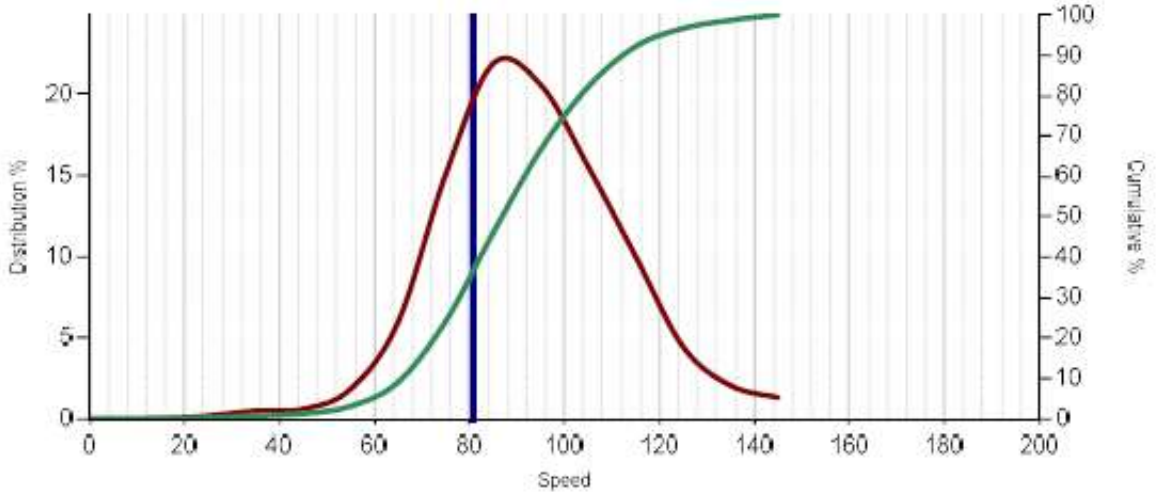


Station Speed Distribution

Site	8211 - R336 Sunland
Speed Limit	80 km/hr
Period	01 Jan 2020 - 31 Dec 2020

Distribution
Cumulative
Speed Limit

Lane 2 - To Kirkwood



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Station Data - 5

Chapter 12: Visual Impact Assessment

Scoping and Environmental Impact Assessment: Sontule Citrus – Agricultural Expansion on Remainder of Farm 632, Sunland, Sundays River Valley Municipality

Final EIA Report

October 2022

Prepared by:

Visual Specialist
Compiled by: Mr Graham Young PrLArch, FILASA
Graham A Young Landscape Architect
PO Box 331
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0027
+27 (0)82 462 1491

Public Process Consultants

SONTULE CITRUS

Visual Impact Assessment Report

April 2022

VISUAL IMPACT ASSESSMENT REPORT

PROPOSED AGRICULTURAL EXPANSION ON REMAINDER OF FARM 632, KNOWN AS SONTULE CITRUS, SUNLANDS, SUNDAYS RIVER VALLEY MUNICIPALITY

EASTERN CAPE

Submitted to:

Public Process Consultants
PO Box 27688, Greenacres, 6057
Tel: +27 041 374 8426

Prepared by:

GYLA

Graham A Young **Landscape Architect**

PO Box 331

Groenkloof

0027

+27 (0)82 462 1491

Report Revision No:	*FINAL*
Date Issued:	23 June 2022
Prepared By:	Graham Young PrLArch, FILASA
Reviewed By:	Graham Young PrLArch, FILASA

Signed:

Reference: 084_2022: Sontule Citrus - VIA

EXPERTISE OF SPECIALIST

Name:	Graham A Young
Qualification:	BL (Toronto); ML (Pretoria)
Professional Registration:	South African Council for the Landscape Architectural Profession (SACLAP) Fellow Institute of Landscape Architects of South Africa (FILASA)
Experience in Years:	40 years
Experience	Graham is a landscape architect with forty years' experience. He has worked in Southern Africa and Canada and has valuable expertise in the practice of landscape architecture, urban design, and environmental planning. He is also a senior lecturer, teaching urban design and landscape architecture at post and undergraduate levels at the University of Pretoria. A speciality of his is Visual Impact Assessment, for which he was cited with an ILASA Merit Award in 1999. He has completed over 280 specialist reports for projects in South Africa, Canada and other African countries. He was on the panel that developed the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011, he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee (they manage a World Heritage Site) and the *Visual Impact Assessment Training Module Guideline Document.*

DECLARATION OF INDEPENDENCE

I, Graham Young, declare that –

- I am contracted as the Visual Impact Assessment Report for the Sontule Citrus and associated infrastructure project.
- I will perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act (Act 107 of 1998), 2014 Environmental Impact Assessment Regulations (as amended on 7 April 2017), and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, regulations, and all other applicable legislation.
- I will consider, to the extent possible, the matters listed in Regulation 13.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing – any decision to be taken concerning the application by the competent authority; and – the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 16 (1)(b)(iii).

Graham A. Young FILASA PrLArch Reg. No. 87001
BL (Toronto), ML (Pretoria)

23 June 2022

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PROTECTION OF PERSONAL INFORMATION ACT

In compliance with the Protection of Personal Information Act, No. 37067 of 26 November 2013, please ensure the following:

- Any personal information provided herein has been provided exclusively for use as part of the public participation registration process and may therefore not be used for any purpose other than that for which it was provided.
- No additional copies may be made of documents containing personal information unless permission has been obtained from the owner of said information.
- All documentation containing personal information must be destroyed as soon as the purpose for which the information was collected has run out.

Specialist Reporting Requirements According to Appendix 6 of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment Regulation 2014 (as amended on 7 April 2017)	
Requirement	**Relevant section in report**
Details of the specialist who prepared the report;	Page 12ii, Appendix E
The expertise of that person to compile a specialist report including a curriculum vitae;	Page 12ii, Appendix E
A declaration that the person is independent in a form as may be specified by the competent authority;	Page 12iii
An indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3 – 1.4
An indication of the quality and age of base data used for the specialist report;	N/A
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 12 and 13
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.5
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure;	Sections 8 and 9
An identification of any areas to be avoided, including buffers;	Section 11
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 5 and 6
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.5
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Sections 9 and 10
Any mitigation measures for inclusion in the EMPR;	Section 11
Any conditions for inclusion in the environmental authorisation;	Sections 11 and 14
Any monitoring requirements for inclusion in the EMPR or environmental authorisation;	N/A

A reasoned opinion whether the proposed activity, activities or portions thereof should be authorised regarding the acceptability of the proposed activity or activities;	Section 14
If the opinion is that the proposed activity, or activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPR, and where applicable, the closure plan;	Section 11
A description of any consultation process that was undertaken during carrying out the study;	N/A PPC (EAP) are busy with this process
A summary and copies if any of comments that were received during any consultation process;	N/A
Any other information requested by the competent authority.	N/A

Acronyms & Abbreviations	
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
GYLA	Graham A Young Landscape Architect
NEMA	National Environmental Management Act
PPC	Public Process Consultants
SACLAP	South African Council for the Landscape Architectural Profession
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay, 1993). Thus, aesthetic value encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (After New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision making. Instead a project, by its visibility, must clearly interfere with or reduce (i.e. visual impact) the public's enjoyment and/or appreciation of the appearance of a

	valued resource e.g. cooling tower blocking a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by development in conjunction with the other past, present, or reasonably foreseeable actions.
Landscape Character	The individual elements that make up the landscape including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings, and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced (Institute of Environmental Assessment & The Landscape Institute 1996).
Study area	For the purposes of this report the project study area refers to the proposed project footprint / project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the project site beyond which the visual impact of the most visible features will be reduced to low to insignificant), which is a 5,0km radius from the approximate centre of the proposed project site footprint.
Project Footprint / Site	For the purposes of this report the Project *site* / *footprint* refers to the actual layout of the project as described.
Sense of Place (*genius locus*)	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. *A genius locus literally means* 'spirit of the place.'
Sensitive Receptors	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	The two-dimensional spatial pattern created by an analysis that defines areas, which contain all possible observation sites from which an object would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and

	surrounding land uses.
Visual absorption capacity	Visual absorption capacity is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. The landscape's ability to absorb change ranges from low-capacity areas, in which the location of an activity is likely to cause visual change in the character of the area, to high-capacity areas, in which the visual impact of development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally to ensure the most severe potential effect is assessed.
Zone of Potential Visual Influence	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance.

OVERVIEW AND BACKGROUND

Public Process Consultants commissioned Graham A Young Landscape Architect (GYLA), to conduct a visual impact assessment (VIA) for the proposed Sontule Citrus project near Addo, Sundays River Valley Municipality, Eastern Cape Province ("the Project"). This report forms part of a Full Scoping and Environmental Impact Assessment (EIA) process, that is being undertaken for the Project. The project applicant, Sun Orange Farms (Pty) Ltd, proposes to expand citrus production at their existing operations on Remainder of Farm 632 (referred to as Sontule) in the Sundays River Valley Municipality (SRVM). The VIA focuses on the potentially intrusive nature of physical aspects of the proposed Project (form, scale, bulk and sense of space) within its local context.

PROJECT SITE AND STUDY AREA

The farm Sontule is located approximately 11km south-east of Kirkwood and approximately 12km west of Addo. The farm can be directly accessed off the tarred R336 (Kirkwood/ Addo Road), which is adjacent to the northern boundary of the farm. The nearest boundary of the Addo Elephant National Park is located more than 11km east of the farm, and therefore, project activities proposed to take place on this property do not trigger listed activities which would require the assessment of impacts on the National Park. The study area comprises a visual envelope of 5,0km around the site[1].

AIM OF THE STUDY

The aim of the study is to determine the impact of the proposed project on the visual/aesthetic character of the landscape, and ensure that the consequences of the proposed Project are understood and adequately considered in the Environmental Impact Assessment (EIA) process in line with Appendix 6 of the EIA Regulations 2014 (as amended).

TERMS OF REFERENCE

A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference were established:

- Undertake a site visit
- Describe the aesthetic value and visual context of the receiving environment (value of visual resource).
- Determine the zone of potential influence
- Determine any legislative requirements, if any
- Create digital surface models of project components (i.e., Shade cloth) in the landscape
- Undertake a view shed analysis of the area, including
- Identify potential direct and indirect impacts on the visual environment and sense of place within the study area.
- Assess the significance of the impacts.
- Assess the potential loss of scenic value of the landscape and impact on key views.

[1] The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 5,0km around the Project sites. At 5,0km and beyond the development would recede into background views and or be screened by topography, vegetation or existing or proposed (approved) power infrastructure.

- Assess cumulative impacts of the study area as well subregion (SRVM)
- Provide appropriate mitigation and management measures to impacts identified

ASSUMPTION, UNCERTAINTIES, AND LIMITATIONS

The following assumptions and limitations have been made in the study:

- The extent of the study area is determined by the zone of potential influence, which in this study, relates to a radius of 5,0km around the centre of the Project site.
- The description of project components is limited to what has been supplied to the author prior to the date of completion of this report.
- The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. To be more accurate at predicting absolute visibility, the analysis would require "a 3D model of a tree/plant and a layer indicating the spatial distribution and density of vegetation on the landscape" (Llobera 2007:799) and buffering all existing buildings, structures and infrastructure. The possibility of indicating both the spatial and density distribution of tree/plants, and the three-dimensional model representing vegetation and all structures, is currently not available to the author. Therefore, on-site observations were critical and indicated that many views of the project site would be screened by existing vegetation.
- Site photos taken in the summer (07 and 08 March 2022) do not necessarily reflect the complete landscape character of the area as experienced through all seasons. At the time of the site visit, the weather was partly cloudy, with moderate haze conditions on the first day and rain on the second day.

FINDINGS

Baseline

The existing visual condition of the landscape that may be affected by the proposed Project has been described in Sections 7 and 8 below. The study area is dominated by two main landscape character types, Sundays Thicket on an undulating plain and Citrus Orchards. The visual integrity of the orchards landscape type and the study area in general is being visually impacted by the shade cloth structures, which contrast with the existing dark green and brown hues of the environment.

The study area's scenic quality is of a mixed character rated *low* (orchards with shade cloth) to *high* (Sundays Thicket on undulating plains). The site, which straddles three of the four landscape character types identified, is also of mixed visual character and is potentially sensitive to change if the change is not effectively managed. Sensitive viewing areas and receptors have been identified and mapped, indicating sensitivity to the project.

Visual Impact

Visual impacts are highest when receptors are sensitive to change, and their view is focused on and dominated by the change. The Project's visual impact will cause changes in the landscape that are noticeable to receptors living in and visiting residences, tourist areas, and public roads to the south, north and east of the project site. It has been established that the most sensitive receptors are residents as well as visitors of the property

immediately to the south of the site. Tourism (hunting and a small guest lodge) and sporting (long-range target shooting) activities occur here. However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project.

The significance of the worst-case scenario impact on the various sensitive receptor areas during the CONSTRUCTION PHASE is a direct negative impact that is partially reversible (should the project not proceed to the Operational Phase). The impact is predicted to be Medium Negative (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment continues to function but in a modified manner. It will have an influence on decision-making if not mitigated. The impact can be reduced with the implementation of the appropriate mitigation measures, but the significance of the impact is likely to remain Medium (-).

During the OPERATIONAL PHASE, a direct, partially reversible (should the shade cloth structures be removed) negative impact is predicted. The long-term impact is assessed as Medium Negative (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment continues to function but in a modified manner. The impact would remain Medium (-) even with the effective implementation of mitigation measures, and it should influence decision-making.

Cumulative Effect

The separate effects of the Project have been rated of Medium Negative (-) significance. When taken together with the negative impacts of existing citrus orchards under shade cloth, which occur across the study area and the sub-region, the negative cumulative effect would remain Medium Negative (-). However, the proposed Sontule project would not appear uncharacteristic when set against the visual attributes of the site's immediate surroundings and the dominant land use of the sub-region.

AUTHOR'S OPINION

The author's opinion is that all aspects of the Sontule Citrus Project, from a potential visual impact perspective, should be approved, provided that the mitigation/management measures are effectively implemented, managed, and monitored in the long term.

*** GYLA ***

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1. INTRODUCTION

1.1 Project Overview and Background

Public Process Consultants commissioned Graham A Young Landscape Architect (GYLA), to conduct a visual impact assessment (VIA) for the proposed Sontule Citrus project near Addo, Sundays River Valley Municipality, Eastern Cape Province ("the Project"). This report forms part of a Full Scoping and Environmental Impact Assessment (EIA) process, that is being undertaken for the Project. The project applicant, Sun Orange Farms (Pty) Ltd, proposes to expand citrus production at their existing operations on Remainder of Farm 632 (referred to as Sontule) in the Sundays River Valley Municipality (SRVM) (see Figure 1 below). The VIA focuses on the potentially intrusive nature of physical aspects of the proposed Project (form, scale, bulk and sense of space) within its local context.

1.2 Project Site and Proposed Study area

The farm Sontule is located approximately 11km south-east of Kirkwood and approximately 12km west of Addo. The farm can be directly accessed off the tarred R336 (Kirkwood/ Addo Road), which is adjacent to the farm's northern boundary. The nearest boundary of the Addo Elephant National Park is located more than 11km east of the farm, and therefore, project activities proposed to take place on this property do not trigger listed activities which would require the assessment of impacts on the National Park. The study area comprises a visual envelope of 5,0km around the site[2]. The locality map (Figure 1) below provides an overview of the location of the proposed Project and the study area.

1.3 The objective of the Specialist Study

The aim of the study is to determine the impact of the proposed project on the visual/aesthetic character of the landscape, and ensure that the consequences of the proposed Project are understood and adequately considered in the Environmental Impact Assessment (EIA) process in line with Appendix 6 of the EIA Regulations 2014 (as amended).

1.4 Terms of Reference

A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference were established:

- Review any relevant legislation, policies, guidelines and standards
- Conduct a site visit accompanied by a photographic survey of the site
- Describe the aesthetic value and visual context of the receiving environment (value of visual resource).
- Determine the zone of potential influence for the project
- Create digital surface models of project components (i.e., Shade cloth) in the landscape
- Determine visual exposure viewpoints
- Undertake a view shed analysis of the area – establish inherent visual sensitivity in terms of slope, landforms, vegetation, special features and land use. Identify potential direct and indirect

[2] The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 5,0km around the Project sites. At 5,0km and beyond the development would recede into background views and or be screened by topography, vegetation or existing or proposed (approved) power infrastructure.

impacts on the visual environment and sense of place within the study area. Assess the significance of the impacts against visual criteria (i.e., visibility, sensitive receptors, and visual absorption).

- Assess the potential loss of scenic value of the landscape and impact on key views.
- Assess cumulative impacts of the study area as well as the subregion (SRVM)
- Provide appropriate mitigation and management measures to impacts identified.

1.5 Assumption, Uncertainties and Limitations

The following assumptions and limitations have been made in the study:

- The extent of the study area is determined by the zone of potential influence, which in this study, relates to a radius of 5,0km around the centre of the Project site.
- The description of project components is limited to what has been supplied to the author prior to the date of completion of this report.
- The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. We have interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. To be more accurate at predicting absolute visibility, the analysis would require “a 3D model of a tree/plant and a layer indicating the spatial distribution and density of vegetation on the landscape” (Llobera 2007:799) and buffering all existing buildings, structures and infrastructure. The possibility of indicating both the spatial and density distribution of tree/plants, and the three-dimensional model representing vegetation and all structures, is currently not available to the author. Therefore, on-site observations are critical.
- Site photos taken in the summer (07 and 08 March 2022) do not necessarily reflect the complete landscape character of the area as experienced through all seasons. At the time of the site visit, the weather was partly cloudy, with moderate haze conditions on the first day and rain on the second day.

Figure 01: LOCALITY - Sontule Citrus

2. LEGAL REQUIREMENTS AND GUIDELINES

This report adheres to the following legal requirements and guideline documents.

2.1 National Legislation and Guidelines

National Environmental Management Act (Act 107 of 1998), EIA Regulations (2014), as amended

The specialist report is prepared in accordance with the specification on conducting specialist studies as per Government Gazette (GN) R 982 (as amended) of the National Environmental Management Act (NEMA) Act 107 of 1998. The mitigation measures as stipulated in the specialist report must be used as part of the Environmental Management Programme Report (EMPr) in line with Appendix 6 of the EIA Regulations 2014 (as amended).

Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)

Although the guidelines were specifically compiled for the Province of the Western Cape, they provide guidance that is deemed appropriate for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should become involved in the EIA process.[3]

2.2 Addo Elephant National Park – Park Management Plan 2015 – 2025 (AENP)

"The primary objective of a park zoning plan is to establish a coherent spatial framework in and around a park to guide and co-ordinate conservation, tourism and visitor experience initiatives and activities. A zoning plan plays a key role in minimising conflicts between different users of a park by separating potentially conflicting activities – such as game viewing and day-visitor picnic areas – whilst ensuring that activities which do not conflict with the park's values and objectives (especially the conservation of the protected area's natural systems and its biodiversity) can continue sustainably in appropriate areas.

The zoning of the park was based on an analysis and mapping of the sensitivity and value of a park's biophysical, heritage and scenic resources; an assessment of the regional context; an assessment of the park's current and planned infrastructure and tourist products; and an assessment of the expansion plan for the park and its implication for use zoning – all interpreted in the context of corporate values and park objectives" (SANParks 2015:39).

The site falls within the Addo Elephant National Park 'Buffer Zone' – Viewshed Protection Areas (refer to Figure 1-1). "These are areas where development is likely to impact the aesthetic quality of the visitor's experience in a park. Within these areas, any development proposals should be carefully screened to ensure that they do not excessively impact the Park's aesthetics. The areas identified are only broadly indicative of sensitive areas, as, at a fine scale, many areas within this zone would be perfectly suited for development. In addition, major projects with large scale regional impacts may have to be considered even if they are outside the viewshed

[3] The Western Cape Guidelines are the only official guidelines for visual impact assessment reports in South Africa and can be regarded as best practice throughout the country.

protection zone" (SANParks 2015:41). However, it should be noted that the proposed agricultural development footprint is approximately 11km west of the nearest boundary of the AENP.

Given that land use in the sub-region is dominated by citrus and other agricultural activities, Project activities would not be considered uncharacteristic within this context. Also, at approximately 16km from the nearest tourist road in the park, the Project is not anticipated to be visible. It should also be noted that the buffer zones with the AENP Management Plan have not yet been gazetted in terms of the National Environmental Management Protected Areas Act, Strategy on Buffer Zones for National Parks.[4] Therefore, it is the opinion of the author that the proposed development will not have a significant impact on the AENP Viewshed Protection Areas.

[4] Public Process Consultants. Chapter 3 Final Amendment Report: Intsomi Citrus. Unpublished Report July 2021.

Map 6: Buffer zone

SANParks. 2015. *Addo Elephant National Park: Management Plan for the period 2015 - 2025. SANParks. Pretoria. pp162*

Figure 01-1: ADDO ELEPHANT NATIONAL PARK: BUFFER ZONES - Sontule Citrus

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3. APPROACH AND METHODOLOGY

3.1 Approach

The assessment of likely effects on a landscape resource and on visual amenity is complex since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impacts, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures.

The landscape, its analysis, and the assessment of impacts on the landscape all contribute to the baseline for visual impact assessment studies. The assessment of the potential impact on the landscape is conducted as an impact on an environmental resource, i.e. the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on the viewers and the impact of an introduced object into a view or scene.

3.1.1 The Visual Resource

Landscape character, landscape quality (Warnock & Brown 1998) and “sense of place” (Lynch 1992) are used to evaluate the visual resource, i.e. the receiving environment. A qualitative evaluation of the landscape is essentially a subjective matter. In this study, the aesthetic evaluation of the study area is determined by the professional opinion of the author based on on-site observations and the results of contemporary research in perceptual psychology.

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response is usually to both visual and non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay 1993). Thus, aesthetic value is more than the combined factors of the seen view, visual quality, or scenery. It includes atmosphere, landscape character and sense of place (Schapper 1993).

Studies for perceptual psychology have shown a human preference for landscapes with higher visual complexity, for instance, scenes with water or topographic interest. Based on contemporary research, landscape quality increases where:

- Topographic ruggedness and relative relief increase.
- Water forms are present.
- Diverse patterns of grassland and trees occur.
- Natural landscape increases, and man-made landscape decreases.
- Where land use compatibility increases (Crawford 1994).

Aesthetic appeal (value) is therefore considered high when the following are present (Ramsay 1993):

- Abstract qualities: such as the presence of vivid, distinguished, uncommon or rare features or abstract attributes.
- Evocative responses: the ability of the landscape to evoke particularly strong responses in community members or visitors.

- Meanings: the existence of a long-standing special meaning to a group of people or the ability of the landscape to convey special meanings to viewers in general.
- Landmark quality: a feature that stands out and is recognized by the broader community.

And conversely, it would be low where:

- Limited patterns of grasslands and trees occur.
- Natural landscape decreases, and man-made landscape increases.
- And where land use compatibility decreases (Crawford 1994).

In determining the quality of the visual resource for the Sontule Project site, both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to provide a keen sense of place, regardless of whether they are scenically beautiful. However, where landscape quality, aesthetic value and a powerful sense of place coincide, the visual resource or perceived value of the landscape is high.

3.1.2 Sensitivity of Visual Resource

The sensitivity of a landscape or visual resource is the degree to which a landscape type or area can accommodate change arising from development without detrimental effects on its character. Its determination is based upon an evaluation of each key element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors as its “quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted” (LI-IEMA 2013).

3.1.3 Sense of Place

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historical use and habitation of the area. According to Lynch (1992), sense of place is the extent to which a person can recognize or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own. Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, the values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and, therefore, keen sense of place.

The study area’s sense of place is derived from the emotional, aesthetic, and visual response to the environment, and therefore it cannot be experienced in isolation. The landscape context must be considered. The combination of the natural landscape together with the man-made structures (urban areas, roads, utilities etc.) contribute to the sense of place in the study area. It is this combination that defines the study area, and which establishes its visual and aesthetic identity.

3.1.4 Sensitive Viewer Locations

The sensitivity of visual receptors and views are dependent on the location and context of the viewpoint, the expectations and occupation or activity of the receptor or the importance of the view, which may be determined with respect to its popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art. Typically, sensitive

receptors may include:

- Users of all outdoor recreational facilities, including public rights of way, whose intention or interest may be focused on the landscape.
- Communities where development results in negative changes in the landscape setting or valued views enjoyed by the community.
- Occupiers of residential properties whose views are negatively affected by the development.

Views from residences and tourist facilities/routes are typically the most sensitive since they are frequent and of long duration.

Other less sensitive receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value).
- People traveling through or past the affected landscape in cars or other transport modes.
- People at their place of work.

For a detailed description of the methodology to determine the value of a visual resource, refer to Appendix A. Image 1 below graphically illustrates the visual impact process used to determine the significance of the visual impact of the Project.

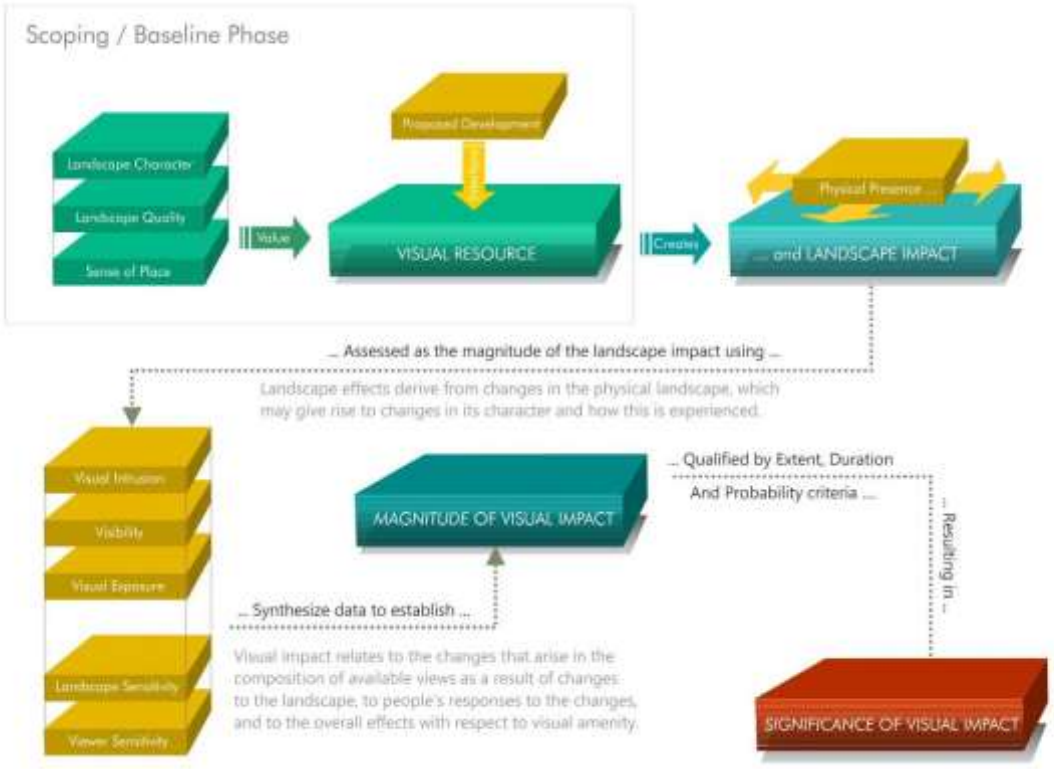

Image 1: Visual Impact Process

3.2 Methodology

The following method was used:

- Site visit: A field survey was undertaken on 07 and 08 March 2022 when the study area was scrutinized to the extent that the receiving environment could be documented and adequately described.
- Project components: The physical characteristics of the project components were described and illustrated based on information supplied by PPC.
- The landscape character of the study area was described. The description of the landscape focused on the nature and character of the landscape rather than the response of a viewer.
- Viewpoints were chosen based on the following criteria:
    - High visibility – sites from where the proposed development will be most visible
    - High visual exposure – view at various distances from the project
    - Sensitive areas and viewpoints (i.e., adjacent game farms)
- The quality of the landscape was described using recognized contemporary research in perceptual psychology as the basis.
- The sense of place of the study area was described as the uniqueness and distinctiveness of the landscape.
- Visibility and project components were modelled, and the anticipated impacts were rated based on criteria aligned with national best practices.

4. DESCRIPTION OF THE PROJECT

The project proponent, Sun Orange Farms (Pty) Ltd, proposes to expand citrus production at their existing operations on the Remainder of Farm 632, Sundays River Valley Municipality (SRVM), which measures approximately 459ha. To supply the proposed development with the required irrigation water, an irrigation dam is proposed to be constructed with a capacity to store approximately 49 000m^3 (3.18ha footprint) supplied from the Lower Sundays River Water User Association (LSRWUA) canal system. The farm is currently zoned Agriculture. Figure 2 below illustrates the proposed layout of the development.

To accommodate the proposed citrus orchard expansion, the total area to be cleared is currently proposed at ~147ha, including associated infrastructure (dam, internal roads, irrigation pipes). This area will, however, be confirmed after specialist and technical input, authority consultation, as well as consultation with I&APs. Irrigation water for the development is to be supplied from a new dam to be constructed on-site. Water will be pumped to this dam from an existing dam on site via a 315mm uPVC pipe. The existing dam is currently supplied with water from the LSRWUA canal system. The new dam proposed to be constructed on Sontule is anticipated to have a storage capacity of ~49 000m³ and a footprint of ~3.18ha.

It is further anticipated that the proposed development will entail the following activities on the site:

- Vegetation clearing
- Levelling and landscaping the site to provide runoff control and stormwater management
- Establishment of unpaved internal roads to provide internal access within the orchards
- Construction of a new dam
- Installation of irrigation infrastructure
- Planting orchards and windbreaks (if required)
- Erecting shade cloth over the orchards.

Once the necessary infrastructure has been established, the area will be used for the establishment of a variety of citrus. No additional logistical services area will be needed as the farm is currently a working citrus farm, and existing infrastructure will be used to provide technical and logistical support to the proposed expanded farming operation.

5. PROJECT ALTERNATIVES

The following alternatives have been identified:

- No-go alternative
- Layout/ footprint alternatives
- Alternatives as identified by I&APs

Reasonable and feasible alternatives as raised by I&APs, specialists and the technical team will be considered in the assessment process. However, at the time of drafting this report, the results of the I&AP process are not known. The no-go alternative will have no associated visual impacts, and fine-tuning of the layout/footprint will not significantly impact visual characteristic, as Project activities would be seen within the same view (assuming similar farm areas are developed). As described in Section 4 and illustrated in Figure 2 below, the draft proposed alternative is, therefore, an alternative that is assessed in this report and equates to the worst-case scenario.

Figure 02: LAYOUT AND FARM PORTIONS- SONTULE CITRUS

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Landscape Architect

6. VISUAL ISSUES and PUBLIC CONCERN

Typical visual issues associated with agricultural projects and shade cloth:

- Who will be able to see the new development?
- What will it look like, and will it contrast with the receiving environment?
- Will the development affect sensitive views in the area, and if so, how?
- What will be the impact of the development during the day and at night?
- What will the cumulative impact be?

The public participation process is being conducted by PPC. At the time of writing, the results were not known; however, it is anticipated that visual issues may be of concern to the public.

During the initial public participation conducted during the environmental assessment process, an adjacent landowner raised the following specific issue relating to visual and sense of place impacts:
Existing shade cloth structures on Sontule are an eyesore and have negatively impacted on his property because he has international hunters who visit his farm.
It has become common practise in the Sundays River Valley for farmers to erect shade cloth over citrus orchards. As a result, large sections of the region have now been covered in shade cloth. The issue pertaining to the potential visual impact caused by the erection of shade cloth as part of this proposed development on Sontule as well as the cumulative impact thereof for the subregion will be addressed in the report.

7. THE ENVIRONMENTAL SETTING

7.1 General Landscape Character

The study area can be divided into two main areas along a northwest to a southeast axis (Figure 5). The southern sector comprises mostly natural veld, and the northern areas are made up of agricultural lands planted primarily with citrus. The Sontule property is at the interface of these two general areas. The property's northern boundary coincides with a low ridgeline immediately south of the R336. It rises to approximately 60m above the R336 at the western end of the property and 18m above the road at the north-eastern corner of the property. The land south of this ridge flattens somewhat into an undulating plain which is where the citrus orchards and associated infrastructure are proposed. Two drainage lines cross the plain as they generally drain to the north and ultimately into the Sundays River. The plain slopes away from the ridge line and the project site to the south, resulting in an approximately 100m rise to the southern extremes of the study area.

Photographic panoramas are presented in Figures 4-1 to 4-4, which illustrate the nature and character of the study area's landscape. Figure 3 below shows the location of the viewing points of the panoramas, and Figure 5 illustrates the spatial distribution of the various landscape types discussed below and their related scenic quality and potential sensitivity to change.

7.2 Sundays River Valley with Albany Alluvial Thicket Vegetation

The Sundays River and its feeder streams cross the study area from west to east to the north of the R336. The riverine thicket tends to occur in the narrow floodplain zones of the river and is not as prominent as existing citrus orchards which have been planted up to the edge of the valley. Nevertheless, the topography, thicket vegetation, and the water give this landscape type the highest scenic quality rating within the study area. It is a vital landscape type and is sensitive to unmitigated change.

7.3 Sundays Thicket on undulating plains

Sundays Thicket on undulating plains occurs primarily in the southern section of the study area with a few patches north of the Sundays River amongst the citrus plantations. It also occurs on the undeveloped portions of the Project site. Across the study area, the density/openness and height of the thicket vary dependent on previous activities on the land (e.g. grazing). It is within this landscape type, south of the Project site, that hunting activities take place, and a guest lodge is located approximately 3km south of Sontule's southern boundary. This landscape type is potentially sensitive to unmitigated change.

7.4 Citrus Orchards

This landscape character type dominates the northern sector of the study area, mainly north of the R336, but also occurs east and west of the Project site, south of the R336. Citrus orchards have also been established in the centre and eastern portion of the farm Sontule. Its moderate scenic value is derived from its positive appearance and cultural value associated with the region.

7.5 Citrus Orchards with Shade Cloth

Shade cloth covering citrus orchards is a practice that has becoming increasingly utilised over the past five or so years. Typically, it comprises of a white 'roof' with green side sheets. This practice occurs across the country where citrus is being planted, presumably for its agronomical benefits, specifically to control humidity in the orchards and to prevent wind damage, among other benefits. It is assumed that the white colour of the cloth has qualities conducive to creating better conditions (than an open orchard) for the sustained and healthy

growth of the fruits[5]. Unfortunately, from a visual perspective, the prevalence of shade cloth structures creates a situation where the white contrasts with and stands out amongst surrounding areas which are generally dark green. The effect is evident in View 3 Figure 4-1, Views 4 and 5 Figure 4-2 and View 12 Figure 4-4. For these aesthetic reasons, this landscape type is rated as having the lowest scenic value, within the context of the study area.

[5] As the author is not an agronomist, he stands to be corrected on these assumptions.

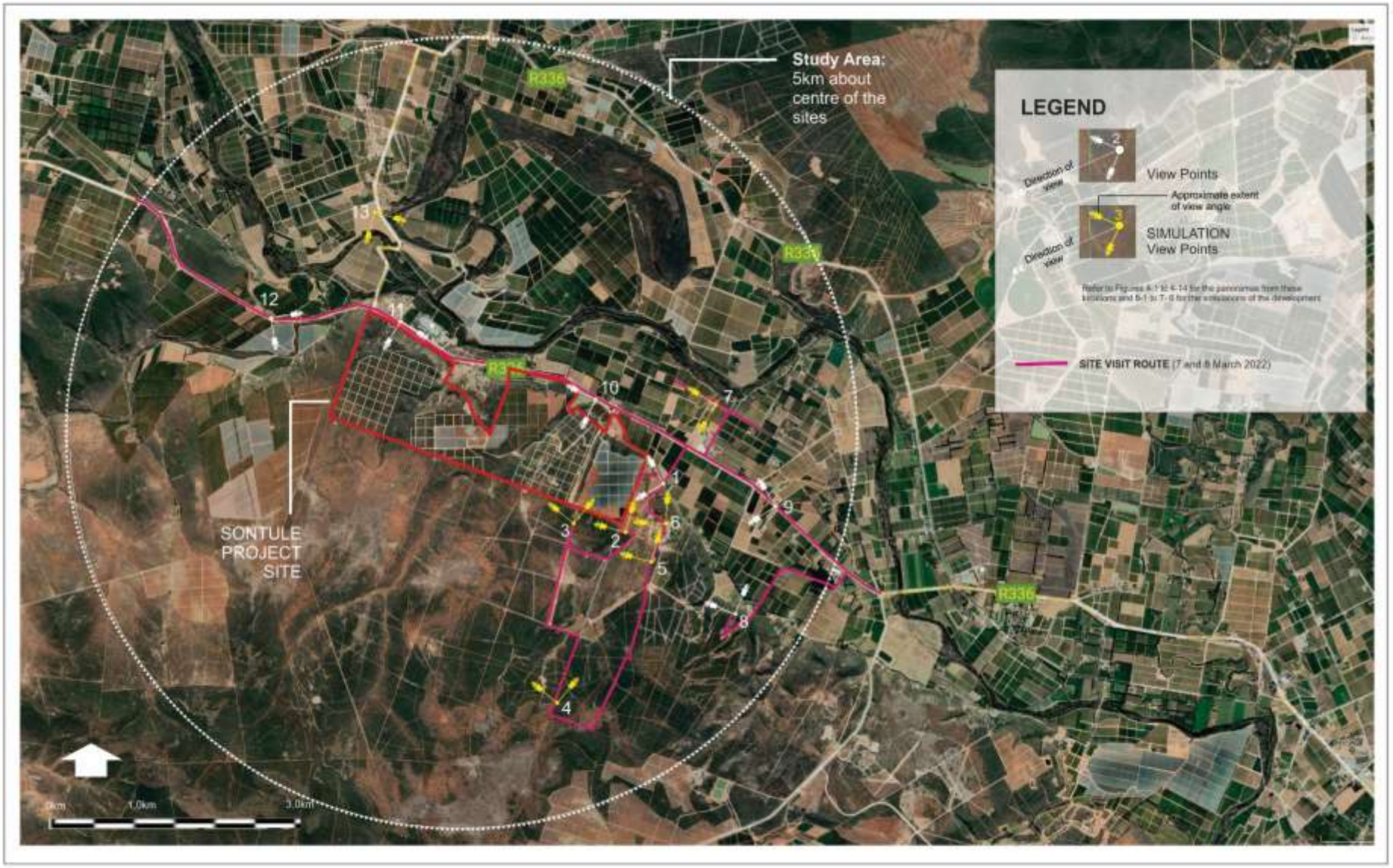

Figure 03: VIEW SITES - Sontule Citrus

Refer to Figures 4-1 to 4-4 for the panoramas and 8-1 to 8-6 for the simulations from these view points

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Figure 04-1: LANDSCAPE CHARACTER - Views 1, 2 and 3

Refer to Figure 3 for location of viewing points

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Figure 04-2: LANDSCAPE CHARACTER - Views 4, 5 and 6

Refer to Figure 3 for location of viewing points

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Figure 04-3: LANDSCAPE CHARACTER - Views 7, 8 and 9

Refer to Figure 3 for location of viewing points

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082 462 1401

Figure 04-4: LANDSCAPE CHARACTER - Views 10, 11 and 12

Refer to Figure 3 for location of viewing points

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8. VISUAL RESOURCE

8.1 Visual Resource Value / Scenic Quality

The scenic quality of the study area is primarily derived from the combination of landscape types described above and as illustrated in Figures 4-1 to 4-4 above and Figure 5 below. The landscape is dominated by the character types discussed above, i.e. Sundays Thicket on an undulating plain and Citrus Orchards. Two landscape character types that are smaller by area are the Sundays River Valley and associated side streams with Albany Alluvial vegetation, and citrus orchard under shade cloth. A summary of their visual resource values is tabulated in Table 1 below. The Project site occurs within the Sundays Thicket landscape type and is immediately adjacent to existing orchards, both open and under shade cloth (refer to Figure 5). Immediately north of the site are citrus orchards (mostly open), and immediately south of the site is the Sundays Thicket plain, which rises topographically to the south. Refer to Appendix A for the scenic quality rating criteria that have been used to determine the value of the visual resource as indicated in table 1.

Table 1: Value of the Visual Resource

(After The Landscape Institute with the Institute of Environmental Management and Assessment, 2002)

Moderate to High Sundays River Valley with Albany Alluvial vegetation	**Moderate** Sundays Thicket on undulating plains and citrus orchards	**Low to moderate** Citrus under shade cloth
This landscape type is considered to have a *high* value because it is a: A distinct landscape that exhibits a positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be of importance to conserve, and which has a powerful sense of place. ***Sensitivity:*** *It is sensitive to change in general and will be detrimentally affected if the change is not appropriately mitigated.*	**This landscape type is considered to have a *moderate* value because it is a:** A common landscape that exhibits some positive character, but which has evidence of alteration/ degradation/ erosion of features resulting in areas of more mixed character. ***Sensitivity****:* *It is potentially sensitive to change in general, and change may be detrimental if not appropriately mitigated.*	**This landscape type is considered to have a *low* value because it is a:** A minimal landscape generally negative in character with few, if any, valued features. ***Sensitivity:*** *It is not sensitive to change in general.*

8.2 Sense of Place

According to Lynch (1992), the sense of place is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, unique, or at least particular, character of its own. The sense of place for the study area derives from combining all landscape types and their impact on the senses. Its sense of place will change depending on the viewer's location relative to these landscape types.

The study area comprises two primary landscape character types, each with its own distinct sense of place.

As illustrated in Views 7, 8 and 9 in Figure 4-3 above, the citrus orchards are culturally relevant to the region and indicative of the dominant aesthetic nature of the broader Sundays River valley. The southern portion of the study area illustrated in Views 4 and 5, Figure 4-2, is typical of the natural thicket landscape that occurs across the sub-region. Although, most of these areas have, to a greater or lesser degree, been impacted. This is true of the areas within and south of the Project site, which exhibit positive characteristics but show evidence of degradation.

The study area's sense of place is mixed, indicating what currently occurs on the site - a combination of natural and cultural elements.

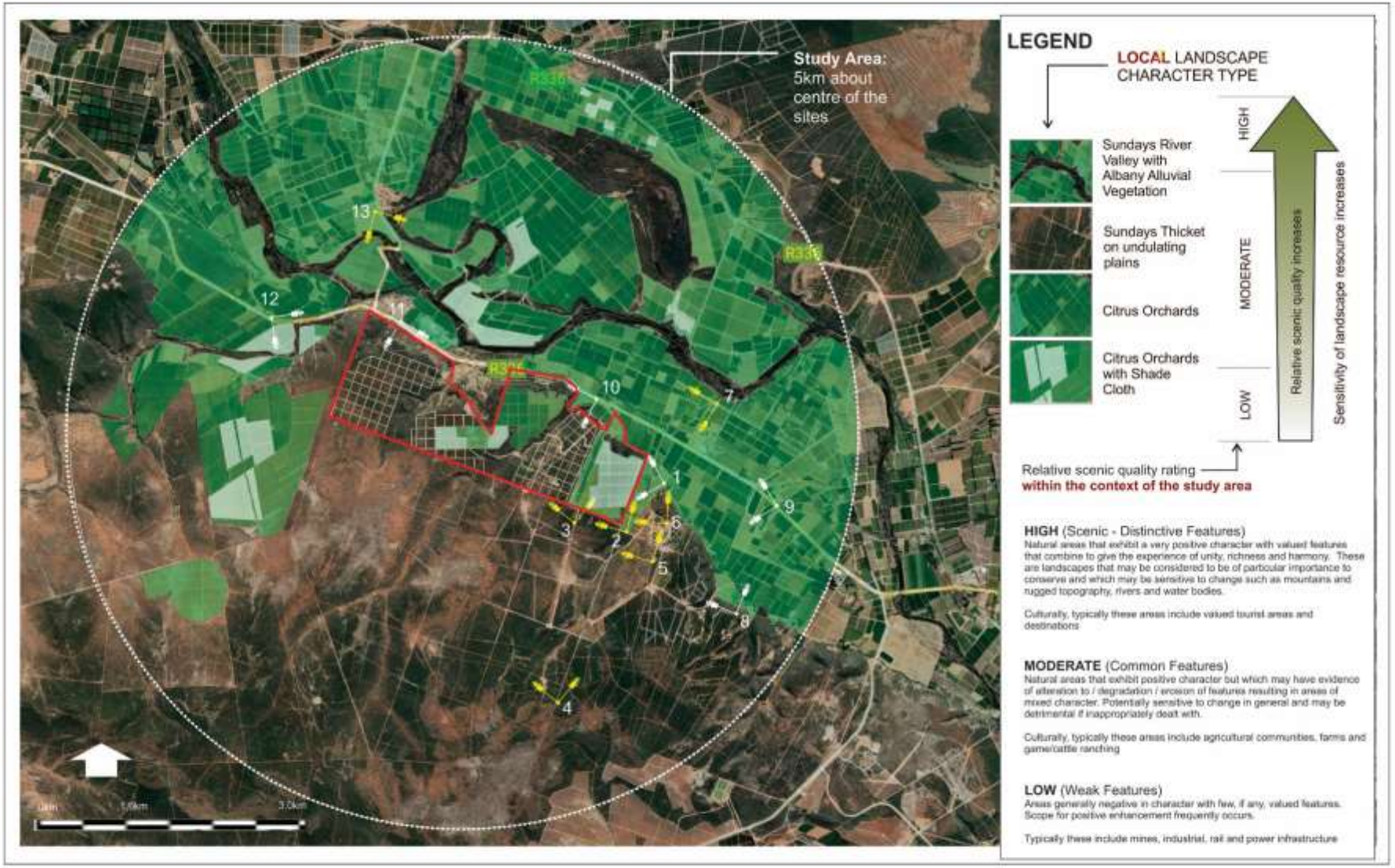

Figure 05: LANDSCAPE SENSITIVITIES - Sontule Citrus

Refer to Figures 4-1 to 4-4 for the panoramas and 8-1 to 8-6 for the simulations from these view points

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9. LANDSCAPE IMPACT

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention or development) of the Project is considered to be ***moderate*** and would be most prevalent during the construction phase. Activities associated with the establishment of the proposed citrus orchards will include:

- Vegetation clearing
- Levelling and landscaping the site to provide runoff control and stormwater management
- Establishment of unpaved internal roads to provide internal access within the orchards
- Construction of a new dam
- Installation of irrigation infrastructure
- Planting orchards and windbreaks (if required)
- Erecting shade cloth over the orchards.

The clearing of vegetation and levelling of the site and the building activities associated with the infrastructure will expose lighter-coloured soil during the construction period. These activities will contrast with the existing hues of the site and its immediate surroundings, resulting in a moderate change to the landscape characteristics of the Project site.

As stated in the approach section (Section 3 above), the physical change to the landscape at the Project site must be understood in terms of the Project's visibility and sensitivity (impact on sensitive viewers and viewing areas) and its effect on the visual aesthetics of the area (impact on the baseline visual resource). The following sections discuss the project's impact on the visual and aesthetic environment.

The worst-case scenario of the proposed development is that the entire area designated for citrus orchards will be covered with shade cloth. Therefore, the dominant feature would be the shade cloth structures (i.e., white top and green side sheets). The nature and brightness of these structures have generated concern for the visual impact that they potentially pose. The first inclination to reduce visual impact would be to change the colour of the shade cloth to a darker hue that would blend with existing baseline landscapes and reflect less light. However, this could negate the agronomic benefits that the white colour brings to the productive cultivation of citrus crops. Therefore, a limitation of this report is that further research is required to establish if the benefits from the white cloth can be achieved using a less intrusive colour. However, the worst-case scenario, being the structure with a white shade cloth roof and green sides, will be assessed in this report.

Visual impacts will be caused by activities and infrastructure in both Project phases, i.e., establishment (less than 1-year duration) and operational (long term – the impact will cease after the operational life of the activity). No decommissioning of the project is envisioned. Activities associated with the Project will be visible from varying distances around the site and to varying degrees. During both the establishment and operational phases, the Project's visibility will firstly be influenced by the construction activities described above (i.e., clearing) and ultimately by the physical presence of the citrus orchards under shade cloth.

The ***consequence/intensity*** of the visual impact is determined using visibility, visual intrusion, visual exposure, and viewer sensitivity criteria (moderate to high for this project). When the ***intensity*** of the impact is qualified with spatial, duration and probability criteria, the *significance* of the impact can be predicted (refer to Appendix C for PPC assessment methodology).

10.1 Sensitive Receptors

When visual intrusion, visibility and visual exposure are incorporated, and qualified by sensitivity criteria (visual receptors) the magnitude of the impact of the development can be determined.

The sensitivity of visual receptors and views will be depended on:

- The location and context of the viewpoint.
- The expectations and occupation or activity of the receptor.
- The importance of the view (which may be determined with respect to is popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).

The most sensitive receptors may include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape.
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.
- Occupiers of residential properties with views affected by the development.
- These would all be high.

Other receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value).
- People travelling through or past the affected landscape in cars, on trains or other transport routes.

- People at their place of work.

The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

In this process more weight is usually given to changes in the view or visual amenity which are greater in scale, and visible over a wide area. In assessing the effect on views, consideration should be given to the effectiveness of mitigation measures, particularly where planting is proposed for screening purposes (Institute of Environmental Assessment & The Landscape Institute (1996). Please refer to Appendix B for more information regarding the identification of sensitive receptors.

Based on the above as well as discussions with adjacent landowners, sensitive visual receptors within the study area have been identified (refer to Figures 6 and 7 below). Sensitive visual receptors include people living in or visiting farmsteads and tourist destinations in the study area. These are primarily in the study area's northern and eastern sections, as indicated in Figure 6. Other potential receptors, but less sensitive, include people travelling along the R336 and the local gravel roads that pass through the study area, linking farms and tourist facilities to the R336.

A number of known tourist facilities and accommodations occur along the Sundays River in the far eastern section of the study area north of the R336. Their views are, however, focused on the river and away from the Project site. In addition, a tourist lodge is located in the far northern section of the study area.

The most sensitive areas and receptors within the study area are located immediately south and southeast of the project site. These properties[6] are used for farming, tourism and sports activities. The tourism activities predominantly revolve around hunting, and the use of a long-range shooting facility on the farm. A small guest lodge is in the southern section of the property, approximately 3,2km from the nearest boundary of the Project site. Refer to Figure 6.

Table 2 below summarises potentially sensitive receptors and their locations. Visual sensitivities would arise from these areas/locations by people who would observe changes to the visual and aesthetic baseline of the study area.

Table 2: Potential Sensitivity of Visual Receptors

High	Moderate	Low

[6] The properties are owned by the adjacent landowner, Mr van der Westhuizen who has raised issues regarding the visual impact of the existing shade cloth erected over orchards on Sontule.

People visiting or living in homesteads to the north and east of the project site and within the foreground (up to 800m) and middle-ground of views (i.e. up to a 3.0km from the site). And people/tourists visiting the farms to the south and east of the site.	Locals, visitors and tourists travelling through the study area on the R336 and other local connector roads.	People living and working on farms, travelling along the local roads whose attention may be focused on their work or activity and who, therefore, may be potentially less susceptible to changes in the view.

As indicated above, the two main sensitive viewing areas of concern which have been identified within the study area (~5km radius), are:

- The R336, a local gravel road and surrounding farmsteads/ farms, located north of the Project site
- The adjacent properties south and east of the Project site.

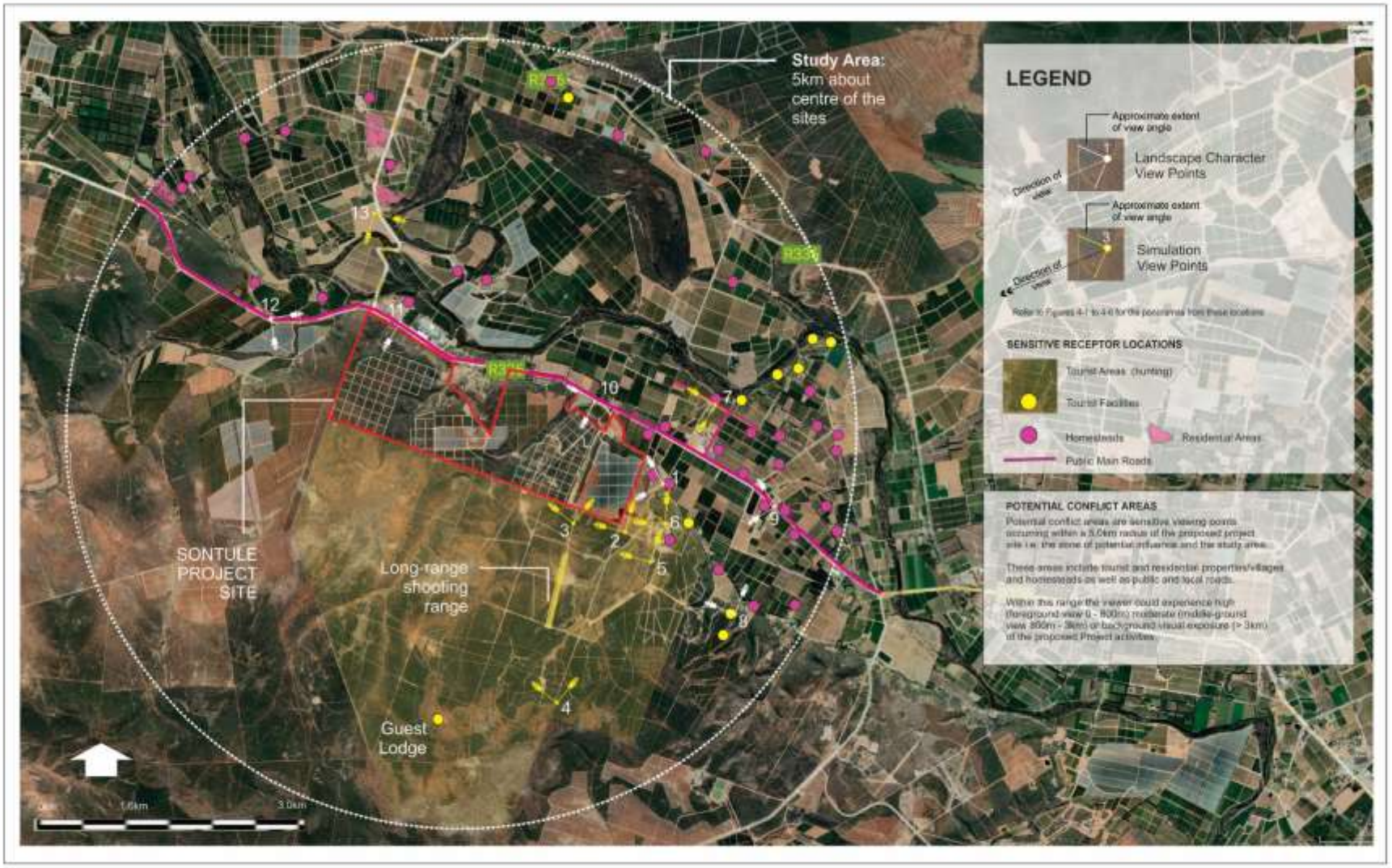

Figure 06: RECEPTOR SENSITIVITIES - Sontule Citrus

Refer to Figures 4-1 to 4-4 for the panoramas and 8-1 to 8-6 for the simulations from these view points

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10.2 Visibility

The 'zone of potential influence' for the Project was established to be a 5,0km radius around the centre of the Project site. Beyond this distance, the impact of the proposed project activities would diminish as they will recede into the background, and/or visibility would be reduced due to atmospheric conditions (haze on days when certain climatic conditions prevail, specifically inversions), topography and vegetative cover. In the form of a low ridge line, topographic relief effectively screens foreground views from the immediate north of the site and along sections of the R336, as indicated in Figure 7 below.

In determining the visibility of the Project, the proposed shade cloth infrastructure was modelled as illustrated in the viewshed analysis in Figure 7. The client has indicated that the shade cloth structure will be a maximum height of 6m, as is the industry standard. Therefore, a series of 6m high off-sets[7] across the development footprint were used to generate the viewshed analyses. The consolidated analysis is shown in Figure 7. This is a theoretical model as only contours were used to model potential visibility.

The screening effect of existing vegetation, citrus orchards, windbreaks and thicket, along with the low ridge line along the northern boundary of the site is relatively high across the study area. Although the viewshed indicates that large swathes of the study area, both north and south of the Project site, would be exposed to views of the development, the on-site observations indicate that many views of Project activities would be partly to completely blocked. This is shown in the simulations in Figures 8-5, 8-6 and 8-7 for views from east and north of the site. The areas south and east of the Project site would also experience partially screened views of the shade cloth structures, due to existing vegetation, orchards and topography. The simulations are in Figures 8-1, 8-3 and 8-4. At no point would all the shade cloth structures be experienced in one view.

[7] i.e. the analyses were generated using a variety of points at 6m above natural ground level.

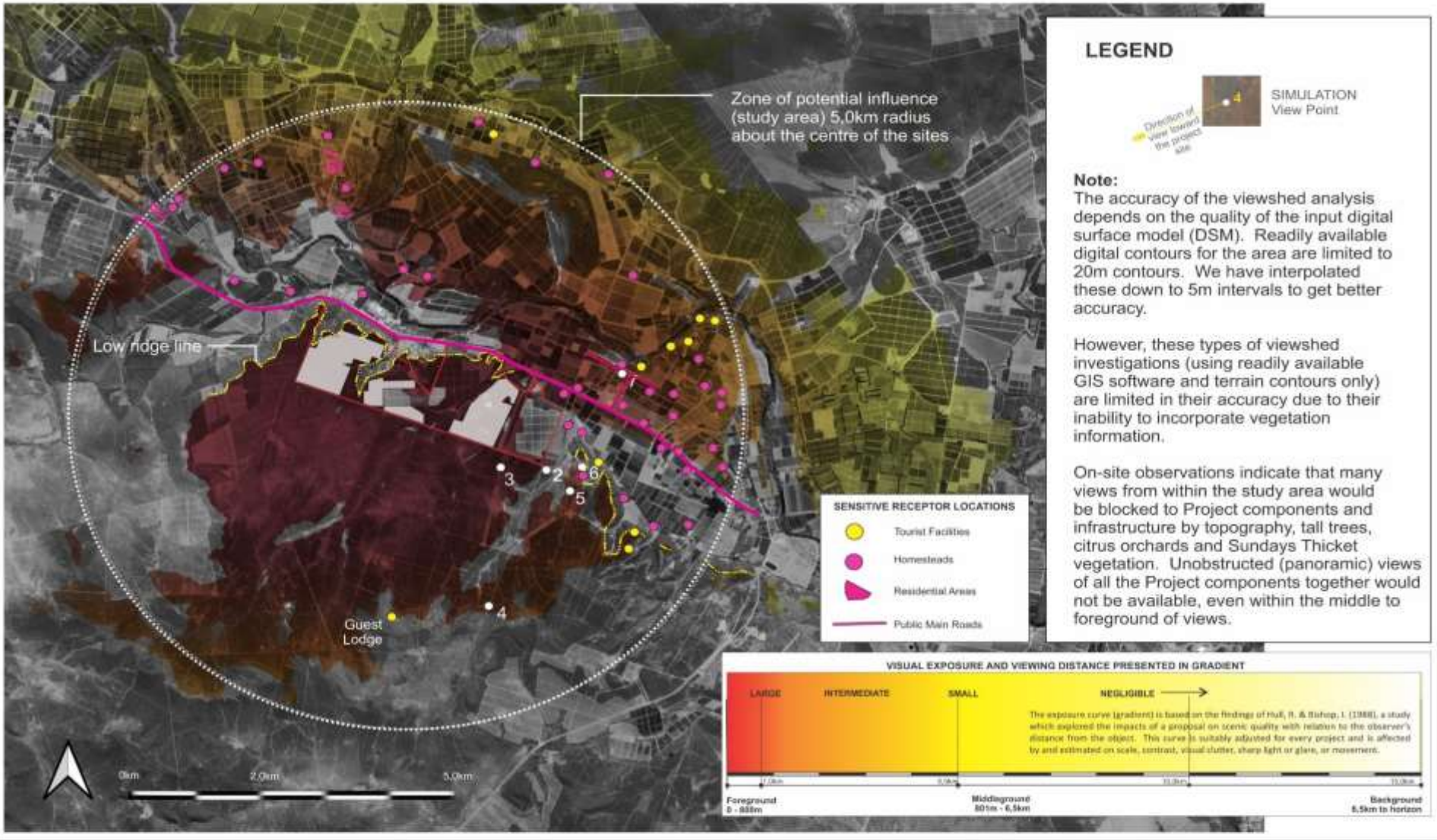

Figure 07: VIEWSHED ANALYSES - Sontule Citrus

Refer to Figures 8-1 to 8-6 for panorama simulations.

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10.3 Visual Exposure

Visual exposure relates directly to the distance of the view. It is a criterion used to account for the limiting effect of increased distance on visual impact. The impact of an object in the foreground (0 – 800m) is greater than the impact of that same object in the middle ground (800m – 5.0 km) which, in turn is greater than the impact of the object in the background (greater than 5.0 km) of a particular scene.

Distance from a viewer to a viewed object or area of the landscape influences how visual changes are perceived in the landscape. Generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance.

Visual exposure is determined by qualifying the visibility with a distance rating to indicate the degree of intrusion and visual acuity. Refer to Appendix B which illustrates the effect of distance on visual exposure.

Table 3 below indicates low to high visual exposure for the sensitive viewing areas identified within the study area, as discussed in Sections 10.1 and 10.2 above The table summarizes visual exposure of the proposed development. The worst-case scenario is rated *high* based on the summary results in Table 3.

Table 3: Visual Exposure

Sensitive Viewing Areas	**Distance**		
	Foreground view, i.e. 0 – 800m from Project Sites	Middle-ground view, i.e. 800m to – 3,0km from Project Sites	Background view i.e. > 3,0km from Project Sites
The R336, local gravel road and farmsteads/ farms generally north of the Project site		**X** mostly partially screened by vegetation and/or topography	**X** mostly screened or no exposure
The adjacent properties south and east of the Project site.	**X** some open to partially obstructed views in the foreground as in View 3 Figure 8-2	**X** mostly partially screened by vegetation and/or topography	**X** mostly screened or no exposure

10.4 Visual Intrusion

Visual intrusion deals with contextualism, i.e. how well does a project component fit with or disrupt/ enhance the ecological and cultural aesthetic of the landscape as a whole? It ties in with the concept of visual absorption capacity (VAC), which, in this instance, is ***moderate***, for the project study area, due to the screening effect of topographic relief and existing vegetation. With regards to the shade cloth structures, which will be prominent in the landscape, from certain viewpoints, the colour of the cloth will vary from bright white (when the sun is directly behind the viewer) to greyish white (during cloudy conditions or when the viewer is looking towards the sun with the structures in the view). It should also be noted that Sontule is currently a working Citrus farm with a mixture of existing citrus orchards, some of which are open and others are under shade cloth, and open, undeveloped land covered with Sundays Thicket vegetation. Thus, the proposed development: citrus orchards under shade cloth and associated infrastructure, would contextually not appear completely out of context within the site's boundaries nor for the sub-region, which is culturally renowned for its citrus orchards.

The simulations in Figures 8-1 to 8-7 illustrate the effect that the shade cloth structures would have on sensitive views when observed from the two primary sensitive viewing areas identified earlier, i.e.

- The R336, a local gravel road and surrounding farmsteads/ farms, located north of the Project site
- The adjacent properties south and east of the Project site.

These modelled depictions represent the worst-case scenario during the operational phase when the shade cloth structures are in place, covering the proposed citrus orchards. They occur in a landscape of mixed visual character with a moderate VAC. The result is a potentially ***high*** visual intrusion for viewpoints located close to the Project site, as the bright structures would negatively affect the baseline's visual quality and sense of place.

Views that would experience the highest intrusion are those from the adjacent property immediately south of the site, as illustrated in Figure 8-2 (typical of a foreground view) and Figures 8-3 and 8-4 (typical of middle-ground views). Moderate to lowest intrusion would be experienced from areas north of the site, as illustrated in Figures 8-6 and 8-7. The western cluster of orchards would be the most exposed as they would be established on the property's highest elevation. Table 4 summarizes these ratings.

Table 4: Visual Intrusion

High	**Moderate**	**Low to none**
The adjacent property south of the Project site within 800m of the Sontule property boundary	The adjacent properties south and east of the Project site beyond 800m of the Sontule property boundary The R336, local gravel road and farmsteads/ farms north of the Project site.	The remainder of the study area
The Project would have a substantial adverse effect on the visual quality (sense of place) of the landscape relative to the landscape because it would: • Contrast dramatically with the patterns or elements that define the structure of the baseline landscape.	The Project would have a moderate negative effect on the visual quality (sense of place) of the landscape: • Contrast with the current patterns or elements that define the structure of the landscape. • Be partially compatible with land use (industrial), settlement or enclosure patterns of the general area;	The Project would have a minimal effect on the visual quality (sense of place) of the landscape: • Contrasts minimally with the patterns or cultural elements that define the structure of the landscape. • Is compatible primarily with land use, settlement, or enclosure patterns;
RESULT: A notable change in landscape characteristics over an extensive area and an intensive change over a localized area resulted in major key views changes.	*RESULT:* A moderate change in landscape characteristics over a localized area resulting in a moderate change in key views.	*RESULT:* A minimal change resulting in a minor change to key views / sensitive viewing areas.

10.5 The effects of night lighting

The impact of lights at night is a sensitive issue associated with development projects. I&APs consistently raise the impact of night lighting, specifically if they can be seen from tourist and residential sites and when the effect

would continue for the life of the Project. However, it is assumed that there will be no night-time activities associated with the proposed agricultural expansion on Sontule.

Figure 8-1: SIMULATION VIEW 2 - Sontule Citrus

Refer to Figure for the location of the view points

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Figure 8-2: SIMULATION VIEW 3 - Sontule Citrus

Refer to Figure for the location of the view points

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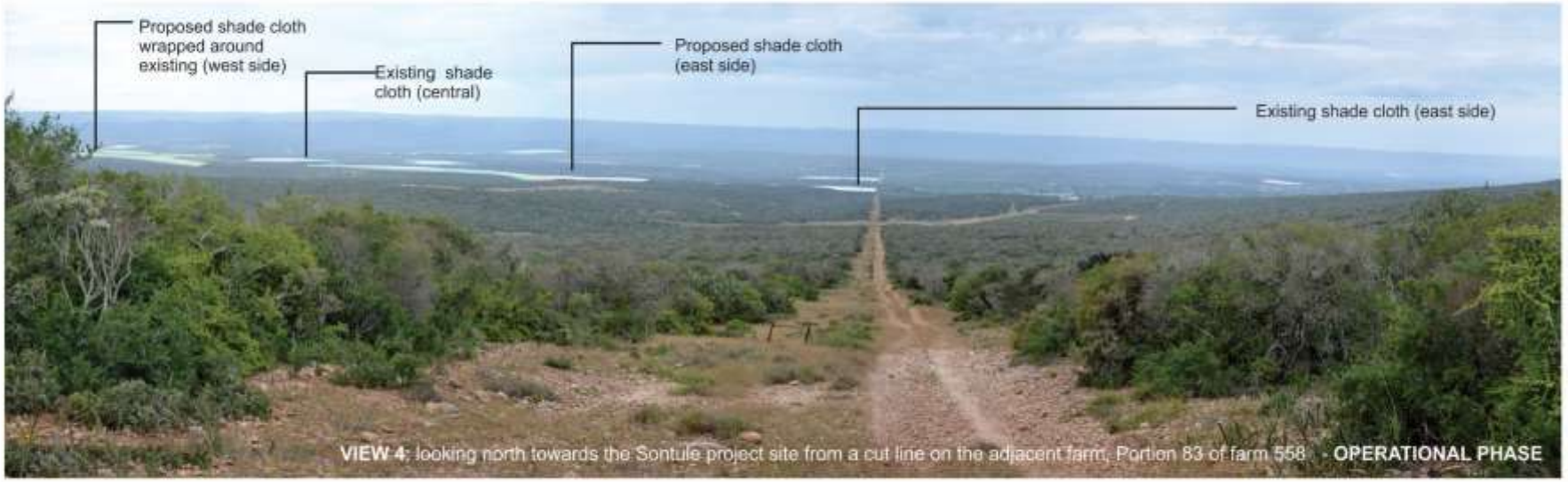

Figure 8-3: SIMULATION VIEW 4 - Sontule Citrus

Refer to Figure for the location of the view points

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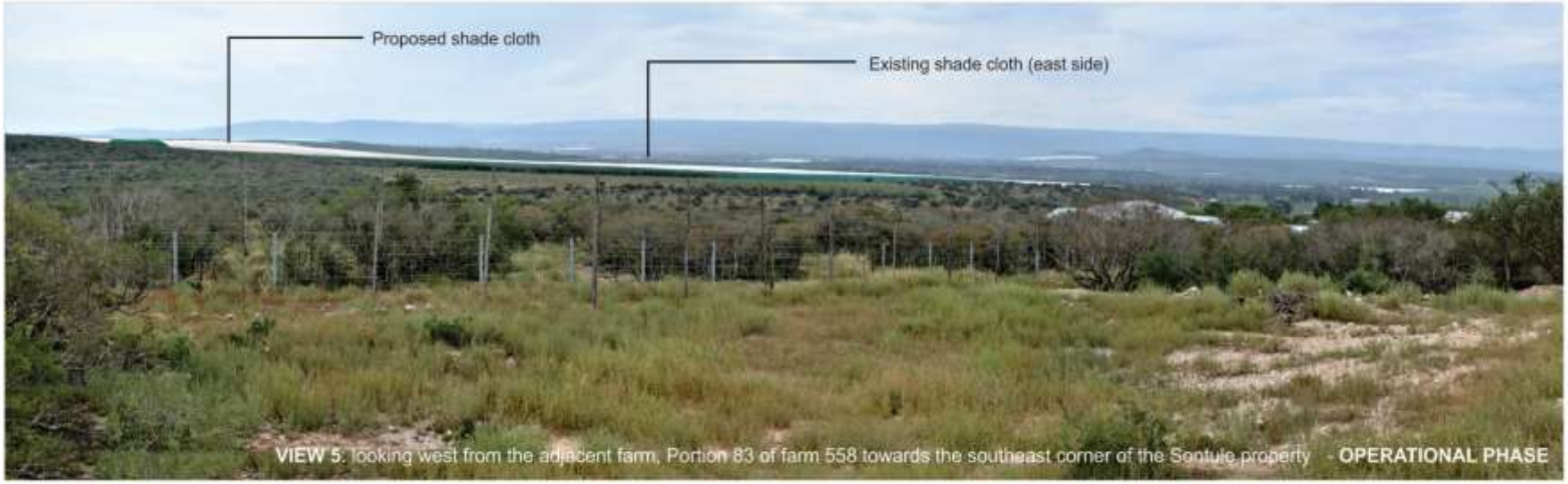

Figure 8-4: SIMULATION VIEW 5 - Sontule Citrus

Refer to Figure for the location of the view points

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Figure 8-5: SIMULATION VIEW 6 - Sontule Citrus

Refer to Figure for the location of the view points

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Figure 8-6: SIMULATION VIEW 7 - Sontule Citrus

Refer to Figure for the location of the view points

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Figure 8-7: SIMULATION VIEW 13 - Sontule Citrus

Refer to Figure for the location of the view points

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10.6 The intensity of Visual Impact

Referring to the discussions above and using the criteria listed in Appendix B, the *intensity* of the visual impact of the Project is rated in Table 5 below for all phases of the project. To assess the *intensity* of impacts, four main factors are considered:

- *Visual Intrusion:* The nature of intrusion or contrast (physical characteristics) of a project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use within the context of the landscape's VAC.
- *Visibility:* The area/points from which project components will be visible.
- *Visual exposure:* Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
- *Sensitivity:* Sensitivity of visual receptors to the proposed development.

In synthesizing the criteria, a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful and should not be used as a substitute for reasoned professional judgement (LI-IEMA 2013). ***Visual exposure is rated high for sensitive viewing areas within 800m south of the Sontule property boundary***. However, it should be noted that the primary tourist activity (hunting) on the adjacent property (4/632) would most likely take place further away from the Sontule property boundary, and more than 800m, thus reducing a receptor's visual exposure to the shade cloth structures. Hunting activities would likely be directed generally to the southern and western section of the farm, away from Sontule likely due to elevation sloping down in a northern direction, eliminating the chance of stray bullets entering populated areas. The long-range shooting range (of international standard) on the 4/632 property is orientated to shoot from the south to the north; again, away from Sontule. Whilst these activities benefit from the general natural aesthetic of the adjacent property, the focus of the activities is on the prey and the shooting range target, and the property is situated in a sub-region dominated by citrus orchard and associated infrastructural activities.

Therefore, moderate intensity is predicted for sensitive areas beyond 800m, north, south and east of the Project site. The western and south-eastern extremities of the study area will have no visual impact as views from these areas are screened by local topography (Figure 7).

Table 5: *Intensity* of impacts of the proposed Project (without mitigation)

HIGH	MODERATE	LOW	NEGLIGIBLE TO NONE
Areas on the adjacent property south of the Project site for foreground views (i.e. within 800m of the property boundary).	Areas on the adjacent properties south and east of the Project site for middle ground views (beyond 800m of the property boundary). The R336, local gravel road and farmsteads/ farms generally north of the Project site.	Areas at the far northern extremes of the study area from northwest to north-east of the site.	Remainder of the study area specifically the western, southern and eastern extremes of the study area
Major loss of or alteration to key elements / features / characteristics of the baseline landscape.	Partial loss of or alteration to key elements / features / characteristics of the baseline landscape.	Minor loss of or alteration to key elements / features / characteristics of the baseline landscape.	Very minor loss or alteration to key elements/features/charact

i.e. Pre-development landscape or view and / or introduction of elements considered to be uncharacteristic when set within the attributes of the receiving landscape. ***High scenic quality impacts would result.***	i.e. Pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic when set within the attributes of the receiving landscape. ***Moderate scenic quality impacts would result***	i.e. Pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape. ***Low scenic quality impacts would result.***	eristics of the baseline landscape i.e. Pre-development landscape or view and / or introduction of elements that is not uncharacteristic with the surrounding landscape – approximating the 'no change' situation. ***Negligible scenic quality impacts would result.***

11. MANAGEMENT MEASURES

In considering mitigating measures, three rules are considered - the standards should be feasible (economically), effective (how long will it take to implement), and what provision is made for management/maintenance) and acceptable (within the framework of the existing landscape and land use policies for the area). To address these, the following principles have been established:

- Mitigation measures should be designed to suit the existing landscape character and the needs of the locality. They should respect and build upon landscape distinctiveness.
- It should be recognized that many mitigation measures, especially the establishment of planted/ vegetation screens and rehabilitation, are not immediately effective.

The following mitigation measures are recommended for the Project and should be included as part of the Environmental Management Programme Report (EMPR).

11.1 Planning and site development

- With the preparation of the land onto which infrastructural activities (dam and other support infrastructure) will take place, clearance of existing vegetation and topsoil should be avoided outside of the development footprint (infrastructure and orchards).
- Ensure, wherever possible, that all the natural indigenous vegetation is retained and incorporated into the site rehabilitation.
- Retain a 20m vegetative buffer zone along the southern boundary and a 10m buffer along the western boundary.
- Construction activities should be limited to reasonable daylight working hours, so as to avoid light pollution
- Adopt responsible construction practices aimed at containing the establishment activities to specifically demarcated areas.

11.2 Landscaping and ecological approach to rehabilitation

- Re-vegetation should be undertaken, where needed (rehabilitation of disturbed areas during construction activities), based on an ecological approach and should include indigenous plants species. Indigenous vegetation will also limit visual impact, as it is synonymous with the current landscape, and maintains biodiversity. This approach can also significantly reduce long term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape is more sustainable.

11.3 Shade Cloth Structures

Notwithstanding the comment in Section 10 regarding the purpose of shade cloth over citrus orchards, consider another less intrusive colour that would blend with the existing hues of the baseline landscape.

11.4 Good housekeeping

- During operation, all roads will require an effective dust suppression management programme, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the

road surface.

- Dust suppression techniques must also be applied to all areas prone to produce dust other than working areas.

11.5 Light Pollution

Light pollution is primarily the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill-designed lighting washes out the night sky's darkness and radically alters the light levels in rural areas where light sources shine as ‘beacons’ against the dark sky and are generally not wanted.

Light pollution is perhaps the most easily remedied of all the visual pollution faced. Simple changes in lighting design and installation yield immediate changes in the amount of light spilt into the atmosphere. In areas where daylight working hours cannot be enforced, lights are needed. It is assumed that there will be limited to no night-time activities required for the proposed agricultural expansion. However, the following measures must be considered should the Project require lighting design:

- Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the site, i.e. lights are to be aimed away from adjacent residential areas.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site.
- Minimise the number of light fixtures to the bare minimum, including security lighting.

12. SIGNIFICANCE OF VISUAL IMPACT

The *Intensity* of the impacts, rated in Table 5 above, is further qualified with *scale (extent)*, *duration* and *probability* criteria to determine the *significance* of the visual impact. Tables 6 and 7 below summarise in detail the *significance* of the visual impacts during all phases of the project. These results are based on the worst-case scenario when the impacts of all aspects of the Project are taken together using the impact criteria in Appendix C. The primary receptor areas of concern are:

- From the adjacent properties south and east of the Project site, and
- The R336, local gravel road and farmsteads/ farms north of the Project site.

12.1 Construction Phase

The following Construction phase activities would cause visual and sense of places impacts and include:

- Vegetation clearing
- Levelling and landscaping the site to provide runoff control and stormwater management
- Establishment of unpaved internal roads to provide internal access within the orchards
- Construction of a new dam
- Installation of irrigation infrastructure
- Planting orchards
- Erecting shade cloth over the orchards.

CONSTRUCTION PHASE IMPACTS

Direct impacts

Vegetation Clearing – Change in the Landscape

Nature of Impact	Impact on the visual environment and sense of place as a result of the clearing of indigenous vegetation – change in landscape character
Extent	Local (**Medium**)
Duration	Temporary (less than 1 year) (**Low**)
Intensity	Moderate (**Medium**)
Probability	Highly probable
Degree of Confidence	**High**
Reversibility	**Partially reversible** (if the project does not proceed to the Operational Phase)
Irreplaceable Loss of Resources	**Partially replaceable** (if the project does not proceed to the Operational Phase)
Status and Significance (Without mitigation)	**Medium Negative** (-) The impact/risk will result in moderate alteration of the environment and will have an influence on decision-making if not mitigated. The impact will reduce moderately with the implementation of the appropriate mitigation measures, but the significance of the impact is expected to remain Medium.
Mitigation	• Development footprints should be demarcated and clearing to occur within demarcated areas • Ensure, wherever possible, that natural indigenous vegetation is retained and incorporated into the site rehabilitation – in order to retain landscape characteristics • Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.

Status and Significance (After mitigation)	**Medium Negative** (-)

Vegetation Clearing – Dust Generation

Nature of Impact	Dust generation because of clearing may cause a visual impact.
Extent	Local (**Medium**)
Duration	Temporary (less than 1 year) (**Low**)
Intensity	**Low**
Probability	Highly probable
Degree of Confidence	**High**
Reversibility	**Partially reversible** (if the project does not proceed to the Operational Phase)
Irreplaceable Loss of Resources	**Partially replaceable** (if the project does not proceed to the Operational Phase)
Status and Significance (Without mitigation)	**Low Negative** (-) Vegetation clearing may result in dust generation, causing undesirable impact on visual receptors. The impact can be avoided with the implementation of the appropriate mitigation measures.
Mitigation	• Development footprints should be demarcated and clearing to occur within demarcated areas • Ensure, wherever possible, that natural indigenous vegetation is retained and incorporated into the site rehabilitation. • Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge. Dust suppression techniques must also be applied to all areas prone to produce dust other than working areas i.e., wetting where needed.
Status and Significance (After mitigation)	**Very Low** Negative (-)

Erecting of Shade Cloth over Orchards

Nature of Impact	Direct impact on the visual environment and sense of place as a result of the proposed shade cloth and installation thereof. This impact refers to the construction of the shade cloth structures and will include 6 meters high poles spaced at regular intervals and metal wire anchors across the footprint.
Extent	Local (**Medium**)
Duration	Temporary (less than 1 year) (**Low**)
Intensity	Moderate (**Medium**)
Probability	Highly probable
Degree of Confidence	High
Reversibility	Partially reversible (if the project does not proceed to the Operational Phase)
Irreplaceable Loss of Resources	Partially replaceable (if the project does not proceed to the Operational Phase)
Status and Significance (Without mitigation)	**Medium Negative** (-) The impact/risk will result in moderate alteration of the environment and will have an influence on decision-making if not mitigated. The impact will reduce moderately with the implementation of the appropriate mitigation measures, but the significance of the impact is expected to remain moderate.
Mitigation	• Clearance of existing natural vegetation and topsoil should not be removed outside of the development footprint of infrastructural areas.

	• Ensure, wherever possible, that natural indigenous vegetation is retained and incorporated into the site rehabilitation. • Establish a 20m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge. • Construction activities should be limited to reasonable daylight working hours • Dust suppression techniques must also be applied to all areas prone to produce dust other than working areas. • If lighting is required, appropriate lighting design and installation to eliminate light being spilt into the atmosphere and beyond the site is required.
Status and Significance (After mitigation)	**Medium Negative** (-)

Light Pollution Impacts

Nature of Impact	Light pollution - This impact refers to the use of flood lights at night during construction, if needed
Extent	Local (**Medium**)
Duration	Temporary (less than 1 year) (**Low**)
Intensity	**Medium**
Probability	Unlikely
Degree of Confidence	**High**
Reversibility	**Reversible**
Irreplaceable Loss of Resources	**N/A**
Status and Significance (Without mitigation)	**Medium Negative** (-) Light pollution is primarily the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted or where it does not naturally occur. It has a significant impact on the night light character associated with the area. The impact will reduce significantly with the implementation of the appropriate mitigation measures.
Mitigation	• Construction should be limited to normal daylight working hours (8am to 5pm) • Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge. • Should lighting be required, it should be angled appropriately (downward) and appropriate lumen strength should be used. • If lighting is required, appropriate lighting design and installation to eliminate light being spilt into the atmosphere and beyond the site is required.
Status and Significance (After mitigation)	**Low Negative** (-)

12.2 Operational Phase

Operational activities which would cause direct visual and sense of place impacts are:

- The physical presence of the orchards and shade cloth structures and associated infrastructure.

DIRECT IMPACTS

Visual Impact of Shade Cloth Over Citrus Orchards

Nature of Impact	The impact of the shade cloth on the visual environment and sense of place of the study area caused by the physical presence of shade cloth structures that appears in contrast with the landscape character.
Extent	Local (**Medium**)
Duration	Long Term – Permanent (**High**)
Intensity	**Moderate**
Probability	**Highly Probable**
Degree of Confidence	**High**
Reversibility	Reversible if shade cloth structures are removed or not erected
Irreplaceable Loss of Resources	Partially replaceable if shade cloth structures are removed
Status and Significance (Without mitigation)	**Medium Negative** (-) The impact/risk will result in moderate alteration of the environment and will have an influence on decision-making if not mitigated. The impact will reduce moderately with the implementation of the appropriate mitigation measures, but the significance of the impact is expected to remain Medium.
Mitigation	• Maintain the proposed 50m vegetative buffer zone around the development footprint • Natural colours (i.e., green or brown) to be used for side walls • Maintain shade cloth in a good condition ○ Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible. • Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured.
Status and Significance (After mitigation)	**Medium Negative** (-)

INDIRECT IMPACTS

Impacts on Tourism

Nature of Impact	Although the area is characterised by citrus orchards and some shade cloth there could be an indirect impact on tourism, especially traveling on the main R336 and hunting operations on adjacent farms. The presence of the development, including shade cloth, may alter the sense of place for visitors.
Extent	Local (**Low**)
Duration	Long Term – Indefinite (**High**)
Intensity	**Low**
Probability	**Possibly**
Degree of Confidence	**Medium**
Reversibility	**Reversible** if shade cloth structures are removed or not erected
Irreplaceable Loss of Resources	N/A
Status and Significance (Without mitigation)	**Low Negative** (-) The impact/risk will result in an alteration of the environment and will have an impact on tourism in the area. The impact will reduce slightly with the implementation of the appropriate mitigation measures.
Mitigation	• Maintain the proposed 50m vegetative buffer zone around the development footprint, especially along the southern boundary.

	• Natural colours (i.e., green or brown) to be used for side walls • Maintain shade cloth in a good condition ○ Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible. • Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured.
Status and Significance (After mitigation)	**Low Negative** (-)

13. CUMULATIVE IMPACTS

Cumulative landscape and visual impacts result from changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate from it) or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative.

Should the Project go ahead, it would be operational in the long term. It is proposed at the interface of the two prominent landscape character types in the study area, Citrus Orchards (with some shade cloth structures) and natural land covered with Sundays Thicket vegetation. The site is a microcosm of this interface as it contains both natural and developed citrus areas.

The effects of the Project alone have been rated of **Medium Negative** (-) significance. When taken together with the negative effects of existing citrus orchards under shade cloth, which occur across the study area and the sub-region, the negative cumulative effect would remain **Medium Negative**. The proposed Sontule project would not appear uncharacteristic when set against the visual attributes of the site's immediate surroundings and the dominant land use of the sub-region.

14. CONCLUSION

14.1 Baseline

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study area is dominated by two main landscape character types, namely, Sundays Thicket on an undulating plain and Citrus Orchards. The visual integrity of the orchards landscape type and the study area generally is being visually impacted by the shade cloth structures, which contrast with the existing dark green and brown hues of the environment.

The study area's scenic quality is of a mixed character rated *low* (orchards with shade cloth) to *high* (Sundays Thicket on undulating plains). The site, which straddles three of the landscape character types, is also of mixed visual character and is potentially sensitive to change if the change is not effectively mitigated. Sensitive viewing areas and receptors have been identified and mapped, indicating sensitivity to the project.

14.2 Visual Impacts

Visual impacts are highest when receptors are sensitive to change, and their view is focused on and dominated by the change. The Project's visual impact will cause changes in the landscape that are noticeable to receptors living in and visiting residences, tourist areas, and public roads to the south, north and east of the project site. It has been established that the most sensitive receptors are visitors to and residents of the property immediately to the south of the site. Tourism (hunting and a small guest lodge) and sporting (long-range target shooting) activities occur here. However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus mitigating the potential impact of the proposed Sontule project.

The significance of the worst-case scenario impact on the various sensitive receptor areas during the CONSTRUCTION PHASE is a direct negative impact that is partially reversible. The overall impact is predicted to be **Medium Negative** (-), i.e. the impact/risk will result in a notable alteration of the environment where the environment continues to function but in a modified manner. It will have an influence on decision-making if not mitigated. The impact will reduce moderately with the implementation of the appropriate mitigation measures, but the significance of the impact is likely to remain Medium Negative.

During the OPERATIONAL PHASE, a direct, partially reversible (should the shade cloth structures be removed) negative impact is predicted. The long-term impact is assessed as **Medium Negative** (-), i.e. the impact/risk will result in a notable alteration of the environment where the environment continues to function but in a modified manner. The impact would remain Medium Negative even with the effective implementation of mitigation measures, and it will have an influence on decision-making.

14.3 Cumulative Impact

The effects of the Project alone have been rated of **Medium Negative** (-) significance. When taken together with the negative impacts of existing citrus orchards under shade cloth, which occur across the study area and the sub-region, the negative cumulative effect would remain **Medium Negative** (-). The proposed Sontule project would not appear uncharacteristic when set against the visual attributes of the site’s immediate surroundings and the dominant land use of the sub-region.

14.4 Authors Opinion

From a potential visual impact perspective, the author's opinion is that all aspects of the Sontule Citrus Project should be approved, provided that the mitigation/management measures are effectively implemented, managed, and monitored in the long term.

*** GYLA ***

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To reach an understanding of the effect of development on a landscape resource, it is necessary to consider the various aspects of the landscape as follows:

Landscape Elements and Character

The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, savannah, trees, water bodies, buildings and roads are generally quantifiable and can be easily described.

Landscape character is therefore the description of pattern, resulting from combinations of natural (physical and biological) and cultural (land use) factors and how people perceive these. The visual dimension of the landscape reflects the way in which these factors create repetitive groupings and interact to create areas that have a specific visual identity. The process of landscape character assessment can increase appreciation of what makes the landscape distinctive and what is important about an area. The description of landscape character thus focuses on the *nature of the land*, rather than the response of a viewer.

Landscape Value – all encompassing (Aesthetic Value)

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay 1993). Thus, aesthetic value encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character and sense of place (Schapper 1993).

Aesthetic appeal (value) is considered high when the following are present (Ramsay 1993):

- *Abstract qualities*: such as the presence of vivid, distinguished, uncommon or rare features or abstract attributes.
- *Evocative responses*: the ability of the landscape to evoke particularly strong responses in community members or visitors.
- *Meanings*: the existence of a long-standing special meaning to a group of people or the ability of the landscape to convey special meanings to viewers in general.
- *Landmark quality*: a feature that stands out and is recognised by the broader community.

Sense of Place

Central to the concept of a sense of place is that the place requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape together with the cultural transformations and traditions associated with historic use and habitation. According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own". Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, these values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and therefore, keen sense of place.

Scenic Quality

Assigning values to visual resources is a subjective process. The phrase, “beauty is in the eye of the beholder,” is often quoted to emphasize the subjectivity in determining scenic values. Yet, researchers have found consistent levels of agreement among individuals asked to evaluate visual quality.

Studies for perceptual psychology have shown human preference for landscapes with a higher visual complexity particularly in scenes with water, over homogeneous areas. Based on contemporary research

landscape quality increases when:

- Topographic ruggedness and relative relief increase.
- Where water forms are present.
- Where diverse patterns of grasslands and trees occur.
- Where natural landscape increases and man-made landscape decreases.
- And where land use compatibility increases and land use edge diversity decreases (Crawford 1994).

Scenic Quality - Explanation of Rating Criteria:

(After The Visual Resource Management System, Department of the Interior of the USA Government, Bureau of Land Management)

Landform: Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Fish River or Blyde River Canyon, the Drakensberg or other mountain ranges, or they may be exceedingly artistic and subtle as certain pinnacles, arches, and other extraordinary formations.

Vegetation: (Plant communities) Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular (wildflower displays in the Karoo regions). Consider also smaller scale vegetational features, which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind beaten trees, and baobab trees).

Water: That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

Colour: Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "colour" are variety, contrast, and harmony.

Adjacent Scenery: Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 kilometres, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate extremely low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

Scarcity: This factor provides an opportunity to give added importance to one or all the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is several not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

Cultural Modifications: Cultural modifications in the landform / water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit.

Scenic Quality Inventory and Evaluation Chart

(After The Visual Resource Management System, Department of the Interior of the USA Government, Bureau of Land Management)

Key factors	Rating Criteria and Score

Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major Badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation and landcover	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle colour variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. National and provincial parks and conservation areas *** 5+**	Distinctive, though somewhat like others within the region. **3**	Interesting within its setting, but common within the region. **1**
Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **4**

Scenic Quality (i.e. value of the visual resource)

In determining the quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are considered to be scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is considered to be very high.

When considering both objective and subjective factors associated with the landscape there is a balance between landscape character and individual landscape features and elements, which would result in the values as follows:

Value of Visual Resource – expressed as Scenic Quality
(After The Landscape Institute with the Institute of Environmental Management and Assessment (2013))

High	Moderate	Low
Areas that exhibit a positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be of particular importance to conserve, and which may be sensitive change in general and which may be detrimental if change is inappropriately dealt with.	Areas that exhibit positive character, but which may have evidence of alteration to /degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change in general; again, change may be detrimental if inappropriately dealt with, but it may not require special or particular attention to detail.	Areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

A visual impact study analysis addresses the importance of the inherent aesthetics of the landscape, the public value of viewing the natural landscape, and the contrast or change in the landscape from the project.

For some topics, such as water or air quality, it is possible to use measurable, technical international or national guidelines or legislative standards, against which potential effects can be assessed. The assessment of likely effects on a landscape resource and on visual amenity is more complex, since it is determined through a combination of quantitative and qualitative evaluations. (The Landscape Institute with the Institute of Environmental Management and Assessment (2002).

Landscape impact assessment includes a combination of objective and subjective judgements, and it is therefore important that a structured and consistent approach is used. It is necessary to differentiate between judgements that involve a degree of subjective opinion (as in the assessment of landscape value) from those that are normally more objective and quantifiable (as in the determination of magnitude of change). Judgement should always be based on training and experience and be supported by clear evidence and reasoned argument. Accordingly, suitably qualified and experienced landscape professionals carry out landscape and visual impact assessments (The Landscape Institute with the Institute of Environmental Management and Assessment (2002),

Landscape and visual assessments are separate, although linked, procedures. The landscape baseline, its analysis and the assessment of landscape effects all contribute to the baseline for visual assessment studies. The assessment of the potential effect on the landscape is carried our as an effect on an environmental resource, i.e. the landscape. Visual effects are assessed as one of the interrelated effects on population.

Landscape Impact

Landscape impacts derive from changes in the physical landscape, which may give rise to changes in its character and from effects to the scenic values of the landscape. This may in turn affect the perceived value ascribed to the landscape. The description and analysis of effects on a landscape resource relies on the adoption of certain basic principles about the positive (or beneficial) and negative (or adverse) effects of change in the landscape. Due to the inherently dynamic nature of the landscape, change arising from a development may not necessarily be significant (Institute of Environmental Assessment & The Landscape Institute (2002)).

Visual Impact

Visual impacts relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity. Visual impact is therefore measured as the change to the existing visual environment (caused by the physical presence of a new development) and the extent to which that change compromises (negative impact) or enhances (positive impact) or maintains the visual quality of the area.

To assess the magnitude of visual impact four main factors are considered.

Visual Intrusion:	The nature of intrusion or contrast (physical characteristics) of a project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use.
Visibility:	The area/points from which project components will be visible.
Visual exposure:	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
Sensitivity:	Sensitivity of visual receptors to the proposed development

Visual Intrusion / contrast

Visual intrusion deals with the notion of contextualism i.e. how well does a project component fit into the ecological and cultural aesthetic of the landscape as a whole? Or conversely what is its contrast with the receiving environment. Combining landform / vegetation contrast with structure contrast derives overall visual intrusion/contrast levels of high, moderate, and low.

Landform / vegetation contrast is the change in vegetation cover and patterns that would result from construction activities. Landform contrast is the change in landforms, exposure of soils, potential for erosion scars, slumping, and other physical disturbances that would be noticed as uncharacteristic in the natural landscape. Structure contrast examines the compatibility of the proposed development with other structures in the landscape and the existing natural landscape. Structure contrast is typically strongest where there are no other structures (e.g., buildings, existing utilities) in the landscape setting.

Photographic panoramas from key viewpoints before and after development are presented to illustrate the nature and change (contrast) to the landscape created by the proposed development. A computer simulation technique is employed to superimpose a graphic of the development onto the panorama. The extent to which the component fits or contrasts with the landscape setting can then be assessed using the following criteria.

- Does the physical development concept have a negative, positive or neutral effect on the quality of the landscape?
- Does the development enhance or contrast with the patterns or elements that define the structure of the landscape?
- Does the design of the project enhance and promote cultural continuity, or does it disrupt it?

The consequence of the intrusion / contrast can then be measured in terms of the sensitivity of the affected landscape and visual resource given the criteria listed below. For instance, within an industrial area, a new sewage treatment works may have an insignificant landscape and visual impact; whereas in a *valued* landscape it might be considered to be an intrusive element. (Institute of Environmental Assessment & The landscape Institute (1996)).

Visual Intrusion

High	Moderate	Low	Positive
If the project: - Has a substantial negative effect on the visual quality of the landscape. - Contrasts dramatically with the patterns or elements that define the structure of the landscape. - Contrasts dramatically with land use, settlement or enclosure patterns. - Is unable to be 'absorbed' into the landscape.	If the project: - Has a moderate negative effect on the visual quality of the landscape. - Contrasts moderately with the patterns or elements that define the structure of the landscape. - Is partially compatible with land use, settlement or enclosure patterns. - Is partially 'absorbed' into the landscape.	If the project: - Has a minimal effect on the visual quality of the landscape. - Contrasts minimally with the patterns or elements that define the structure of the landscape. - Is mostly compatible with land use, settlement or enclosure patterns. - Is 'absorbed' into the landscape.	If the project: - Has a beneficial effect on the visual quality of the landscape. - Enhances the patterns or elements that define the structure of the landscape. - Is compatible with land use, settlement or enclosure patterns.

Result Notable change in landscape characteristics over an extensive area and/or intensive change over a localized area resulting in major changes in key views.	*Result* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*Result* Imperceptible change resulting in a minor change to key views.	*Result* Positive change in key views.

Visual intrusion also diminishes with scenes of higher complexity, as distance increases, the object becomes less of a focal point (more visual distraction), and the observer's attention is diverted by the complexity of the scene (Hull and Bishop (1988)).

Visibility

A viewshed analysis was carried out to define areas, which contain all possible observation sites from which the development would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1.8m above ground level. Topographic data was captured for the site and its environs at 10 m contour intervals to create the Digital Terrain Model (DTM). The DTM includes features such as vegetation, rivers, roads and nearby urban areas. These features were 'draped' over the topographic data to complete the model used to generate the viewshed analysis. It should be noted that viewshed analyses are not absolute indicators of the level of significance (magnitude) of the impact in the view, but merely a statement of the fact of potential visibility. The visibility of a development and its contribution to visual impact is predicted using the criteria listed below:

Visibility

High	Moderate	Low
Visual Receptors If the development is visible from over half the zone of potential influence, and/or views are mostly unobstructed and/or most viewers are affected.	*Visual Receptors* If the development is visible from less than half the zone of potential influence, and/or views are partially obstructed and or many viewers are affected	*Visual Receptors* If the development is visible from less than a quarter of the zone of potential influence, and/or views are mostly obstructed and/or few viewers are affected.

Visual Exposure

Visual exposure relates directly to the distance of the view. It is a criterion used to account for the limiting effect of increased distance on visual impact. The impact of an object in the foreground (0 – 800m) is greater than the impact of that same object in the middle ground (800m – 5.0 km) which, in turn is greater than the impact of the object in the background (greater than 5.0 km) of a particular scene.

Distance from a viewer to a viewed object or area of the landscape influences how visual changes are perceived in the landscape. Generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance.

Areas seen from 0 to 800m are considered foreground; foliage and fine textural details of vegetation are normally perceptible within this zone.

Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to

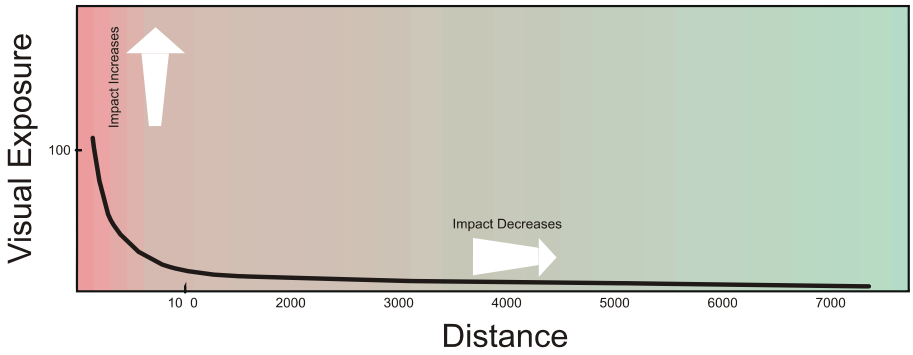
8.0km.

Areas seen from 5.0km to 8.0km and sometimes up to 16km and beyond are considered background. Landforms become the most dominant element at these distances.

Seldom seen areas are those portions of the landscape that, due to topographic relief or vegetation, are screened from the viewpoint or are beyond 16km from the viewpoint. Landforms become the most dominant element at these distances.

The impact of an object diminishes at an exponential rate as the distance between the observer and the object increases. Thus, the visual impact at 1000 m would be 25% of the impact as viewed from 500 m. At 2000 m it would be 10% of the impact at 500 m. The inverse relationship of distance and visual impact is well recognised in visual analysis literature (e.g.: Hull and Bishop (1988)) and is used as an important criteria for the study. This principle is illustrated in the Figures below.

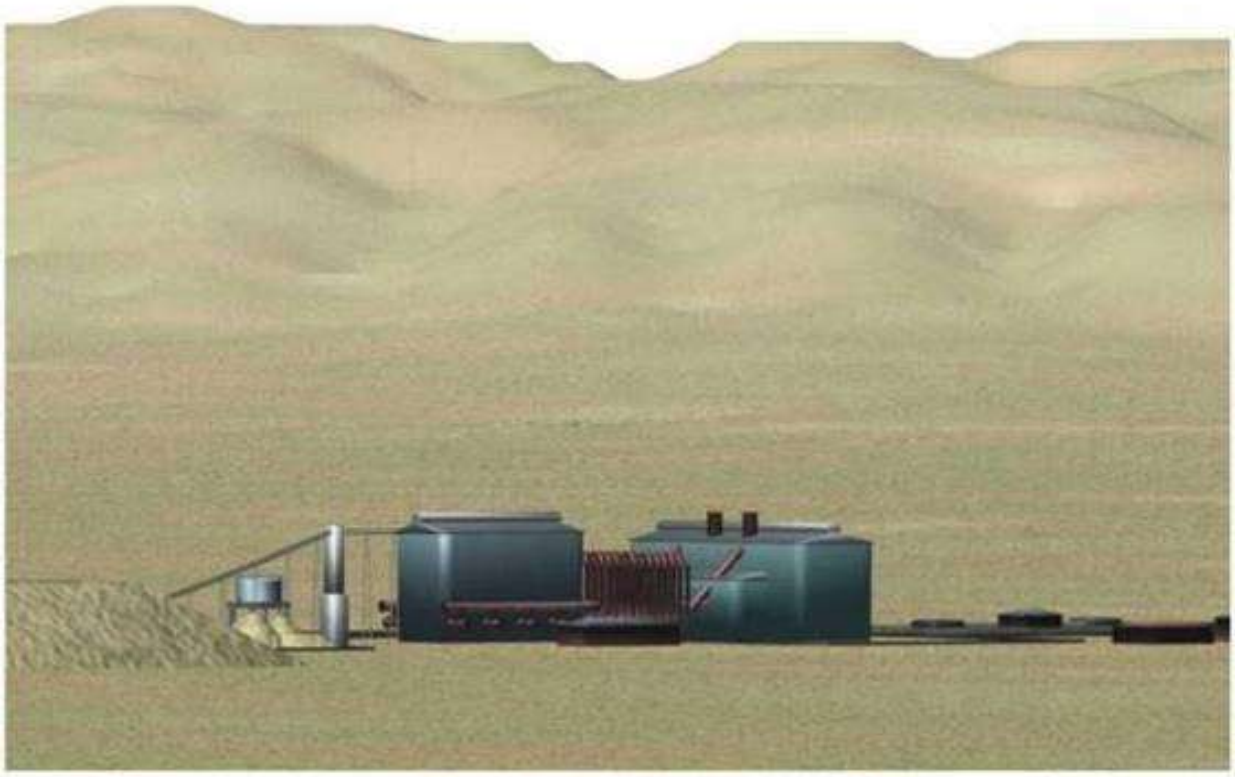
Effect of Distance on Visual Exposure



View from 10 000 metres

View from 5 000 metres

View from 3 000 metres



View from 1 000 metres

Sensitivity of Visual Receptors

When visual intrusion, visibility and visual exposure are incorporated, and qualified by sensitivity criteria (visual receptors) the magnitude of the impact of the development can be determined.

The sensitivity of visual receptors and views will be depended on:

- The location and context of the viewpoint.
- The expectations and occupation or activity of the receptor.
- The importance of the view (which may be determined with respect to is popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).

The most sensitive receptors may include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape.
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.
- Occupiers of residential properties with views affected by the development.
- These would all be high.

Other receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value).
- People travelling through or past the affected landscape in cars, on trains or other transport routes.
- People at their place of work.

The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

In this process more weight is usually given to changes in the view or visual amenity which are greater in scale, and visible over a wide area. In assessing the effect on views, consideration should be given to the effectiveness of mitigation measures, particularly where planting is proposed for screening purposes (Institute of Environmental Assessment & The Landscape Institute (1996).

Sensitivity of Visual Receptors

High	Moderate	Low
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape. Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value). People travelling through or past the affected landscape in cars, on trains or other transport routes.	The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view (i.e. office and industrial areas). Roads going through urban and industrial areas

Occupiers of residential properties with views affected by the development.		

Intensity of the Visual Impact

Potential visual impacts are determined by analysing how the physical change in the landscape, resulting from the introduction of a project, are viewed and perceived from sensitive viewpoints. Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks, and conservation areas, highways and travel routes, and important cultural features and historic sites, especially in foreground views.

The magnitude of impact is assessed through a synthesis of visual intrusion, visibility, visual exposure and viewer sensitivity criteria. Once the magnitude of impact has been established this value is further qualified with spatial, duration and probability criteria to determine the *significance* of the visual impact.

For instance, the fact that visual intrusion and exposure diminishes significantly with distance does not necessarily imply that the relatively small impact that exists at greater distances is unimportant. The level of impact that people consider acceptable may be dependent upon the purpose they have in viewing the landscape. A particular development may be unacceptable to a hiker seeking a natural experience, or a household whose view is impaired, but may be barely noticed by a golfer concentrating on his game or a commuter trying to get to work on time (Ittleson *et al.,* 1974).

In synthesising these criteria a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement. (Institute of Environmental Assessment and The landscape Institute (1996)).

Intensity (Intensity) of Visual Impact

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements/features/characteristics of the baseline.	Partial loss of or alteration to key elements/features/characteristics of the baseline.	Minor loss of or alteration to key elements/features/characteristics of the baseline.	Very minor loss or alteration to key elements/features/characteristics of the baseline.
I.e. Pre-development landscape or view and/or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view and/or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view an/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view and/or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the 'no change' situation.

High scenic quality impacts would result.	Moderate scenic quality impacts would result	Low scenic quality impacts would result.	Negligible scenic quality impacts would result.

Cumulative effects

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility (visibility) of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions. (Institute of Environmental Assessment and The landscape Institute (1996)).

APPENDIX C: SIGNIFICANCE OF IMPACT RATING

As per Guideline Document 5: Assessment of Alternatives and Impacts, the following methodology[8] is to be applied to the prediction and assessment of impacts and risks. Potential impacts should be rated in terms of the direct, indirect and cumulative.

- **Direct** impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect** impacts of an activity are indirect or induced changes that may occur because of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.
- **Cumulative** impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over time and can include both direct and indirect impacts.
- **Spatial extent** – The size of the area that will be affected by the impact/risk
  - Site specific
  - Local (<2 km from site)
  - Regional (within 30 km of site)
  - National
- **Consequence/Intensity** –The anticipated severity of the impact/risk
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease)
  - High (severe alteration of natural systems, patterns or processes i.e. where environmental functions and processes are altered such that they temporarily or permanently cease)
  - Medium (notable alteration of natural systems, patterns or processes i.e. where the environment continues to function but in a modified manner)
  - Low (negligible alteration of natural systems, patterns or processes i.e. where no natural systems/environmental functions, patterns, or processes are affected)
- **Duration** –The timeframe during which the impact/risk will be experienced
  - Temporary (less than 1 year)
  - Short term (1 to 6 years)
  - Medium term (6 to 15 years)
  - Long term (the impact will cease after the operational life of the activity)
  - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient)
- **Reversibility** – The degree to which the potential impacts/risks can be reversed
  - Reversible
  - Partially Reversible
  - Irreversible
- **Irreplaceable loss of Resources** - The degree to which the impact/risk may cause irreplaceable loss of resources
  - Replaceable
  - Partially Replaceable
  - Irreplaceable

Using the criteria above, the impacts will further be assessed in terms of the following:

[8] Supplied by Public Process Consultants, Gqeberha

- **Probability** –The probability of the impact/risk occurring
  - Improbable (little or no chance of occurring)
  - Probable (<50% chance of occurring)
  - Highly probable (50 – 90% chance of occurring)
  - Definite (>90% chance of occurring)

- **Significance** – Will the impact/ risk cause a notable alteration of the environment?
  - Low to very low (the impact/risk may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making)
  - Medium (the impact /risk will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures and will only have an influence on the decision-making if not mitigated).
  - High (the impact/risk will result in major alteration to the environment even with the implementation of the appropriate mitigation measures and will have an influence on decision-making)
  - Very high (the impact/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating).

- **Status** - Whether the impact/risk on the overall environment will be positive, negative or neutral
  - "+" (positive - environment overall will benefit from the impact/risk).
  - "-" (negative - environment overall will be adversely affected by the impact/risk).
  - "o" (neutral - environment overall will not be affected).

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge
  - Low
  - Medium
  - High

Impacts, mitigatory measures and the monitoring of impacts will then be collated into the EMPr and these will include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Positive impacts will be identified, and mitigation measures will be identified to potentially enhance positive impacts where possible.

Management Actions and Monitoring of the Impacts:

- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Where positive impacts are identified, mitigatory measures will be identified to potentially enhance positive impacts.

The table below is to be used by specialists for the rating of impacts:

Table 6.3: Rating of impacts.

Nature of the Impact	**This should include a description of the proposed impact to indicate if the impact is a direct, indirect or a cumulative impact.**
Extent	Site specific, local, regional, or national
Duration	Temporary, short term, medium term, long term or permanent
Consequence /Intensity	Extreme, High, medium, or low
Probability	Improbable, probable, highly probable, definite
Degree of Confidence	Low, medium, or High
Reversibility	Reversible, Partially Reversible, Irreversible
Irreplaceable Loss of Resources	Replaceable, Partially Replaceable, Irreplaceable
Status and Significance (without mitigation)	Low, Medium, or High indicating whether Positive (+), Negative (-) or Neutral (o)
Mitigation	Overview of mitigatory measures to mitigate potentially negative impacts or enhance potential positive impacts indicating how this mitigatory measure impacts on the significance of the impact
Status and Significance (after mitigation)	Low, Medium, or High indicating whether the status of the impact is Positive (+), Negative (-) or Neutral (o)

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction and operational phases of the project:
  - **NOTE**: No assessment of impacts during the decommissioning phase of the project is proposed. The relevant guidelines and rehabilitation requirements applicable at that time will need to be applied.
- Impacts will be evaluated with and without mitigation to determine the effectiveness of mitigation measures on reducing the significance of a particular impact; and
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area.

The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

To characterize the nature and magnitude of visual intrusion of the proposed project, a photographic simulation technique was used. This method was used according to Sheppard (in Lange 1994), where a visual simulation is good quality when the following five criteria are met.

Representativeness:	A simulation should represent important and typical views of a project.
Accuracy:	The similarity between a simulation and the reality after the project has been realized.
Visual clarity:	Detail, parts and overall contents have to be clearly recognizable.
Interest:	A simulation should hold the attention of the viewer.
Legitimacy:	A simulation is defensible if it can be shown how it was produced and to what degree it is accurate.

To comply with this standard it was decided to produce a stationary or static simulation (Van Dortmont in Lange, 1994), which shows the proposed development from a typical static observation points (Critical View Points).

Photographs are taken on site during a site visit with a manual focus, 50mm focal depth digital camera. All camera settings are recorded and the position of each panoramic view is recorded by means of a GPS. These positions, coordinates are then placed on the virtual landscape (see below).

A scale model of the proposal is built in virtual space, scale 1:1, based on CAD (vector) information as supplied by the architect / designers. This model is then placed on a virtual landscape, scale 1:1, as produced by means of GIS software. The accuracy of this depends on the contour intervals.

The camera views are placed on the points as recorded on the virtual landscape. The respective photographs are overlaid onto the camera views, and the orientation of the cameras adjusted accordingly. The light source is adjusted to suit the view. Each view is then rendered as per the process above.

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Visual Impact Assessments

Graham is a registered landscape architect with interest and experience in landscape architecture, urban design and environmental planning. He holds a degree in landscape architecture from the University of Toronto and has practiced in Canada and Africa, where he has spent most of his working life. He has served as President of the Institute of Landscape Architects of South Africa (ILASA) and as Vice President of the Board of Control for Landscape Architects. He is a Fellow of ILASA.

During his 40 years plus career he has received numerous ILASA and other industry awards. He has published widely on landscape architectural issues and has had projects published both locally and internationally in, scientific and design journals and books. He was a being a founding member of Newtown Landscape Architects and is also a senior lecturer, teaching landscape architecture and urban design at post and undergraduate levels, at the University of Pretoria. He has been a visiting studio critic at the University of Witwatersrand and University of Cape Town and in 2011 was invited to the University of Rhode Island, USA as their Distinguished International Scholar for that year. He currently practices as a Sole Proprietor.

A niche specialty of his is Visual Impact Assessment for which he was cited with an ILASA Merit Award in 1999. He has completed over 250 specialist reports for projects in South Africa, Canada and other African countries. He was on the panel that developed the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011, he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee (they manage a World Heritage Site) along with the *Visual Impact Assessment Training Module Guideline Document.*

*** GYLA ***

CHAPTER THIRTEEN: CONCLUSIONS AND RECOMMENDATIONS

13.1 INTRODUCTION

As per section 3. (1) l of Appendix 3 of the NEMA EIA Regulations, 2014 (as amended) this section of the report provides an environmental impact statement which contains a summary of the key findings of the environmental impact assessment including:

- *"a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives"*
- *"recording of proposed impact management outcomes for the development for inclusion in conditions of authorization"*
- *"any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorization"*
- *"a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorization"*

This section presents the conclusion on the most significant impacts identified through the EIA Process, together with management actions required to avoid or mitigate the negative impacts; or to enhance the positive benefits.

The assessment of impacts is presented in the following sections:

- Terrestrial Biodiversity – potential impacts on vegetation, biodiversity patterns and processes, as well as fauna (Chapter Six)
- Aquatic Biodiversity – potential impacts on aquatic resources within the development footprint, as well as within a 500m radius (Chapter Seven)
- Soil Suitability - agricultural potential of the site and slope analysis (Chapter Eight)
- Heritage – potential impacts on heritage resources (Chapters Nine (Archaeological) and Ten (Palaeontological))
- Traffic – potential impacts on condition and operation of the roads in the vicinity, as well as suitability of the access point (Chapter Eleven)
- Visual – potential impacts on the visual environment and sense of place of the study area (Chapter Twelve).

The monitoring of impacts is outlined in the Draft Environmental Management Programme (EMPr) included as Part B of this report. The key issues identified during the Scoping Process, which have been the subject of separate specialist assessments during the EIA, are outlined below:

- Biophysical (Biological and Physical) site assessment including:
  - Potential project related impacts on natural vegetation and faunal habitat associated with the area under assessment, need to be considered.
  - An aquatic survey to identify and map aquatic features associated with the area under assessment, if any.
  - Assign suitable buffers for aquatic features identified, if any.
  - Provide comment on the potential impact of the proposed development on Aquatic and Terrestrial CBAs, as identified in the ECBCP.
  - The determination of suitable buffers associated with meeting biodiversity conservation targets specific to the vegetation types associated with the area under assessment, and in line with those targets indicated by the relevant planning frameworks for the area.
- The undertaking of a Phase 1 Palaeontological and Phase 1 Archaeological Impact Assessment to identify heritage resources, materials and artefacts that occur within the area under assessment and recommendations regarding the conservation thereof.

- The undertaking of a Traffic Impact Assessment to determine the impact of the additional trip generation and the suitability of the access point to ensure safe access and egress from the site.
- The undertaking of a Soil Suitability Assessment in the form of a Land Capability Study, to determine the suitability of the soil for the establishment of citrus orchards, including slope analysis of the site, to inform the proposed layout.
- The undertaking of a Visual Impact Assessment to determine the potential effect on the visual environment and sense of place of the study area.

13.2 IMPACTS ON TERRESTRIAL BIODIVERSITY AND RECOMMENDED MITIGATORY MEASURES

The vegetation specialist has confirmed that the vegetation on Sontule is predominantly Sundays Valley Thicket. The vegetation on site is a mix of intact solid thicket with no to low degradation, moderately to highly degraded thicket, transitional vegetation and karroid vegetation as well as transformed areas (dwellings, roads, cutlines & fence-lines). Alien invasion is presently low with occasional Prickly Pear and Jointed Cactus, as well as various ruderal weeds often proliferating in disturbed areas.

Based on the outcome of the detailed specialist assessments, technical input and consultation process, it is proposed to clear an area of ~147ha in order to facilitate the establishment of ~127ha of citrus orchards and associated infrastructure (~17ha) as well as the proposed new dam (~3.7ha).

Given that an area of ~137ha has been transformed on the farm for orchards and associated infrastructure (~133ha), as well as an airstrip with hangars (~4ha), and an additional area of ~147ha is proposed to be cleared, it is anticipated that an area measuring ~175ha will remain untransformed within the No-Go areas on Sontule. This represents ~38% of the original extent of the natural vegetation (Sundays Thicket) that will be retained on the farm, which exceeds the assigned conservation target for Sundays Thicket, of 19%.

13.2.1 Flora

Sundays Valley Thicket tends to have a relatively high flora diversity and is also quite uniform in terms of species composition in terms of dominant and common species, with occasional individuals or clumps of less common species, including those listed as being of conservation concern. Several endemic and range restricted species are known from the surrounding area. **None of the sensitive species listed as per the National Screening Tool, nor any Critically Endangered or Endangered floral species were found to be present within the affected area.** There is a residual possibility that representatives of these species could be present. Sampling has been undertaken as far as possible to investigate species composition but is generally limited to using existing tracks and cutlines and accessing internal areas of solid thicket where possible. Due to the localised nature of the impact, as well as the level of degradation of the site, the risk of a species suffering any significant loss is **low**. Floral Species of Conservation Concern that were confirmed to be present within the study area are presented in table 13.1 below. A floral search and rescue should be undertaken for species of conservation concern, before clearing commences.

Table 13.1: Floral Species of Conservation Concern confirmed on site.

SCIENTIFIC NAME	FAMILY	STATUS[1, 2]	LIKELIHOOD OF PRESENCE
Acrolophia micrantha	Orchidaceae	LC, PNCO[3]	Possibly present
Aloe africana	Asphodelaceae	LC, PNCO	SVT[4], Present
Aloe ferox	Asphodelaceae	LC, PNCO	SVT, Present
Aloe speciosa	Asphodelaceae	LC, PNCO	SVT, Present
Bulbine frutescens	Asphodelaceae	LC, PNCO	SVT, Present
Carpobrotus edulis	Aizoaceae	LC, PNCO	SVT, Present
Cotyledon orbiculata	Crassulaceae	LC, PNCO	SVT, Present
Delosperma echinatum	Aizoaceae	LC, PNCO	SVT, Present
Delosperma uniflorum	Aizoaceae	LC, PNCO	SVT, Present
Drimia altissima	Hyacinthaceae	LC, PNCO	SVT, Present
Gasteria bicolor	Asphodelaceae	LC, PNCO	SVT, Present, Common
Hypoxis argentea	Hypoxidaceae	LC, PNCO	SVT, Present
Sideroxylon inerme	Sapotaceae	NFA[5]	SVT, Present
Tritonia securigera	Iridaceae	LC, PNCO	SVT, Present

13.2.2 Fauna

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact on faunal habitat, associated with the proposed footprint, would be of **low significance** if mitigation measures are adhered to. **No sensitive species, as identified by the screening tool, were found on the site and the likelihood of presence is likely also low. No other species of conservation concern were confirmed on site, however there is a residual possibility that representatives of these species could be present or may be transient to the site**. For this reason, it is recommended that a faunal search and rescue be undertaken before clearing commences.

[1] Conservation Status as per SANBI Threatened Species Programme (http://redlist.sanbi.org/index.php, accessed 20 March 2021).
[2] IUCN: Lease Concern (LC), Near Threatened (NT), Vulnerable (VU), Critically Endangered (CR), Endangered (EN); NEST – National Environmental Screening Tool.
[3] PNCO: Protected in terms of the Provincial Nature Conservation Ordinance (Act 19 of 1974)
[4] SVT: Sundays Valley Thicket
[5] NFA: National Forests Act (Act No. 84 of 1998)

Ecological connectivity is currently maintained to the west, east and south of the farm portion, primarily following drainage lines which are not significantly transformed. The farm is functionally disconnected from intact habitat to the north, and faunal movement is likely limited to a few species. The farm portion is fenced off with security fencing, thus movement of larger mammals is likely significantly restricted. Birds would be unaffected as well as reptiles and smaller mammals. Larger tortoises would likely be confined by the fencing type and movement would be restricted.

Thus, it is recommended that the areas surrounding watercourses and slopes are retained to ensure connectivity. These areas follow four watercourses that traverse the property (north-south). In addition, in order to allow free movement (west-east) of fauna and provide connectivity between the north-south watercourse corridors it is recommended that a corridor (~50 m wide) of vegetation is retained along the southern and western boundaries.

13.2.3 Impacts and Management of Terrestrial Biodiversity

The following table provides a summary of the key direct and indirect impacts associated with the development. Only impacts that are rated as having a potential *Medium to High or Very High* negative impact (before mitigation) are listed below:

Table 13.2: Key direct and indirect impacts on vegetation and biodiversity (Medium to High Negative pre-mitigation only).

Development phase	**Impact type**	**Impact**	**Rating**	
			Without mitigation	**With mitigation**
Construction:	**Direct:**	Loss of vegetation due to clearing	Medium (-)	Low (-)
		Loss of ESA due to clearing	Medium (-)	Low (-)
		Loss of flora and fauna species of special concern during vegetation clearing	Medium (-)	Low (-)
		Fragmentation of natural habitat due to clearing	Medium (-)	Low (-)
		Loss of flora and faunal habitat due to clearing	Medium (-)	Low (-)
Operational:	**Direct:**	Fragmentation of natural habitat	Medium (-)	Low (-)
		Loss of flora & fauna habitat	Medium (-)	Low (-)
	Indirect	Loss of flora and fauna SCC due to poaching / illegal harvesting	Medium (-)	Low (-)

The following recommendations are made with regards to the mitigation and management of impacts on vegetation:

- Connectivity must be maintained along the watercourses and adjacent slopes, neither of which are suited to citrus orchards.

- Ecological connectivity will be partly retained between the recommended ecological corridors and the surrounding undeveloped farms to the east, west and south; however, perimeter security fencing will restrict free movement of certain faunal groups (larger mammals and tortoises). Faunal movement between corridors on the east and west side of the farm portion will also be impeded by citrus orchards (existing and proposed). Recommended solutions would be to retain a vegetated strip (± 50 m wide) along the western and southern boundary.
- No species of conservation concern having an Endangered, Critically Endangered or Vulnerable status were recorded during the site visit.
- Faunal sensitive species 7, although potentially a transient visitor is unlikely to be present, as the fencing around the site would likely exclude free movement of this species.
- Permits are required to be obtained from DFFE for the removal / damage to tree species protected in terms of the National Forests Act (Act No. 84 of 1998).
- Several flora species are present that are generally more widespread and not under threat but are protected in terms of the Provincial Nature Conservation Ordinance. Similarly, several protected faunal species are also likely present including tortoises and other reptiles. A flora and fauna search and rescue will enable these species to be identified and relocated before any vegetation clearing commences.

It is the conclusion of the terrestrial biodiversity assessment that the proposed clearing of vegetation for citrus orchards is unlikely to have any significant terrestrial biodiversity impact as long as connectivity issues are mitigated by retaining the natural vegetation as indicated in the proposed layout plans.

13.3 AQUATIC BIODIVERSITY FEATURES (ARTIFICIAL AND NATURAL)

13.3.1 Rivers within and surrounding the study area

The site assessment confirmed that there are a number of non-perennial tributaries falling with the project area. These non-perennial tributaries likely historically drained into the perennial Sundays River system, however, there has been complete alteration/disconnection of the non-perennial tributaries falling within the project footprint and the Sundays River. These rivers would be termed non-perennial with intermittent flow in terms of SANBI Classification guidelines (2013). However, given the nature of this assessment and requirement for delineation and recommendation of buffer zones of the rivers within the study area, they have been described as follows:

- Non-perennial rivers

The non-perennial streams have no clear or well-defined active channel but rather vegetated channels with more pronounced drainage pathways compared to the drainage lines. These non-perennial rivers would likely rarely see any flows, only during rainfall or flood events. A large majority of these non-perennial rivers are in a modified state from existing activities on the farm portions (gravel roads, tracks, animal pathways, historical and current cultivation). These non-perennial rivers appear completely disconnected from the Sundays River system and are considered to be of relatively low ecological importance.

- Drainage lines

The drainage lines are mostly inconsistent, with no exact flow path and location. No well-developed channels or riparian zone is evident. These drainage lines typically act as flow paths for water and would only likely see surface flows during heavy rainfall or flooding events.

Drainage lines appear more pronounced at their source where they are at a steeper gradient (and erosion is also present) and become less pronounced further downslope where the gradient

becomes gentler, with the dispersion of potential flow more extensive and uneven making definite drainage paths difficult to detail. The large majority of drainage lines identified appear to have formed as a result of erosion due to historical gravel roads, pathways, small-scale excavation and borrowing activities.

- Riparian vegetation

Vegetation within and surrounding the non-perennial rivers and drainage lines appeared to be predominantly terrestrial in nature and typical of the vegetation types identified by SANBI (2019), namely Sundays Valley Thicket (refer to Chapter 6 of the EIA Report).

Typically terrestrial species, *Acacia natalitia, Euphorbia mauritanica, Portulacaria afra, Lampranthus productus* and *Azima tetracantha* were some prominent species identified within riparian areas associated with the non-perennial rivers.

13.3.2 Wetlands within and surrounding the study area

No natural wetlands were identified on the property under assessment, based on desktop analysis and site investigation. NWM5 (NBA, 2018) identified one natural riverine wetland associated with the Sundays River within 500m of the development footprint. This river was noted to have prominent reed beds. It is worth noting, that this river will not be affected by the project development, given its distance from the site and existing road, canal and cultivated/developed areas acting as a buffer between the property and the Sundays River.

13.3.3 Water storage/stock dams

A number of water storage dams occur within and surrounding the project footprint. One off-channel water storage dam occurs within the property and two instream water storage dams occur adjacent to the border of the property. The remaining water storage dams occur on neighbouring properties within 500m of the development footprint and will not be affected by the development proposal.

Wetland vegetation was only observed within the two water storage dams adjacent to the property boundary and included *Typha capensis* and *Phragmites* species. The remainder of the water storage dams and along their perimeter was dominated by terrestrial vegetation with the same composition as that mentioned under the riparian vegetation section above.

13.3.4 Impact Assessment

Table 13.3: Key direct and indirect impacts on aquatic features (Medium to High Negative pre-mitigation only).

Development phase	**Impact type**	**Impact**	**Rating**	
			Without mitigation	**With mitigation**
Planning and Design:	**Direct:**	Loss of riparian habitat at watercourse crossings and habitat around the dams.	Medium (-)	Low (-)
	Indirect:	Potential pollution of ground and surface water.	Medium (-)	Low or Very Low (-)
Construction	**Direct:**	Loss of riparian habitat at watercourse crossings and habitat around the dams	Medium to Low (-)	Low (-)

	Indirect:	Changes to hydrological regimes of the non-perennial rivers and drainage lines.	Medium (-)	Low (-)
	Indirect:	Potential pollution of all water resources within and surrounding the development footprint.	Medium (-)	Low or Very Low (-)
	Indirect:	Increase in sedimentation and turbidity levels of instream habitats (non-perennial rivers and drainage lines).	Medium (-)	Low (-)
Operational:	**Direct:**	Loss of and alteration of riparian habitat	Medium (-)	Low (-)
	Indirect:	Changes to the hydrological regime of the watercourses affected by the development proposals.	Medium (-)	Low (-)
	Indirect:	Increase in sedimentation and turbidity levels of surrounding watercourses and increase in the potential for erosion.	Medium (-)	Very Low (-)
	Indirect:	Potential pollution of all water resources within and surrounding the development footprint.	Medium (-)	Low (-)

- Cumulative Impacts

Construction Phase:

Cumulative construction impacts are anticipated to occur, given the area (an area of large-scale agricultural developments). Cumulative impacts are likely to relate to the loss and alteration of riparian habitat and alteration of hydrological flow regimes associated with watercourse crossings, although, in the case of this project, this is expected to be relatively small. While, these cumulative impacts are anticipated, through the implementation of the mitigation measures in this report the overall significance of these cumulative impacts can be reduced to low negative significance.

Operational Phase:

It is anticipated that there will be cumulative operation impacts associated with the project. These relate to the change in the catchment hydrology through alteration and change in land use of the catchment of small non-perennial rivers and drainage lines occurring within and surrounding the project footprint. The layout and design of the proposed citrus expansion has taken into account appropriate buffers from the non-perennial rivers and drainage lines occurring within and surrounding the project footprint as far as possible. This approach to layout and design, coupled with the implementation of the mitigation measures provided in the operational impacts section will reduce the significance of these cumulative impacts.

Recommended buffer widths are as follows:

- 100m buffer from the centre line of the non-perennial rivers
- 40m buffer from the centre line of drainage lines
- 40m buffer from border of water storage dams

13.3.5 Recommendations and Mitigation

The following recommendations are made with regards to the mitigation and management of impacts on Aquatic features:

- Appropriate stormwater protection measures should be incorporated around structures crossing watercourses
- Stormwater management and management of potential runoff as a result of irrigation must be in place. This could be in the form of berms or swales to capture and attenuate the runoff.
- A rehabilitation and alien vegetation management plan must be developed for implementation
- Construction work within areas associated with the pipeline crossings should be short-term with disturbed areas rehabilitated as soon as construction is complete to reduce the possibility of erosion of the areas and resultant sedimentation of the watercourses
- The proposed water storage dam and any other storage facilities should be lined and designed in such a way that prevents contamination of surrounding ground and surface water
- Prevent clearing to no more than the minimum width required
- All hazardous substances and hazardous waste (if any) must be stored in existing impermeable structures placed at the logistical services area
- Temporary stormwater and erosion control infrastructure must be put in place and monitored during the construction phase

13.4 ARCHAEOLOGICAL ASSESSMENT

13.4.1 Archaeological Results and Findings

Access to the study area was easy, but dense vegetation and grass in certain areas made it difficult to find *in situ* archaeological sites/materials. Nonetheless, occasional Middle Stone Age (MSA) stone tools were observed in a vehicle track along the southern boundary fence. These stone tools were in secondary context and not associated with any other archaeological material and no further action is needed. There is a dilapidated old building next to a quarry on the property. There are no known graves older than 60 years on the property.

The proposed development will take place near the Sundays River, in an area where one would expect to find freshwater mussel middens. It is recommended that if such features or any other concentrations of archaeological material are exposed, it must be reported to the archaeologist at the Albany Museum in Makhanda (Grahamstown) or to the Eastern Cape Provincial Heritage Resources Authority so that a systematic and professional investigation can be undertaken. Furthermore, all clearing activities must be monitored and managers/foremen should be informed before clearing/construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. The ECO can be trained to monitor the clearing of the vegetation and to report finds. In general, the proposed areas for development appears to be of **low archaeological sensitivity** and the development may proceed as planned.

13.4.2 Archaeological Impacts and Recommendations

The main impact on archaeological sites/remains (if any) will be the physical disturbance of the material and its context. The clearing of the vegetation may expose, disturb and displace archaeological sites/material. However, from the investigation it would appear that the proposed areas earmarked for development are of **low archaeological sensitivity**. The Middle Stone Age stone tools observed in the area to be developed are considered to be of **low cultural significance**, because they are in secondary context and not associated with any other archaeological remains. Notwithstanding, important materials may be covered by soil and vegetation. There are no known graves or buildings older than 60 years on the area surveyed. The potential impact on buried pre-colonial archaeology sites/remains during the proposed development has been rated **as Low Negative (-)** before mitigation and Neutral (0) after mitigation.

The cumulative impacts on above and below ground heritage will increase when further developments take place in adjoining areas, such as the proposed development of approximately 250 hectares of citrus orchards and associated infrastructure on Portion 4 of the Farm Klein Rooipoort No. 632 (located to the south and adjacent to the proposed Sontule Citrus development) and the development of a storage dam on Portion 2 of Farm 658 (located to the north and adjacent to the proposed Sontule Citrus development). It is anticipated that archaeological material uncovered or found during the development will be of low cultural significance similar to those observed during this survey. The cumulative impact of the developments therefore does not change the overall impact rating of **Low Negative (-).**

The following actions are recommended:

- Although it would seem unlikely that any significant archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological remains such as freshwater shell middens and historical material may be uncovered during the development. Should such material be exposed during construction, all work must cease in the immediate area (depending on the type of find) and it must be reported to the archaeologist at the Albany Museum in Makhanda (Grahamstown) (Tel: 046 6222 312) or to the Eastern Cape Provincial Heritage Resources Authority (Tel: 043 7450 888), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations will follow from the investigation (See appendix B of Chapter Nine for a list of possible archaeological sites that maybe found in the area).
- All clearing activities and other developments must be monitored. Managers/foremen should be informed before clearing/construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. Alternatively, it is suggested that a person must be trained (ECO) as a site monitor to report to the foreman when heritage sites/materials are found.

13.5 PALAEONTOLOGICAL ASSESSMENT

13.5.1 Palaeontological Results and Findings

The Sontule Citrus agricultural project area is underlain at depth by fossiliferous marine sediments of the Sundays River Formation (Uitenhage Group) of Early Cretaceous age. Shelly invertebrate fossils have been previously recorded from the Cretaceous beds here in the scientific literature (e.g. McLachlan & McMillan 1976). During a recent one-day site visit several rich fossil sites yielding well-preserved bivalve molluscs as well as storm-generated coquinas (shell beds) of broken shelly remains and a few blocks of well-preserved petrified wood were recorded from small exposures of marine siltstones and calcareous sandstones along the low escarpment on the northern borders of the project area. However, none of these fossil sites lie within the project footprint and therefore no mitigation measures are recommended in their regard.

The proposed agricultural expansion will be situated in an undulating, gently sloping plateau area which has already been partly disturbed by agriculture, farm tracks and quarrying and is largely vegetated by dense subtropical thicket. The Cretaceous bedrocks here are entirely mantled by deep (several meters) alluvial deposits of the Late Caenozoic Kudus Kloof Formation. These sandy to gravelly sediments of inferred Pliocene age are often calcretised in the subsurface and are generally unfossiliferous. No fossil remains, apart from possible calcretised plant root traces of low scientific interest, were recorded within them.

13.5.2 Palaeontological Impacts and Recommendations

Given (1) the small (partially disturbed) footprint of the proposed agricultural expansion, (2) the likely deeply weathered condition of the underlying Mesozoic bedrocks near-surface, as well as (3) the low palaeontological sensitivity of the overlying superficial sediments, the palaeontological heritage impact significance of all components of the proposed agricultural expansion (i.e. new blocks of citrus plantation, new dam, internal roads, irrigation pipeline etc) is assessed as **LOW (negative)** without mitigation. Current impacts on palaeontological heritage within the wider project area involve on-going destruction of newly exposed fossils by natural weathering and erosion processes (Impacts due to farming activities or illegal fossil collection here are likely to be negligible). This assessment applies to the individual project components as well as their anticipated cumulative impact.

There are no objections on palaeontological heritage grounds to authorisation of the proposed Sontule Citrus agricultural development. No further palaeontological heritage studies or specialist mitigation are required for the proposed developments, pending the potential discovery or exposure of any significant fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, shelly fossil horizons) during the construction phase. The ECO responsible for these developments should be alerted to the possibility of important fossil remains being found either on the surface or exposed by fresh excavations during construction.

Should fossil remains such as bones, shells or petrified wood be discovered during construction, these should be safeguarded (preferably in situ) and the ECO should alert the Eastern Cape Provincial Heritage Resources Authority (ECPHRA. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). This is so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist (See tabulated Chance Fossil Finds Procedure in Appendix 2 to this report). The specialist involved would require a collection permit from ECPHRA. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013).

13.6 TRAFFIC ASSESSMENT

The following conclusions can be drawn from the traffic specialist study:

- Access to the proposed orchard expansion can be provided directly from MR00471 (R336) via the existing access point at km 34.700; and
- A total of 604 trips per picking season (302 in and 302 out) equating to 6 per day generated at full development will have minimal impact on the operational capacity of the adjacent road network should regular maintenance be conducted.

Table 13.4 below provides a summary of the key direct and indirect impacts associated with the development that have been identified by the traffic specialist. Only impacts that are rated as having a potential *Medium to High or Very High* negative impact (before mitigation) are listed below:

Table 13.4: Key direct and indirect traffic impacts (Medium to High Negative pre-mitigation only).

Development Phase	Impact	Rating	
		Without mitigation	With mitigation
Construction	Additional traffic volumes	Medium (-)	Low (-)
Construction	Traffic Safety Impact due to slow moving traffic	High (-)	Medium (-)
Operational	Traffic safety due to additional traffic	High (-)	Medium (-)
Operational	Deterioration of Public Road Network	Medium (-)	Low (-)
Operational	Generation of Dust on Gravel Access Road	Medium (-)	Neutral (o)

In view of the findings of this study, it is recommended that:

- This TIA be approved by SANRAL SOC;
- Access to the proposed development be gained via the existing access point at km 34.700 on MR00471 (R336) as indicated on Figure 2 (in Chapter Eleven); and
- Suitable warning signage be erected on the approaches to the access point as indicated on Figure 2 (in Chapter Eleven).

13.7 VISUAL ASSESSMENT

13.7.1 Visual Results and Findings

The study area is dominated by two main landscape character types, Sundays Thicket on an undulating plain and Citrus Orchards. The visual integrity of the orchards landscape type and the study area in general is being visually impacted by the shade cloth structures, which contrast with the existing dark green and brown hues of the environment.

The study area's scenic quality is of a mixed character rated *low* (orchards with shade cloth) to *high* (Sundays Thicket on undulating plains). The site, which straddles three of the four landscape character types identified, is also of mixed visual character and is potentially sensitive to change if the change is not effectively managed. Sensitive viewing areas and receptors have been identified and mapped, indicating sensitivity to the project.

13.7.2 Visual Impacts and Recommendations

Visual impacts are highest when receptors are sensitive to change, and their view is focused on and dominated by the change. The Project's visual impact will cause changes in the landscape that are noticeable to receptors living in and visiting residences, tourist areas, and public roads to the south, north and east of the project site. It has been established that the most sensitive receptors are visitors to and residents of the property immediately to the south of the site. Tourism (hunting and a small guest lodge) and sporting (long-range target shooting) activities occur here. However, views from the property towards the project activities already contain features associated with citrus production and the ever-increasing establishment of shade cloth structure, thus reducing the significance of the potential visual impact of the proposed Sontule project.

The significance of the worst-case scenario impact on the various sensitive receptor areas during the CONSTRUCTION PHASE is a direct negative impact that is partially reversible (should the project not proceed to the Operational Phase). The impact is predicted to be **Medium Negative** (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment

continues to function but in a modified manner. It will have an influence on decision-making if not mitigated. The impact can be reduced with the implementation of the appropriate mitigation measures, but the significance of the impact is likely to remain Medium (-).

During the OPERATIONAL PHASE, a direct, partially reversible (should the shade cloth structures be removed) negative impact is predicted. The long-term impact is assessed as **Medium Negative** (-), i.e. the impact/risk will result in a moderate alteration of the environment where the environment continues to function but in a modified manner. The impact would remain Medium (-) even with the effective implementation of mitigation measures.

When taken together with the negative impacts of existing citrus orchards under shade cloth, which occur across the study area and the sub-region, the negative cumulative effect would remain **Medium Negative** (-). However, the proposed Sontule project would not appear uncharacteristic when set against the visual attributes of the site's immediate surroundings and the dominant land use of the sub-region.

The following recommendations of significance have been provided by the visual specialist:

- Establish a 50m buffer zone of indigenous vegetation along the southern boundary and a 10m buffer along the site's western edge.
- Natural colours (i.e., green or brown) to be used for side walls.
- Maintain shade cloth in a good condition.
    - Regular checks should be undertaken for damaged, tears or flapping shade cloth and must be repaired as soon as possible.
- Should operations (i.e., picking season) occur outside of normal daylight working hours, appropriate lighting (of appropriate lumen and downward angles) should be ensured.

13.8 ASSESSMENT OF ALTERNATIVES

The following alternatives were identified for consideration in this assessment:

- No-Go alternative
- Property/ Location alternatives
- Land-Use alternatives
    - Grazing/ game
    - Citrus orchard establishment
- Layout alternatives (development footprints)

The preferred alternatives from the list above as contemplated in detail in Chapter Five are summarized below.

13.8.1 No-Go Option

The No-Go option would entail not clearing the site for the proposed expansion of citrus orchards and a new off-stream farm dam, whilst retaining the remainder of the Sundays Valley Thicket. This will include the continued encroachment of exotic and invasive vegetation, if not actively controlled, and the resultant continued degradation of the vegetation over time. Conversely the No-Go option would result in the loss of potentially productive agricultural land in an area known for citrus production and at a site that forms part of an existing working citrus farm. The no-go option would result in the loss of a capital investment estimated to be approximately R25 million. The operational phase of the project will result in the creation of 97 employment opportunities with an annual income of approximately ~R3 million. In addition, since the applicant, Sun Orange Farms (Pty) Ltd

forms part of a broad-based black ownership scheme, the no-go option would mean that several historically disadvantaged individuals (HDIs) do not receive the benefits of the proposed expansion. The no-go option would result in a loss of these economic opportunities, as well as the increased production of food for local and international markets, which is considered to be a negative impact.

While the No-Go option will have no significant negative biophysical environmental impacts, it will result in the loss of positive social and economic benefits which are associated with the Go option. Finally, the No-Go option will result in the farm not being optimally utilized for agriculture, for which it is zoned and well positioned. Therefore, the **No-Go option is not the preferred alternative**.

13.8.2 Property/ Location Alternatives

Regarding the content of the Scoping Report, Appendix 2, Section 2 (1) (g) (x) requires that, if an alternative is not considered, the reasoning/ motivation for such is provided. In line with this regulation the following reasoning was provided for not including the assessment of property alternatives in the approved Scoping Report, however, layout development footprints have been considered, as contained in section 13.8.4 below.

Reasoning/ Motivation for the Elimination of an Alternative

Chapter One of the EIA Regulations 2014 (as amended), provides for the interpretation and purpose of the regulations, including, amongst others the assessment of alternatives, which may include the property or location upon which an activity is proposed to take place. This should not be confused with layout/ development footprint alternatives within a specific site, which will be included in this assessment process (see section 13.8.4 below). As a baseline, the No-Go alternative will be assessed.

Sontule was considered suitable for the agricultural expansion of this nature due to amongst others, the fact that there is existing citrus and associated infrastructure on the farm, the availability of the land, soil suitability, and biophysical attributes (vegetation and aquatic) which would allow for cultivation, as well as conservation. In addition, the proposed site was identified due to its close proximity to existing irrigation infrastructure, access to irrigation water (LSRWUA canal system) and the logistical services area on the same farm which will be required to service the additional orchards.

The farm known as Sontule is zoned Agriculture I and ~133ha of the farm has been transformed for citrus orchards and associated infrastructure (dam, logistical services area, roads and lay down areas). Based on the recommendations by the various specialists (e.g., aquatic features and associated buffers, biodiversity conservation target areas, soil suitability, slope etc.), as well as technical input, a portion of Sontule measuring ~175ha (38% of the original extent) is not suitable for development.

Given that the proposed agricultural development will tie into existing agricultural activities on Sontule, it is not deemed feasible to assess other property alternatives.

Based on the experience of the EAP, land available for cultivation and which is zoned Agriculture I, which is situated adjacent to existing agricultural areas, have existing water use rights, suitable soils, and is near the LSRWUA canal system, is becoming increasingly scarce in the Sundays River Valley. Sontule meets the abovementioned requirements and thus, **no other reasonable or**

feasible property/ location alternatives are proposed to be assessed. Layout/ development footprint alternatives within the farm, however, have been assessed (see Section 13.8.4 below).

13.8.3 Land Use Alternatives: Citrus Orchard Establishment

As outlined in Chapter One of this report, the area under assessment is located in the SRVM, is zoned Agriculture I and located on a working citrus Farm. In terms of the Section 8 Zoning Scheme Regulations this "*means the cultivation of land for crops and plants or the breeding of animals, or the operation of a game farm on an extensive basis on the natural veld or land, and includes only such activities and buildings as are reasonably connected with the main farming activities of the farm, but does not include the consent uses applicable to agriculture zone 1."*

The project applicant, Sun Orange Farms (Pty) Ltd, proposes to clear approximately 147ha for the expansion of the existing agricultural development on Remainder of Farm 632 (~459ha), Sundays River Valley Municipality (SRVM), for the establishment of additional citrus orchards and associated infrastructure (internal roads, lay down areas, internal irrigation pipes), hereafter referred to as Sontule. No logistical services area is required as the applicant will make use of existing support infrastructure (offices, stores, workshops) on the farm to provide technical and logistical support.

In order to supply the proposed development with the required irrigation water, an irrigation dam is proposed to be constructed with a capacity to store approximately 49 000m³ and a footprint of 3.7ha, which will be supplied from the LSRWUA canal system. Irrigation water will be reticulated to the proposed orchards via uPVC internal pipelines of varying diameters. The applicant has confirmed that they have 96ha of existing water use entitlements which are not currently in use on Sontule. Therefore, the applicant intends to utilise the spare water rights to irrigate the additional proposed orchards (~127ha effective irrigation area).

Sontule is located adjacent to existing agricultural activities on its northern, eastern and western boundaries (Chapter Three). The farm is currently being utilised as a working citrus farm (~133ha are transformed). The vegetation on the properties located towards the southern boundary seems to be near natural, although evidence of modification (cutlines and vehicle tracts) is evident. In addition, the property shows varying levels of degradation presumably associated with game grazing.

Based on the surrounding land uses, the proposed agricultural expansion on Sontule is not likely to cause a significant change in character within the surrounding landscape, as the areas north, west and east of the area under assessment are agricultural in nature. The highest impact on sense of place is anticipated during the construction phase, when soils are laid bare for planting.

Some of the key elements contributing to the sustainability of the agricultural expansion of Sontule is, the fact that it is an existing citrus farm, access to arable land, the site is zoned as Agriculture I, suitable soils, the topography of the site and access to as well as the availability of water. Based on the experience of the independent EAP in the area, access to such land in the Sundays River Valley, which meet the abovementioned requirements, is becoming increasingly scarce. The reason being that suitable land with sufficient access to water is already being utilized for commercial citrus and crop production. Potentially suitable land parcels do not always have ready access to canal water from the LSRWUA. Because of the distance to water, developments often require a larger capital investment, to ensure a reliable irrigation water supply. At present, Sontule

meets the abovementioned criteria and is, therefore, considered to have a high agricultural potential and is potentially suitable for the proposed development.

The proposed agricultural expansion on Sontule will create several additional temporary construction phase, as well as permanent, operational and seasonal employment opportunities. In addition, a number of indirect employment opportunities associated with the fruit packing and processing industry, transportation and logistical companies, purchasing, as well as hiring of various products (chemicals, pallets, cartons), are anticipated to be created.

Based on market conditions, as well as fruit quality, the fruit produced as a result of the proposed agricultural development will be predominantly sold as fresh fruit to international markets (export), with poorer quality fruit being sold locally or processed at a local juicing factory. International markets generate income from foreign currency, thus, contributing to local economic growth.

For the reasons outlined above, **this is the preferred alternative**, which has been assessed in detail during the EIA phase of the assessment, and which includes preferred layout/ development footprint alternatives within the preferred site. Chapter Four of this report provides an overview of the methodology for the identification, rating, and assessment of impacts (both positive and negative) and the specialist studies undertaken during the EIA phase of the assessment.

13.8.4 Layout Alternatives

The EIA phase of the assessment has assessed layout/ development footprint, alternatives on Sontule, based on the detailed specialist studies, as well as technical input.

Specialist studies which formed part of this assessment are:

- Soil suitability - potential of soils for the establishment of citrus orchards
- Slope analysis - slopes in excess of 25% are not suitable
- Terrestrial Biodiversity – species of special concern, ecological corridors, biodiversity conservation targets
- Aquatic Biodiversity – aquatic sensitivity and buffer zones
- Heritage – Archaeological and Paleontological features on the farm
- Traffic – additional trip generation and access
- Irrigation - irrigation infrastructure layout
- Visual – potential alteration of the sense of place and visual impacts of the shade netting, in particular

The Alternative 2 layout (preferred development footprint within the site) for the project has been determined by the specialists and technical input in the EIA phase of the assessment as well as public consultation and proposes to clear ~147ha to accommodate the proposed agricultural development, including associated infrastructure (See Chapter Two). It is anticipated that an area measuring ~175ha will remain untransformed within the No-Go areas on Sontule.

For more detail regarding the alternatives that were not considered further in the assessment process due to them not being preferred, see Chapter Five of this report. For more detail on the preferred alternative assessed in detail in this assessment process, see Chapter Two of this report.

13.9 PERMIT REQUIREMENTS

Permission will be required from various provincial authorities prior to the clearance of vegetation as follows:

- Permits from the relevant authority (Department of Economic Development Environmental Affairs and Tourism) are required for the removal, translocation or destruction of all plants and animals listed as endangered or protected in terms of the Cape Nature and Provincial Conservation Ordinance (No. 19 of 1974), as well as those listed as Threatened or Protected Species in terms of NEMBA.
- Permits are required to be obtained from Department of Forestry, Fisheries and Environment (DFFE) for the removal / damage to tree species protected in terms of the National Forests Act (Act No. 84 of 1998).
- The applicant will need to apply for a permit for the Cultivation of Virgin Soil in terms of Regulation 2 of CARA prior to the commencement of any activities on site.
- The Traffic Impact Assessment is to be submitted to the SANRAL SOC for approval prior to commencement of the construction phase.
- A Water Use Licence or General Authorisation in terms of Section 21 (c) and (i) of NWA is required for all watercourse crossings (pipelines and internal access roads) associated with this project.

13.10 OVERALL EVALUATION OF IMPACTS

In 2015, the 2030 Agenda for Sustainable Development was adopted by South Africa and 192 other countries at the Sustainable Development Summit. The new agenda, entitled “Transforming Our World: The 2030 Agenda for Sustainable Development”, was agreed upon by the 193 member states of the United Nations, and includes 17 **Sustainable Development Goals** (SDGs) and 169 targets.

In addition, agriculture was highlighted in President Ramaphosa’s State of the Nation Address in 2020 as one of the areas with the highest growth potential. Similarly, the 2019 South African SDG Country Report identified targets addressing SDG objectives in the food and beverage sector as having the most enabling conditions. Investments in this sector – particularly agriculture – are strongly linked with ending poverty, living dignified lives, and the ability to make the most of educational and economic opportunities. The following extracts from the South Africa SDG Investor Map (UNDP, 2020[6]) have reference:

- *“The sector is also fairly resilient to economic shocks, has high potential for job creation and is important for export-led growth.”*
- *“The sector has remained relatively protected during COVID-19, with limited job losses.”*
- *“As a key link between people and planet, investments in agriculture can help achieve multiple SDGs. Although primary agriculture only constitutes 2.9% of GDP (2018), the broader value chain is estimated to contribute 12% to GDP. Furthermore, it is significant to the broader development agenda as a driver of employment (9% of the total workforce works in this sector) and future job creation.”*

Although the National Development Plan (NDP) pre-dates the adoption of the 2030 Sustainable Development Agenda, there is alignment between the development priorities highlighted in the NDP and the SDGs. As such, the NDP provides a roadmap for South Africa’s efforts to achieve the SDGs, as well as the development priorities identified in the NDP itself.

South Africa has made progress in addressing SDG 2, which aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture by 2030. A 2017 study conducted

[6] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, Pg 47, 49.

by StatsSA indicates that there was a decline in the number of households that were vulnerable to hunger from 24.2% in 2002 to 10.4% in 2017.[7] The proposed agricultural project is in line with SDG 1 (No Poverty), 2 (Zero Hunger) and 8 (Decent Work and Economic Growth). In addition, the proposed development must take into account SDG 12 (Responsible Consumption and Production) and 15 (Life on Land).

South Africa's National Development Plan (NDP, 2030), has as one of its focal points, the expansion of agriculture in order to facilitate job creation. The NDP (2030; page 222), notes the following:

"Expanding commercial agriculture has the potential to create 250 000 direct jobs and a further 130 000 indirect jobs. This can be achieved by picking winning agricultural sub-sectors where the expansion in production and further value-adding processes are sustainable over the long term. Expansion is not only driven by higher levels of productivity, but also supported by foreign and domestic demand. Without boosted demand, increased production will depress domestic price, which is bad for employment creation in the sector.".

With regards to citrus as a subsector of labour-intensive agriculture, The NDP (2030; Page 222), states the following:

"There are about 60 000 hectares of citrus trees in South Africa. The employment requirement to produce citrus fruit is estimated at one worker per hectare, about 60 000 workers are employed on citrus farms. Direct downstream labour requirements for citrus are estimated at one labourer per 2 500 cartons packed: with about 100 million cartons packed per year, some 40 000 jobs are created in packing plants for a period of six months, or 20 000 full-time equivalents. In addition, there are labour requirements for transportation, warehousing, port handling, research and development, and processing. From 2000 to 2010, the citrus-farming area increased by 28 percent, from 47 000 to 60 000 hectares."

The Final Integrated Development Plan for the SRVM (SRVM IDP 2016/ 2017), indicates that the current unemployment rate in the municipal area may be as high as 38.54%. The Agricultural sector provides room for growth in terms of employment opportunities, as it currently represents ~11% of the employment for the SRVM area (Final SRVM IDP 2015/ 2016). Additionally, the SRVM IDP (2015/ 2016; Page 36) states that: *"The municipality can boast its ecotourism and agricultural potential."* Finally, the following statement is given by the SRVM Spatial Development Framework (SRVM SDF 2013; Page 8): *"The agricultural sector is one of the key economic drivers of the Sundays River Valley Municipality*."

It is the applicant's intention to build on this economic base in the SRVM, by making optimum use of the available resources in the area, i.e. available land zoned as agriculture, the availability of a sustainable supply of irrigation water from the LSRWUA canal system, the suitability/ fertility of the soils, as well as the available work force from local communities. By making use of this labour market, the proposed development would also support the vision of the Sundays River Valley Local Economic Strategy as outlined in the SRVM SDF (2013) which indicates agriculture, as a Local Economic Development Priority and identifies the need *to "…expand the agricultural section in the region."*, as an Economic Development Objective.

[7] UNDP South Africa Country Office (2020) The South Africa SDG Investor Map, pg 47.

The proposed agricultural expansion will require the capital investment of approximately R25 million and will create additional direct permanent, as well as seasonal employment opportunities. In addition, a number of indirect, employment opportunities associated with the fruit packing industry, transportation and logistical companies, purchasing, as well as hiring of various products (chemicals, pallets, cartons), are anticipated to be created. In addition, since the applicant, Sun Orange Farms (Pty) Ltd forms part of a broad-based black ownership scheme, the proposed agricultural expansion on Sontule will result in benefits for historically disadvantaged individuals (HDIs).

During the operational phase of the development, it is estimated that 12 new skilled and 85 unskilled employment opportunities will be created at a value of ~R3 million per annum. Labour will be sourced locally from communities in the SRVM and Nelson Mandela Bay Municipality (NMBM).

Based on the experience of the EAP, land available for cultivation, which is situated adjacent to existing agricultural areas, is zoned for agricultural use, has existing water use rights, suitable soils, and is near the LSRWUA canal system, is becoming scarce in the Sundays River Valley.

The additional clearance of ~147ha will result in **~38%** (175ha) of the original extent of the near-natural and degraded vegetation on the farm being retained. By adopting the proposed no-go areas and all mitigation measures recommended by the Biodiversity Specialists, the biodiversity pattern target area for the various vegetation types, and the ecological and hydrological process areas on the farm will be safeguarded.

By applying the mitigatory measures proposed *Construction Phase* direct and indirect impacts of medium to high significance can be reduced to impacts of *medium to low negative impacts*. The key direct and indirect impacts associated with the *Operational Phase* of the development can, by applying the mitigatory measures proposed be reduced from negative impacts of high to medium significance to impacts of *medium to low negative or neutral impacts*.

The Environmental Assessment process has not identified any negative impacts that should be considered “fatal flaws” from an environmental perspective, and thereby necessitate substantial re-design or termination of the project. Taking into consideration the findings of the EIA process, it is the opinion of the Environmental Assessment Practitioner that the project benefits outweigh the negative residual environmental impacts, provided that the specified mitigation measures are applied effectively, it is proposed that the project receive environmental authorization in terms of the EIA process.