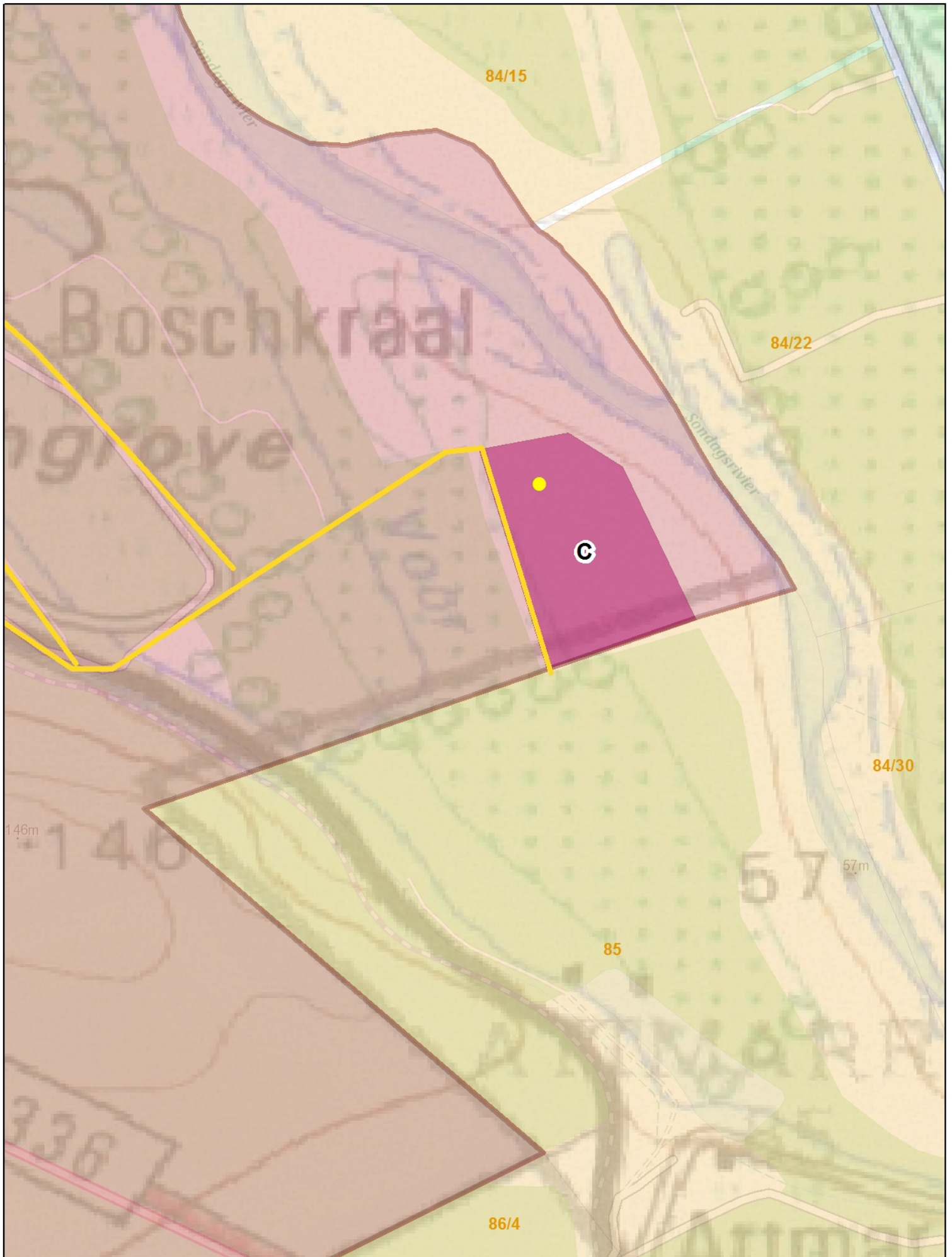


# **APPENDIX A**

## **SITE PLANS**

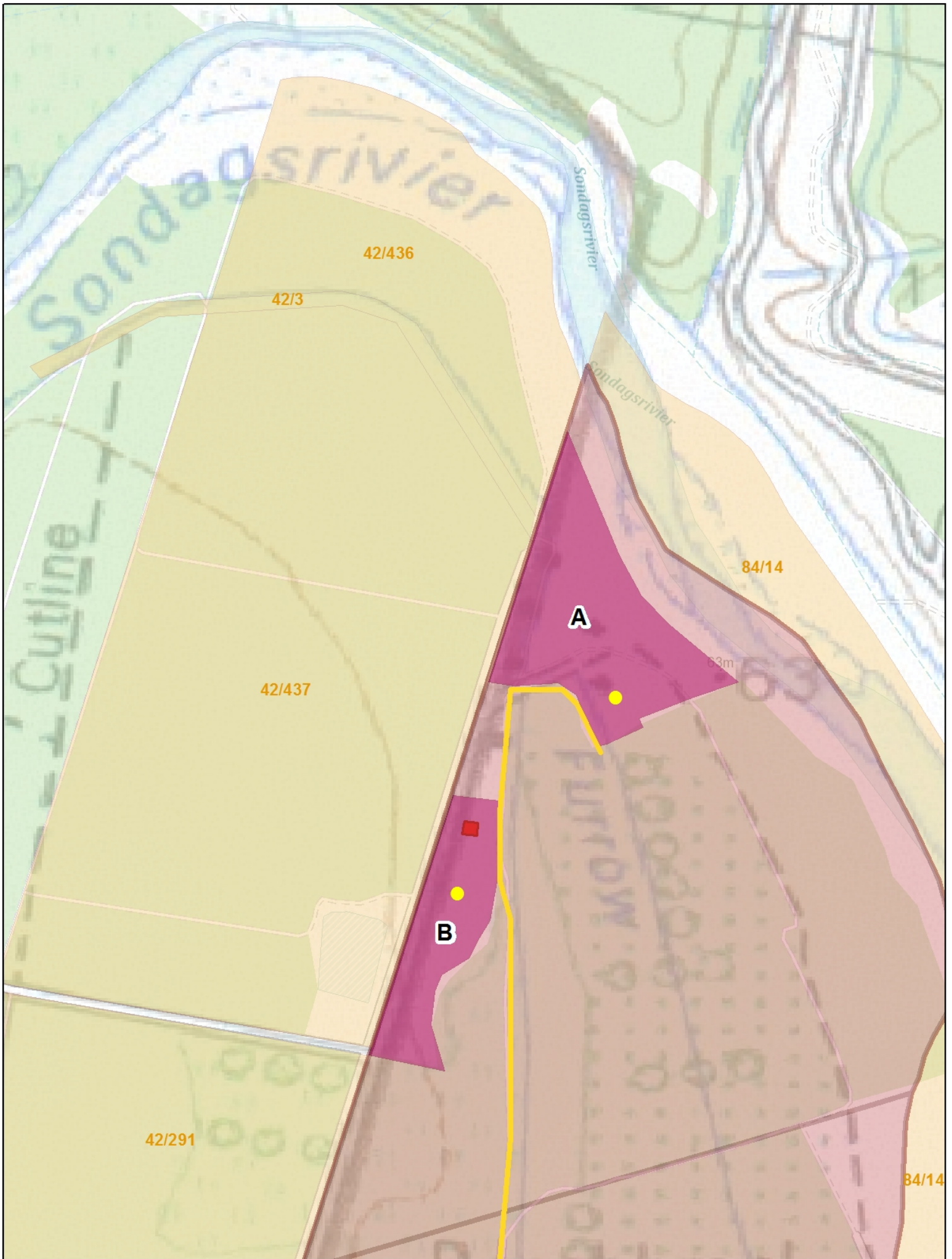


- Legend**
- Photograph Points
  - Access Road
  - Boschkraal Farm
  - Agricultural Land
  - Adjacent Farms
  - Location of Graves
  - Blocks to be cleared

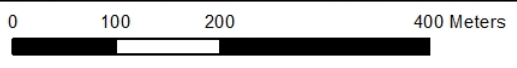


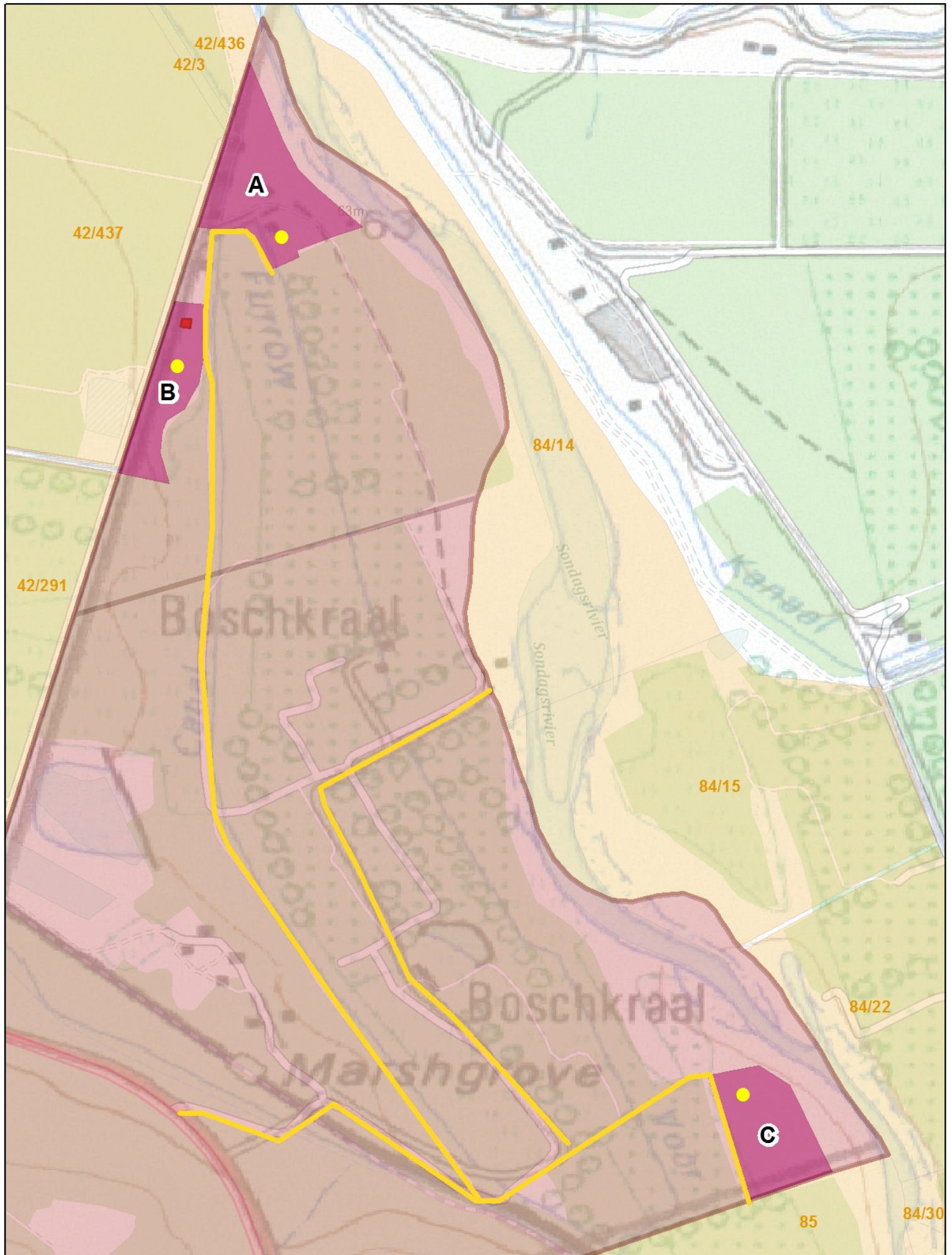
0 87.5 175 350 Meters





- Legend**
- Agricultural Land
  - Photograph Points
  - Access Road
  - Adjacent Farms
  - Location of Graves
  - Boschkraal Farm
  - Blocks to be cleared





- Legend**
- Photograph Points
  - Access Road
  - Boschkraal Farm
  - Location of Graves
  - Blocks to be cleared
  - Agricultural Land
  - Adjacent Farms



0 125 250 500 Meters

**APPENDIX B**

**PHOTOGRAPHS**



Prime Resources (Pty) Ltd  
 The Workshop 70-7th Avenue Parktown North 2193  
 PO Box 2316 Parklands 2121  
 T [011] 447 4888 F [011] 447 0355 E prime@resources.co.za  
 www.resources.co.za



**BLOCK A**



Photo 1: Block A Boundary.



Photo 2: Block A North.



Photo 3: Block A North East.



Photo 4: Block A East.



Photo 5: Block A South East.



Photo 6: Block A South.



Photo 7: Block A South West.



Photo 8: Block A West.



Photo 9: Block A North West.

**BLOCK B**



Photo 10: Block B North.



Photo 11: Block B North East.



Photo 12: Block B East.



Photo 13: Block B South East.



Photo 14: Block B South.



Photo 15: Block B South West.





Photo 16: Block B West.



Photo 17: Block B North West.



Photo 18: Graves within Block B.



Photo 19: Graves within Block B.

**BLOCK C**



Photo 20: Block C North.



Photo 21: Block C North East.



Photo 22: Block C East.



Photo 22: Block C South East.



Photo 23: Block C South.



Photo 23: Block C South West.



Photo 24: Block C West.



Photo 25: Block C North West.



## **APPENDIX C**

### **FACILITY ILLUSTRATIONS**

**N/A**

## **APPENDIX D**

### **SPECIALIST REPORTS**

# **ARCHAEOLOGICAL STUDY**



## DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

(For official use only)

File Reference Number:

NEAS Reference Number:

Date Received:


Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014

### PROJECT TITLE

Proposed clearing of vegetation in three areas to establish citrus orchards on the farm Boschkraal near Kirkwood in the Sunday's River Valley Local Municipality of the Eastern Cape Province

Specialist:	Dr Johan Binneman		
Contact person:	Mr Kobus Reichert (Eastern Cape Heritage Consultants cc)		
Postal address:	PO Box 689, Jeffreys Bay		
Postal code:	6330	Cell:	072 800 6322
Telephone:	042 296 0399	Fax:	042 2960 399
E-mail:	jnfbinnean@gmail.com		
Professional affiliation(s) (if any)	Member of the Association of Southern African Professional Archaeologists (ASAPA)		
Project Consultant:	Prime Resources (Pty) Ltd		
Contact person:	Ms Romy Antrobus		
Postal address:	PO Box 2316, Parklands		
Postal code:	2121	Cell:	0722357067
Telephone:	011447488	Fax:	0114470355
E-mail:	romy@resources.co.za		



4.2 The specialist appointed in terms of the Regulations\_

I, **J.N.F. Binneman**, 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 report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- 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;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

*J.N.F. Binneman*  
Signature of the specialist:

**Eastern Cape Heritage Consultants cc**

Name of company (if applicable):

*2016-03-11*

Date:

*2016-03-11 (H. N. M. M. M.)*

Signature of the Commissioner of Oaths:

*2016-03-11*

Date:

**WARRANT OFFICER:**

Designation:

Official stamp (below)

Version 1 of 2015







**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  
P.O. Box 2316  
Parklands  
2121  
Tel.: 011 447 4888  
Fax.: 011 447 0355  
Contact person: Ms R. Antrobus  
E-mail: prime@resources.co.za

**Compiled by:** Dr Johan Binneman and Mr Kobus Reichert  
**On behalf of:** Eastern Cape Heritage Consultants  
P.O. Box 689  
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6330  
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jnfbinneman@gmail.com

**Date:** February 2016

## CONTENTS

EXECUTIVE SUMMARY	1
PROJECT INFORMATION	2
The type of development	2
Applicant	2
Consultant	2
Purpose of the study	2
Site and location	2
Relevant impact assessments, databases and collections	3
BRIEF ARCHAEOLOGICAL BACKGROUND	4
Literature review	4
References	4
ARCHAEOLOGICAL INVESTIGATION	4
Methodology	4
Limitations and assumptions	5
Results and findings	5
DISCUSSION AND MITIGATION	9
GENERAL REMARKS AND CONDITIONS	10
APPENDIX A: brief legislative requirements	11
APPENDIX B: Guidelines and procedures for developers	12
MAPS	13-14

**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**

**Compiled by:** Dr Johan Binneman and Mr Kobus Reichert

**On behalf of:** Eastern Cape Heritage Consultants

P.O. Box 689

Jeffreys Bay,

6330

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**Note:** This report follows the minimum standard guidelines required by the South African Heritage Resources Agency for compiling Archaeological Phase 1 Impact Assessment (AIA) reports. The report is part of an Environmental Impact Assessment.

**EXECUTIVE SUMMARY**

Prime Resources (Pty) Ltd appointed Eastern Cape Heritage Consultants to conduct Phase 1 Archaeological Impact Assessments (AIA's) of three areas with a combined size of approximately 20 hectares for the proposed clearing of vegetation to establish citrus orchards on the farm Boschkraal near Kirkwood in the Sunday's River Valley Municipality of the Eastern Cape Province. The surveys were conducted to establish the range and importance of the archaeological sites/remains, the potential impact of the development and to make recommendations to minimize possible damage to these sites.

Access to the three areas to be cleared was easy except for area 2 and parts of area 3 where the archaeological visibility was moderate to poor due to the dense vegetation. A bush fire destroyed the vegetation in area 3, but covered the surface with a thick layer of ash which made it difficult to locate archaeological sites/materials.

The graves in area 2 are protected by legislation and must be conserved and may not be disturbed or destroyed without the necessary permits and proceedings. Vegetation covering the graves and in the immediate vicinity must be carefully removed to expose and to establish the location of all possible graves in the area. The vegetation must be removed by hand and must be cut not pulled from the ground. The graves must be fenced-off with the fence not closer than two metres to the graves. No development may take place within five metres from the fence. In general, areas 1 and 3 appears to be of low heritage sensitivity, but must be carefully monitored for heritage sites/material during the development.

The proposed development will take place in close vicinity of the Sunday's River, in an area where one would expect to find freshwater mussel middens. If such features or any other concentrations of archaeological material are exposed, it must be reported to the archaeologist at the Albany Museum in Grahamstown or to the Eastern Cape Provincial Heritage Resources Authority so that a systematic and professional investigation can be undertaken.

## **PROJECT INFORMATION**

### **Type of development**

The proposed development on the farm Boschkraal near Kirkwood in the Sunday's River Valley Municipality of the Eastern Cape Province will include the clearing of vegetation in three areas to establish citrus orchards to expand the existing agricultural activities with an additional 20 hectares (Maps 1-2).

### **Applicant**

CHF Woolley Trust

### **Consultant**

Prime Resources (Pty) Ltd  
P.O. Box 2316  
Parklands,  
2121  
Tel.: 011 447 4888  
Fax.: 011 447 0355  
Contact person: Ms R. Antrobus  
E-mail: prime@resources.co.za

### **Purpose of the study**

The purpose of the study was to conduct Phase 1 Archaeological Impact Assessments (AIA's) for the proposed clearing of vegetation in three areas with a combined size of approximately 20 hectares to establish citrus orchards on the farm Boschkraal near Kirkwood in the Sunday's River Valley Municipality of the Eastern Cape Province. The surveys were 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.

### **Site and Location**

The sites on the farm Boschkraal for the proposed vegetation clearing near Kirkwood is located within the 1:50 000 topographic reference map 3325BC Coerney (Map 1). The proposed property for development is situated approximately 10 kilometres southeast of the Kirkwood CBD and north of the R336 main road connecting Kirkwood with Sunland. The development will take place along and close to the western embankment of the Sunday's River (GPS readings: area 1, 33.27.526S; 25.31.289E; area 2, 33.26.566S; 25.30.591E; area 3, 33.26.442S; 25.30.704E) (Maps 1-2).

The 20 hectares earmarked for clearing were disturbed in the past by farming activities (Map 2, figures 1-3). Area 1 is situated next to Sunday's River and most of the vegetation was destroyed by a bush fire. Area 2 is approximately 500 metres west of the Sunday's River and covered by dense bush and *Acacia karroo* trees. Area 3 is also situated next to the river and a

large part comprised of degraded old fields, ruins of various structures, features and rubble from previous farming activities and human occupation. The remainder of the area is covered by dense *Acacia karoo* trees.

### **Relevant impact assessments from the adjacent region, databases and collections**

- 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. 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 Vlakke No. 98, Sunland near Kirkwood, Sundays River Valley Municipality, Eastern Cape Province. Prepared for I.W. Terblanche & Associates. Stellenbosch. Eastern Cape Heritage Consultants. 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. 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. Jeffreys Bay.
- Binneman, J. 2013a. A phase 1 archaeological impact assessment for the proposed clearing of land for agricultural purposes on Panzi citrus farm near Kirkwood, Division of Uitenhage, Sundays River Valley Municipality, Eastern Cape Province. Prepared for CEN Integrated Environmental Management Unit. Port Elizabeth. Jeffreys Bay.
- Binneman, J. 2013b. 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.
- Binneman, J. 2012a. A phase 1 archaeological impact assessment for the proposed expansion of agricultural activities on Falcon Ridge, Portion 274 Strathsomers Estate No. 42, Sundays River Valley Municipality, Eastern Cape Province. Prepared for Public Process Consultants Greenacres. Eastern Cape Heritage Consultants.

The Albany Museum in Grahamstown houses collections and information from the wider region.

## **BRIEF ARCHAEOLOGICAL BACKGROUND**

### **Literature review**

Little systematic archaeological research and regional surveys/recordings have been conducted in the study area. The oldest evidence of the early inhabitants are large stone tools, called hand axes and cleavers and can be found amongst river gravels along the Sunday's River 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 Uitenhage (approximately 20 km south of the study area), 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).

The large hand axes and cleavers were replaced by smaller stone tools called the Middle Stone Age (MSA) flake and blade industries. 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 Sunday's River and 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-gatherers 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. Pre-colonial indigenous 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.

## **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. *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.

## **ARCHAEOLOGICAL INVESTIGATION**

### **Methodology**

The landowner was contacted prior to the investigation to inform him about the visit and to gain access to the property. He and his daughter accompanied us and pointed out the proposed areas for development. We also consulted them on possible locations of archaeological remains, graves and historical buildings and features. All previous relevant survey information for the immediate and adjacent areas was consulted before the investigation started. A Google Earth aerial image study was also conducted of the area prior to the investigation (Map 2). The survey was conducted on foot by two archaeologists. GPS readings were taken and all important features were digitally recorded.

## **Limitations and assumptions**

Access to the three areas to be cleared was easy except for area 2 and parts of area 3 where the archaeological visibility was moderate to poor due to the dense thicket vegetation, grass and low bushes. On the other hand a bush fire destroyed all the vegetation in area 3, but covered the surface with a thick layer of ash which made it difficult to locate archaeological sites/materials (Figures 1-3).

Regardless of the restrictions imposed by the natural conditions, the experiences and knowledge gained from other investigations in the immediate area and 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 area, or which may be covered by the soil and vegetation.

## **Results and findings**

No heritage sites or materials were observed in area 1 due to the thick layer of ash covering the surface. The landowner pointed out a few graves covered by thicket vegetation in area 2 and on further investigation more graves were located. At least 14 graves were observed (general GPS reading: 33.26.566S; 25.30.591E), but it is possible that there may be several more covered by the dense vegetation. There are no headstones or any other information on the origin or age of the graves. Most of the graves composed of earth mounds, but a few are marked by river cobbles (Figure 2). No other heritage sites/materials were observed.

No heritage sites or materials were observed in area 3 due to the dense ground cover and the disturbed nature of the area. There are ruins, foundations and building rubble of several features in the area, but these are not of any heritage significance and are younger than 60 years old. No further action is required.

No graves or buildings older than 60 years were found in areas 1 and 3 and in general it would appear that these areas are of low cultural sensitivity and that it is unlikely that any sensitive archaeological remains will be exposed during the development.



Figure 1. General views of area 1 earmarked for clearing after a bush fire.





**Figure 2. General views area 1 and the graves covered by dense vegetation.**



**Figure 3. General views of the degrade fields, remains of structures and features of previous farming activities and human occupation in area 3.**

## DISCUSSION AND MITIGATION

The proposed areas for development are situated next to or near the Sunday's River and it is possible that freshwater mussel middens/material may be found on the sites. Little research has been conducted on these middens along the Sunday's River and therefore the archaeological contexts of these features are largely unknown. Freshwater middens were observed along the embankments of the Sunday's River near Barkly Bridge, but it is unknown to what distance they would be situated from the river. Although these sites may date from the past 8 000 years or older, the stone tools observed at these middens included large quartzite backed segments which has been ascribed to the Kabeljous Industry (Binneman 2007) and may date to 4 500 years old.

The main impact on archaeological sites/remains will be the physical disturbance of the material and its context. The clearing of the vegetation to expand the existing agricultural activities (20 ha) may expose, disturb and destroy archaeological sites/material. However, from the investigations and observations in adjacent areas, it would appear that the proposed areas 1 and 3 earmarked for development are of low archaeological sensitivity. Notwithstanding, important materials may be covered by soil and vegetation. Although it is unlikely that any sensitive archaeological remains will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered. It is recommended/suggested that;

Following SAHRA's standard requirements it is recommended that;

1. All graves and graveyards older than 60 years are protected by the National Heritage Resources Act (Act No. 25 Of 1999) (Section 36). Those younger than 60 years are not protected by the National Heritage Resources Act, but protected by the Human Tissue Act and by regional and municipal regulations and may not be disturbed or destroyed without the necessary permits and proceedings. The cemeteries and all graves, including the unmarked ones must therefore be protected and conserved during any developments, for example by fencing them off and that a long term maintenance plan is implemented.
  - Although the origin and age of the graves in area 2 are unknown (appeared to be younger than 60 years old), they are protected by legislation and must not be destroyed or disturbed.
    - When area 2 is cleared from vegetation care should be taken that the graves are not damaged. Vegetation covering the graves and in the immediate vicinity must be carefully removed to expose and to establish the location of all possible graves in the area. The vegetation must be removed by hand and must be cut not pulled from the ground.
    - The graves must be fenced-off with the fence not closer than two metres to the graves. No development may take place within five metres from the fence.
2. The proposed development will take place in close vicinity of the Sunday's River, in an area where one would expect to find freshwater mussel middens. If such features or any other concentrations of archaeological material are exposed, then work must cease in the immediate area of the finds and it must be reported to the archaeologist at the Albany Museum (Tel.: 046 6222312) in Grahamstown or to the Eastern Cape Provincial Heritage Resources Authority (Tel.: 043 6422811), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material (See Appendix B for a list of possible archaeological sites that maybe found in the area).

## Reference

Binneman, J.N.F. 2007. Archaeological research along the south-eastern Cape coast part2, caves and shelters: Kabeljous River Shelter 1 and associated stone tool industries Southern African Field Archaeology 15 & 16:57-74.

## GENERAL REMARKS AND CONDITIONS

**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 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, power line, 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<sup>2</sup> 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<sup>2</sup> 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 A: 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<sup>2</sup> 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 is not fully understood, however, some are thought to represent burial cairns while others may have symbolic value.

### **Stone artefacts**

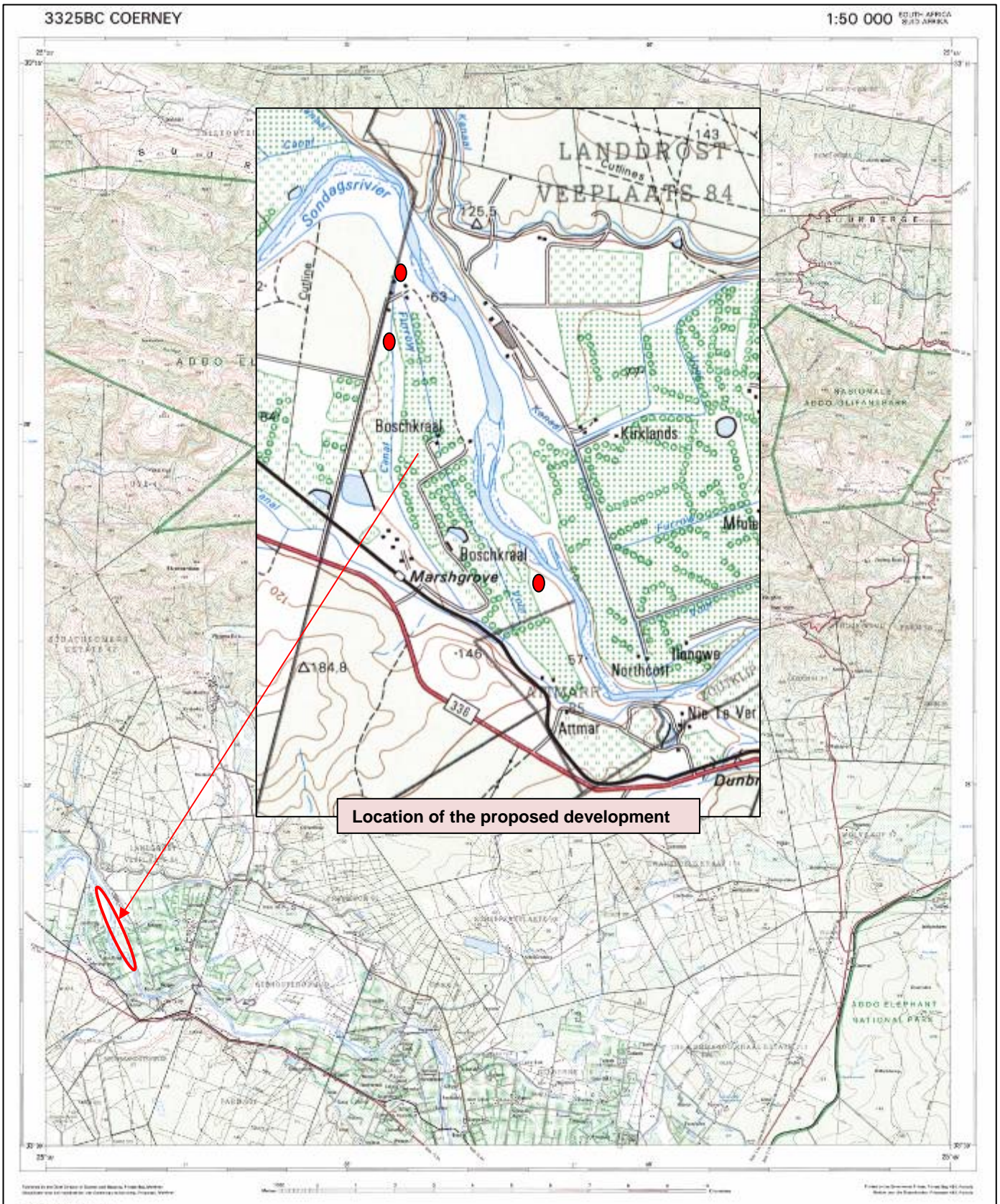
These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologists notified.

### **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 locations of the development marked by the red oval and dots.



**Map 2. Aerial images indicating the locations of the proposed areas earmarked for vegetation clearing (insert image courtesy of Prime Resources Environmental Consultants).**



# **ECOLOGY STUDY**



**DETAILS OF SPECIALIST AND DECLARATION OF INTEREST**

(For official use only)

File Reference Number:

NEAS Reference Number:

Date Received:


Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014

**PROJECT TITLE**

The proposed Boschkraal Citrus Farm Project

Specialist:

Contact person:

Postal address:

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Telephone:

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General declaration:

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- 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 report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- 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;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

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15 MARCH 2016

Date:

53664051  
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2016 03-15

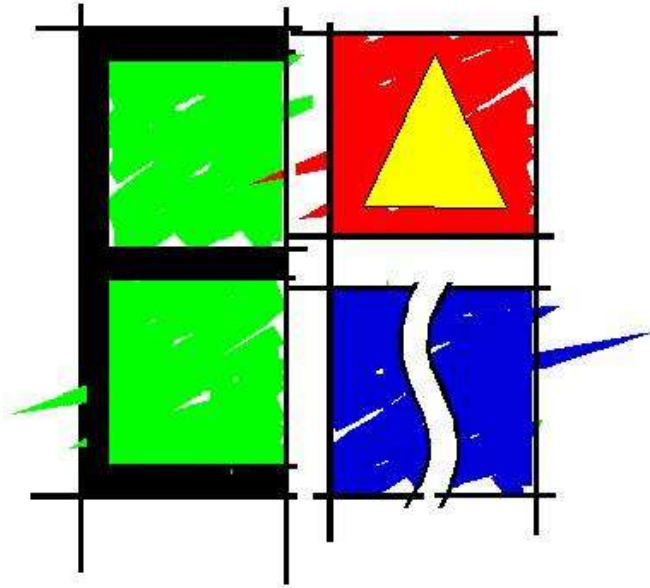
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# ***Boschkraal Citrus Farm: Ecological Assessment Report***



*Report Prepared by:*  
**Engineering Advice & Services (Pty) Ltd**

**EAS Project Number: 1275**

**4 May 2016**

# **Boschkraal Citrus Farm: Ecological Assessment Report**

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**Prime Resources**

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**EAS Project Number: 1275**

**4 May 2016**

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## Table of Contents

1	Introduction & Background .....	1
1.1	Project Description .....	1
1.1.1	Activity Location .....	1
1.1.2	Activity Description.....	1
1.2	Methodology and Approach.....	1
1.3	Proposed Approach .....	1
1.4	Legislation Framework.....	2
1.5	Systematic Planning Frameworks .....	3
1.5.1	Vegetation of Southern Africa .....	4
1.6	Vegetation and Ecological Processes .....	5
1.6.1	Ecological Processes in Thicket (sensu Vlok & Euston-Brown, 2002) .....	6
1.6.2	Eastern Cape Biodiversity Conservation Plan (ECBCP) .....	9
1.7	Implications of Systematic Planning frameworks .....	10
1.8	List of Spatial Planning Maps.....	10
2	Description of the Terrestrial Environment.....	18
2.1	Site Locality.....	18
2.2	Topography and Drainage.....	18
2.3	Vegetation and Flora.....	18
2.3.1	Terrestrial vegetation.....	18
2.3.2	Alluvial soils and deposited material .....	19
2.3.3	Riparian Vegetation .....	19
2.3.4	Species of Special Concern occurring in the region.....	20
2.3.5	Alien Invasive species .....	20
3	Fauna.....	22
3.1	Protected areas.....	22
3.2	Invertebrates.....	22
3.3	Amphibians and Reptiles .....	23
3.4	Birds .....	25
3.4.1	Important Bird Areas (IBA).....	25
3.5	Mammals .....	25
3.6	Recommendation .....	26
3.7	Permit Requirements.....	27
3.8	List of Site Maps.....	27
4	Impact Assessment .....	35
4.1	Assessment of the significance of the potential impacts .....	35
4.1.1	Criteria of assigning significance to potential impacts .....	35
4.1.2	Significance Rating.....	35
4.2	Identification of potential impacts .....	36
4.2.1	Possible impacts on biodiversity during construction and operations.....	36

4.2.2 Summary of actions, activities, or processes that have sufficiently significant impacts to require mitigation.....36

4.2.3 Potential cumulative impacts .....36

5 Mitigation and Management.....38

5.1 Vegetation and Flora Clearing and Relocation Plan.....38

6 Conclusions .....39

7 Appendix B: References.....40

8 Appendix C: Site Photographic Record .....42

8.1 BLOCK A .....42

8.2 BLOCK B .....43

8.3 BLOCK C .....44

**List of Figures**

Figure 1: Map indicating locality of the site relative to surrounding major roads, towns, etc. ....10

Figure 2: Aerial Map (Full Extent and zoomed in to Block A, B and C) .....10

Figure 3: Geology Map.....10

Figure 4: Positioning of the site relative to the NSBA and Vegmap (2006) vegetation types (Mucina & Rutherford, 2006).....10

Figure 5: Critical Biodiversity Areas, as per Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007). CBA 1, 2 & 3 areas as well as Forest pockets and Expert species data are shown .....10

Figure 6: Rivers and Wetlands.....10

Figure 7: Aerial Photo – Block A .....27

Figure 8: Aerial Photo – Block B .....27

Figure 9: Aerial Photo – Block C .....27

Figure 10: Vegetation Sensitivity – Overall.....27

Figure 11: Vegetation Sensitivity – Block A.....27

Figure 12: Vegetation Sensitivity – Block B .....27

Figure 13: Vegetation Sensitivity – Block C .....27

**List of Tables**

Table 1: Summary of Biodiversity features. ....3

Table 2: Flora Species of Special Concern known to occur in the vicinity of the sites. ....20

Table 3: Alien Invasive plants and common weeds present and respective NEMBA classifications. ....21

Table 4: Amphibian and Reptile Species of Special Concern known to occur in the vicinity of the sites. ....23

Table 5: Bird Species of Special Concern known to occur in the vicinity of the sites. ....25

Table 6: Mammal Species of Special Concern known to occur in the vicinity of the sites. ....25

Table 7: Summary indicating significance of potential impacts (**SB = Significance BEFORE Mitigation; SA = Significance AFTER Mitigation**) .....37

## Abbreviations

<b>CARA</b>	Conservation of Agricultural Resources Act 43 of 1983
<b>CBA</b>	Critical Biodiversity Area
<b>DEDEAT</b>	Department of Economic Development, Environmental Affairs and Tourism
<b>DEMC</b>	Desired Ecological Management Class
<b>DWS</b>	Department of Water Affairs and Sanitation
<b>DWAF</b>	Department of Water Affairs and Forestry (former department name)
<b>EA</b>	Environmental Authorisation
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIR</b>	Environmental Impact Report
<b>EMC</b>	Ecological Management Class
<b>EMP</b>	Environmental Management Plan
<b>EMPr</b>	Environmental Management Programme report
<b>ER</b>	Environmental Representative
<b>ESS</b>	Ecosystem Services
<b>IAP's</b>	Interested and Affected Parties
<b>IEM</b>	Integrated Environmental Management
<b>LM</b>	Local Municipality
<b>masl</b>	meters above sea level
<b>NBA</b>	National Biodiversity Assessment
<b>NEMA</b>	National Environmental Management Act 107 of 1998
<b>NFA</b>	National Forests Act
<b>NEMBA</b>	National Environmental Management: Biodiversity Act 10 of 2004
<b>NFA</b>	National Forest Act 84 of 1998
<b>PEMC</b>	Present Ecological Management Class
<b>PES</b>	Present Ecological State
<b>PNCO</b>	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
<b>RDL</b>	Red Data List
<b>RHS</b>	Right Hand Side
<b>RoD</b>	Record of Decision
<b>SANBI</b>	South African National Biodiversity Institute
<b>SDF</b>	Spatial Development Framework
<b>SoER</b>	State of the Environment Report
<b>SSC</b>	Species of Special Concern
<b>TOPS</b>	Threatened of Protected Species
<b>ToR</b>	Terms of Reference
<b>+ve</b>	Positive
<b>-ve</b>	Negative



## Glossary

<b>Corridors:</b>	Have important functions as strips of a particular type of landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "stepping stones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
<b>Degraded habitat/land:</b>	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
<b>Ecological Processes:</b>	Ecological processes typically only function well where natural vegetation remains, and in particular where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.
<b>Ecosystem status:</b>	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem.
<b>Ecosystem:</b>	All of the organisms of a particular habitat, such as a lake or forest, together with the physical environment in which they live.
<b>Endangered:</b>	Endangered terrestrial ecosystems have lost significant amounts (more than <b>60 % lost</b> ) of their original natural habitat, so their functioning is compromised.
<b>Endemic:</b>	A plant or animal species, or a vegetation type, which is naturally restricted to a particular defined region. It is often confused with indigenous, which means 'native, occurring naturally in a defined area'.
<b>Environment:</b>	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
<b>Exotic:</b>	Non-indigenous; introduced from elsewhere, may also be a <i>weed</i> or alien <i>invasive</i> species. Exotic species may be invasive or non-invasive.
<b>Fragmentation (habitat):</b>	Causes land transformation, an important current process in landscapes as more and more development occurs.
<b>Habitat:</b>	The home of a plant or animal species. Generally those features of an area inhabited by animal or plant which are essential to its survival.

<b>Indigenous:</b>	Native; occurring naturally in a defined area.
<b>Least threatened terrestrial ecosystems:</b>	These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild).
<b>Riparian:</b>	Pertaining to, situated on or associated with a river bank.
<b>River corridors:</b>	River corridors perform a number of ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
<b>Transformation:</b>	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
<b>Transformed Habitat/Land:</b>	Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
<b>Tributary/ Drainage line:</b>	A small stream or river flowing into a larger one.
<b>Untransformed habitat/land:</b>	Land that has not been significantly impacted upon by mans activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
<b>Vulnerable:</b>	Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.
<b>Weed:</b>	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens.
<b>Wetlands:</b>	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

# 1 Introduction & Background

A vegetation and flora assessment was performed to investigate the proposed expansion of citrus on Farm Landros Veeplaats (Farm 84), Sundays River Valley. The proposed activity includes the clearing of 14 Ha of vegetation (greater than 1 Ha but less than 20 Ha) for the cultivation of citrus orchards. The proposed activity will take place on a privately owned farm, which is also situated on the banks of the Sundays River. Although this was a terrestrial ecological assessment, cognisance has been taken of the riparian zone and associated ecological processes.

## 1.1 Project Description

### 1.1.1 Activity Location

The proposed project involves the clearing of areas of land (14 Ha) on Boschkraal Farm, near Sunland for the cultivation of citrus orchards. The farm is situated on the banks of the Sundays River (Refer to Figure 1).

### 1.1.2 Activity Description

The applicant intends to clear natural indigenous vegetation in order to expand the existing citrus orchards in phases by establishing approximately 14 Ha of additional citrus orchards and associated agricultural infrastructure.

## 1.2 Methodology and Approach

Specific terms of reference include:

- Confirm all the Environmentally Sensitive aspects relating to vegetation and flora areas along the route;
- Collect sufficient information to inform a Basic Assessment Report (BAR) which has to be submitted to Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) and Department of Water Affairs and Sanitation (DWS) for water use licence applications;
- Identify all relevant legislation or policies that may be applicable to this project in the Eastern Cape;
- Undertake field studies, if required;
- Identify and rate all significant impacts associated with the proposed development; and
- Recommend mitigations measures to minimise or prevent impact on the sensitive features of the study area.

## 1.3 Proposed Approach

The Ecological Assessment Report will be compiled to include the following aspects:

- Undertake a desktop assessment of available data layers (vegetation types, red data book species, bioregional plans, etc.), literature and legislation or policies.
- Conduct a site assessment of the entire proposed site including verification of the desktop assessment and route sensitivity mapping.
- Describe and rate the potential vegetation and botanical impacts including an overall rating of the ecological sensitivity of the route and the effect of the development on the ecology of the site.
- Identify and rate potential impacts and mitigation measures for negative and positive impacts.
- Make recommendations for the Environmental Management Programme Report.
- Additional site visit to address specific concerns raised by Interested and Affected Parties, if required.

## 1.4 Legislation Framework

In terms of NEMA EIA Regulations (08 December 2014), the following Listing notices have bearing on this report:

Listing Notice 1 (GN R 983): 27: “ *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—*

- (i) undertaking of a linear activity; or*
- (ii) purposes undertaken in accordance with a maintenance management plan.”*

Listing Notice 3 (GN R 985):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 In Eastern Cape, Free State, Gauteng, Limpopo, North West and Western Cape provinces:*

- 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;*
- iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or*
- iv On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.*

Other relevant legislation includes the following:

EIA Regulations (08 December 2014; GN R. 982): Published in terms of NEMA trigger the need for applicants to undertake either a Basic Assessment or Scoping and Environmental Impact Assessment if the proposed activity is included in one or more of the three Listing Notices; and Listing Notice 3 (listing activities and sensitive areas per province, for which a Basic Assessment process must be conducted) (GN No. R. 985).

Water Use Authorisations: the National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for ‘the reserve’, namely to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.

NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMAs) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. 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. This is supported by the Biodiversity Act as it relates to loss of biodiversity.

Liability for any environmental damage, pollution, or ecological degradation: Arising from any and all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing or reoccurring (polluter pays principle). Where a

person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.

**Public participation:** Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and taken into account when the administrative discretion to grant or refuse the licence is made.

**Constitution of Republic of South Africa (1996):** Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.

**National Forests Act 84 of 1998 with Amendments:** Lists Protected trees, requiring permits for removal (Department of Agriculture, Forestry and Fisheries).

**Conservation of Agricultural Resources Act 43 of 1993:** Lists Alien invasive species requiring removal.

**Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974:** Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).

## 1.5 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 1), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Critical Biodiversity Areas
- Ecological Support Areas
- Vulnerable Ecosystems
- River and Wetland Freshwater Ecosystem Priority Areas (FEPAs)
- 100 m buffer of Rivers and Wetlands
- Protected Areas
- Protected Area buffers

Table 1: Summary of Biodiversity features.

Feature	Description (Boschkraal)	Implications/Comment
<i>Affected Vegetation Types</i>	Albany Alluvial Vegetation (AZa 6)	Block A, B and C are all Endangered (Target 31 %)
<i>Critically Endangered and Endangered Ecosystems</i>	Albany Alluvial Vegetation	Endangered
<i>Vulnerable Ecosystems</i>	None	
<i>Critical Biodiversity Areas</i>	Predominately CBA 2, but also CBA 1	Block A (CBA 2 and CBA 1); Block B (CBA 2) and Block C (CBA 1 and CBA 2)
<i>Aquatic Critical Biodiversity Areas</i>	CBA 2 (A2b) (near-natural state)	Block A, B and C
<i>IBA's</i>	Closest one is the Alexandria Coastal Belt 37.5 km SE from Block C	
<i>Protected Areas in vicinity</i>	Addo-Elephant National Park	9.1 km NNW from Block A; 9.4 km NNW from Block B and 11.4 km NNW from Block C
<i>Protected Areas</i>	Block A and B fall within the 10 km of Addo Elephant Park	
<i>Quaternary Catchment</i>	N40C	Sundays

Feature	Description (Boschkraal)	Implications/Comment
<i>River Names within Study Area</i>	Sundays River	
<i>Within 500 m of Rivers and Wetlands</i>	Sundays River and three Natural Wetlands	Block A is (41 m W of Sundays River, 57.5 m W and 183.0 WNW of two Natural Wetlands); Block C is (approx. 70 m W of Sundays River and 455.0 m NNW of a Natural Wetland)
<i>Within 100 m of River or Wetland</i>	Sundays River and one Natural Wetland	Block A (Sundays River and the Natural Wetland) and Block C (Sundays River)
<i>Within 32 m of a watercourse/wetland</i>	None	
<i>Geology</i>	Q (Sedimentary) Quaternary	
<i>Surrounding Land Uses</i>	Mostly cultivated Agriculture, but also Natural and Degraded areas	Block A (Top corner Natural; Bottom small portion in Degraded; Majority in Urban Built-Up); Block B (Majority in Urban Built-Up and small slivers (sides and bottom) in Degraded); and Block C (Majority Urban Built-Up except for at the bottom left and bigger portion at the bottom right are Degraded)
<i>Ecological Support Areas</i>	No ESA defined or fine scale planning for the affected area	Buffer area around drainage lines would be equivalent to ESA
<i>Mapped Vegetation Unit</i>	Degraded, Residential and Natural	Block A (Degraded, Residential and Natural); Block B and C (both Degraded and Natural)
<i>Mapped Sensitivity</i>	Moderate, Low and High	Block A (Moderate, Low and High); Block B and C (both Moderate and High)

### 1.5.1 Vegetation of Southern Africa

One vegetation unit is primarily affected by the proposed agricultural expansion (Mucina & Rutherford, 2006), namely: Albany Alluvial Vegetation (Aza 6) which has an Endangered Conservation Status. The vegetation is primarily located in Alluvial sandy deposits along the floodplain of the Sundays River. Some elements of Sundays Thicket are present where soils derived from Mudstones and other formations are present, which tend to be on areas outside of the Alluvial floodplain.

#### Albany Alluvial Vegetation

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: Ranges from 20-1000 meters.

Vegetation and Landscape Features: Two major types of vegetation pattern are observed in these zones, 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.

Geology, Soil and 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. In land type.

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 to 717 mm). The area has a warm-temperate climate (overall MAT 18°C; range 15.7 to 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.

Conservation: Endangered. Target 31 %. 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 Double Drift Reserve Complex. About 2 % enjoys protection in eight private conservation areas. More than half of the area has been transformed for cultivation, urban development, road building and plantations. Alien invaders include *Acacia Saligna*, *Nerium oleander* and *Eucalyptus species*.

Remarks: Vlok and 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.

### Sundays Thicket

Distribution: Eastern Cape Province: From the surrounds of Uitenhage and the northern edge of Port Elizabeth into the lower Sundays River Valley to east of Colchester and northwards to the base of the Zuurberg Mountains and stretching westwards north of the Groot Winterhoek Mountains to roughly the Kleinpoort longitude. Also an extensive area north of the Klein Winterhoek Mountains including much of the Jansenville District and parts of the far-southern Pearston District and far-western Somerset East District.

Altitude: 0–800 m.

Vegetation and Landscape Features: Undulating plains and low mountains and foothills covered with tall, dense thicket, where trees, shrubs and succulents are common, with many spinescent species. The transition between lower and upper canopies is obscured by the presence of a wide variety of lianas. The local dominance of *Portulacaria afra* increases and the relative abundance of woody species decreases with increasing aridity. There is considerable structural heterogeneity within the vegetation unit.

Geology and Soils: Mostly on deep (>1m) red, loamy to clayey soils derived from the Sundays River and Kirkwood Formations (Mesozoic Uitenhage Group) in the south. In the Zuurberg Mountains, soils are more sandy and nutrient poor and derived from the Bokkeveld and Witteberg Groups (Cape Supergroup). In the inland region of the Sundays River the soils are derived from Ecca Group Shales and mudstones, and are heavy due to high clay content. Fc land types dominate the area, followed by Ae.

Biogeographically Important Taxa: SUCCULENT CLIMBER: *Ceropegia ampliata* var. *ampliata* (southern limit); HERBACEOUS CLIMBER: *Fockea sinuata* (southern limit); EPIPHYTIC PARASITIC HERB: *Cuscuta bifurcata*; GEOPHYTIC HERB: *Pelargonium campestre*.

Endemic Taxa: SMALL TREE: *Encephalartos horridus*; SUCCULENT SHRUBS: *Aloe bowiea*, *A. gracilis*, *Bergeranthus addoensis*, *Glottiphyllum grandiflorum*, *Orthopterum coegana*, *Ruschia aristata*, *Trichodiadema rupicola*; SUCCULENT CLIMBERS: *Aptenia haeckeliana*, *Ceropegia dubia*; SUCCULENT HERBS: *Haworthia arachnoidea* var. *xiphiophylla*, *H. aristata*, *Huernia longii* subsp. *longii*; GEOPHYTIC HERBS: *Brachystelma cummingii*, *B. schoenlandianum*, *B. tabularium*, *Pelargonium ochroleucum*, *Strelitzia juncea*, *Tritonia dubia*; HERBS: *Arctotis hispidula*, *Argyrolobium crassifolium*, *Lessertia carnosae*, *Lotononis monophylla*, *Senecio scaposus* var. *addoensis*, *Wahlenbergia oocarpa*.

Conservation: Least threatened. Target 19%. Protected statutorily in Greater Addo Elephant National Park, Groendal Wilderness Area as well as in Swartkops Valley and Springs Nature Reserves. Private conservation areas, especially game farms (Kuzuko, Koedoeskop, Schuilpatdop, Tregathlyn, Citruslandgoed, Voetpads-kloof) and a couple of nature reserves contribute to conservation of this vegetation type as well. More than 6% already transformed (cultivated, urban development). Sundays Thicket has also been highly degraded through grazing by livestock (Hoffman & Cowling 1990, 1991, Lloyd et al. 2002, Lechmere-Oertel 2003). The degraded state resembles a secondary Thornveld or grassland, dominated by invasive weedy species. In this state, most of the original thicket species are lost. Erosion is moderate to very low.

## **1.6 Vegetation and Ecological Processes**

The Eastern Cape Province has highly diverse vegetation since it occupies an area where the biomes of South Africa converge (Rutherford and Westfall, 1994). As a result, the Eastern Cape vegetation is a mosaic of vegetation types, many of which have become severely threatened by development (Lubke *et al.*, 1988, Low and Rebelo, 1996). The vegetation of the region falls in the Tongoland-Pondoland phytochorion (White, 1983) that is considered to have

originated in Natal and migrated south-westward where it merged with Cape and arid flora, hence the vegetation is generally highly diverse.

### 1.6.1 Ecological Processes in Thicket (sensu Vlok & Euston-Brown, 2002)

The majority of the vegetation types identified on site (Sundays Valley Thicket, Sundays Doringveld Thicket, Motherwell Karroid Thicket, and Coega Bontveld) are considered part of Subtropical Thicket, or the thicket biome. As with all ecological systems, within the Subtropical Thicket a number of processes at all levels have shaped and will continue to shape the structure and function of the vegetation communities. The most important and relevant of these will be discussed, although a detailed discussion is contained in the various STEP documents, particularly Vlok & Euston-Brown (2002), and are summarized below.

#### Dynamic Ecosystem Processes In Sundays Thicket

The most important ecological and evolutionary processes that are an integral part of Thicket include climatic and edaphic conditions at a regional level as well as fire and herbivory to maintain diversity within and between the different vegetation types. Dispersal is also an important ecological process that shapes the vegetation community.

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, Rhus longispina, Rhus pterota, 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 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.

It is believed 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 a 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 north-easterly "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 with Nama Karoo units along the floodplains of the local rivers. Here species such as *Acacia karoo* may become dominant in the absence of large herbivores. A finely 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 specialised pollinators. Even the seemingly specialised flowers of the local Asclepiadaceae (e.g. *Ceropegia ampliata*), utilise taxa from up to five different families of Diptera to facilitate pollination.

Vast areas of the recently revised Albany Thicket Biome have been degraded. Much of the degradation has been in the semi-arid thickets, principally effected through unsustainable livestock practices. It has been well established that the semi-arid thickets exhibit very poor resilience to degradation, and active restoration is required to return the lost natural capital and resuscitate optimal levels of ecosystem services.

Conventional restoration techniques have been shown to deliver poor results in degraded subtropical thickets (Todkill, 2001). Not only are many thicket plant species relatively slow growing, but there is also very little evidence of natural regeneration – probably as a result of poor seedling survival and lack of canopy recruitment (Sigwela, 2004). Frugivorous birds may play an important role in seed dispersal within subtropical thicket (Dean, 2002), explaining the high number of plant species with fleshy fruits (Vlok & Euston Brown, 2002).

The role of these can be summarized as follows:

- Edaphic factors
  - Vegetation types (or Broad Habitat Units) are largely defined by the underlying geology and soils which play a critical role in the community structure.
  - Soil forming processes (including leaf-litter accumulation) are further critical in maintaining thicket units, through water and nutrient retention and possibly preventing grasses from establishing under bush clumps (and hence increase fire likelihood).
- Climatic factors
  - Rainfall (pattern and amount) play an important role in defining thicket vegetation units, where moist and dry sites vary markedly in species composition and structure.
- Fire and herbivory
  - These act as important shaping factors of Thicket at a local level and the relative abundance of both these factors play a fundamental role in shaping the vegetation communities present within an area.
  - The relative abundance and frequency of fire and herbivory determine whether a particular area will become a climax solid Thicket unit or will remain as a Grassland or Grassland Mosaic unit.
  - Grasses tend to be fire prone compared to solid Thicket units, so frequent fires (and herbivory) will tend to maintain a grass dominated community. In the presence of fire, grassland dominated vegetation types are favoured, whilst when fire and herbivory is excluded the vegetation will tend towards a Thicket type, which in turn becomes fire resistant.
  - Herbivory (particularly by browsers) tends to favour a vegetation type that is sensitive to fire, unless there is excessive grazing and loss of grass cover, in which case lack of fire will favour the formation of small clumps of thicket, particularly around termite mounds.

- Fire also serves to create gaps in Thicket which allow the full complement of Thicket species to occur.
- Species richness levels tend to be highest at the contact or tension zones between Thicket and different vegetation types, partly because species from both biomes are present but also due to the presence of localized endemics.
- Some disturbance is thus important to maintain optimal species diversity within the Thicket biome, from both fire (especially during dry periods) and herbivory (to create gaps).
- The proportion of browsers to grazers is important in maintaining a balance of disturbance, which varies between vegetation types.
- Further ecological studies should be conducted to determine the historical occurrence of large herbivores and other disturbance agents within the area.
- Dispersal mechanisms
  - Seed dispersal is particularly important in Thicket ecology and many pioneer Thicket species are bird and wind dispersed. Fences, provide natural perches for birds and in most areas this is visible as distinct hedgerows of small shrubs and trees along fence lines. These fence lines provide an important corridor in areas that have been transformed through agricultural practices as they provide a habitat for many Thicket preferring species. The retention of an unbroken habitat is important to maintain these processes.
  - Thicket plays an important role in maintaining connectivity between different vegetation types as it shares many common species with them. It is important to retain this connectivity for adequate functioning at a landscape level.

Thicket also provides an important water and soil conservation function in that it is able to retain water in the soil and humus during high rainfall events (Vlok & Euston Brown, 2002).

#### Factors Threatening the Thicket Vegetation

The impacts by man on the Thicket vegetation started long before colonial times. Especially the more inland Arid Thicket units may have been exposed to grazing pressure by domestic stock for 2 000 or more years. The Dune Thicket and adjacent Valley Thicket in the coastal environment has also been exposed to the use of fire by man for 100 000 years and stock farming for 2 000 years. There can, however, be little doubt that the transformation process of the Thicket vegetation has accelerated considerably during the past 300 years.

At present much of the Dune Thicket is highly threatened by formal and informal urban development. Not only directly in being displaced by towns and townships, but also indirectly by utilization of Thicket species by the local inhabitants. Ironically, the introduction of alien species (such as *Acacia cyclops* and *Acacia saligna*) and altered fire regime (reduction of fire frequency) in Dune Fynbos vegetation that still occurs in semi-urban areas, may favour the establishment of Dune Thicket clumps. If left unburned for long enough they will develop into solid stands of Dune Thicket. This has happened in the Wilderness to Knysna coastal area. The reverse is, however, true for Limestone Fynbos. Where dense stands of *Acacia cyclops* occurs, the fire intensity is increased and these high intensity fires can enter and eradicate stands of Dune Thicket. The occurrence of these alien *Acacia* species holds a threat to the patterns of biodiversity in the Dune Thicket vegetation, especially as many of the localized endemic species tend to occur in the open sites between the Thicket clumps. In the Transfish Dune Thicket we also observed rapid spread and dense stands of Guava (*Psidium guava*) trees in the matrix Grassland vegetation. It may well develop into a similar problem in these eastern areas as the *Acacia*'s are in the western region.

The mainland Thicket also has a number of alien species that threatens the intrinsic biodiversity of its units. The best-known example is the Prickly-pear (*Opuntia ficus-indica*), which despite concerted efforts to eradicate it over many years still remain abundant in some of the Valley Thicket units. The Prickly-pear populations may be on the decline or stable, but there are several other alien weeds increasing their populations gradually in the Thicket vegetation. These include a number of other Cactaceae species, especially those belonging to the genera *Cereus*,

*Echinopsis*, *Epiphyllum*, *Opuntia* and *Trichocereus*. In disturbed Valley and Arid Thicket sites one often sees quite extensive stands of *Agave* and *Trichocereus* species. Especially *Agave vivipara* seems to be able to develop rapidly into dense stands, which prevents the reestablishment of Thicket species in these disturbed areas. Along the local rivers we have often noted extensive stands of *Arundo donax*, *Casuarina cunninghamiana*, *Schinus molle*, *Tamarix chinensis* and *Tamarix hispida*. The Arid Thicket and especially disturbed stands of Spekboomveld are prone to dense infestations by *Atriplex lindleyi* subsp. *inflata*, which once well established, can also prevent the reestablishment of the original Thicket vegetation (Milton *et al*, 1999). None of these invasive alien plant species can hold any good for the maintenance of the ecological processes or the biodiversity of the Thicket Biome.

The Thicket vegetation may well be remarkably resilient to withstand even major shifts in climatic conditions. With those at any particularly point temporally changing from one to another type, as the temporal climatic conditions dictates. As evidence to this statement we must refer to at least one excellent example of archaeological research at the Boomplaas cave near Oudtshoorn. Reconstruction of the local vegetation over the past 5 000 years clearly indicated that the local area was periodically dominated by either Thicket units (*Olea* Woodland), Valley Thicket (*Pappea* dominated) or Arid Thicket (Karoo elements present), largely due to local climatic conditions and probably the impacts of “farming” by modern man during the past 1 700 years. Such shifts in the Thicket vegetation can, however, only happen when the Thicket vegetation retains its connectivity through a series of river valleys and especially the Dune Thicket along the coast. Any extensive break in the connection of these Thicket units may well break an important genetic retention route of the faunal or floral components of the Thicket Biome. For several thousands of years the people living of the Thicket Biome and its associated communities did not break these connections. We should not either.

Despite its seemingly rigidity to deter impacts of man, it is very vulnerable to changes in land use patterns, especially where it involves alterations in fire and herbivory regimes. The impact of intensive agricultural practices, where specific areas in the Thicket Biome are targeted for the production of Citrus, Pineapple, vegetable, *etc.* production, is quite obvious. So are the impacts of the rampant development of towns and holiday resorts along the coast. The impacts of extensive stock and game farming are, however, not always clear-cut and the gradual degradation of the Thicket vegetation in these areas often go unnoticed, even by the landowners, despite the massive extent thereof. The establishment of “Game Reserves” often seem to be a more acceptable form of land use, but in many cases we doubt that the impact of introduced game would be any less than those of domesticated stock in many cases. The Thicket vegetation did also not escape the impacts of political regimes. We are seriously concerned about the state of the Thicket vegetation and present land use practices in the former homelands, Ciskei and Transkei. Not only is there no control over grazing and burning practices in these areas, but also a conspicuous lack of township and regional planning in these areas. None of the Environmental Impact Assessment practices at present required in the rest of South Africa seems to be followed here, with the few remaining intact areas of Thicket vegetation being eradicated to build roads, water pipelines, *etc.*, as if it were stands of alien vegetation. Here and elsewhere there seems to be a serious lack of understanding the vital importance (and sensitivity) of the Thicket vegetation to uphold the process so necessary to maintain the humans living within the Thicket Biome. Ignorance of the importance of the processes sustaining the Thicket vegetation may well prove to be the greatest threat to the biodiversity of this Biome and a large portion of the population of South Africa, those people living within this Biome.

### 1.6.2 Eastern Cape Biodiversity Conservation Plan (ECBCP)

Critical biodiversity areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (SANBI 2007). These form the key output of the conservation plan. They are used to guide protected area selection and should remain in their natural state as far as possible.

As indicated in Figure 5, the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) the site is situated within areas designated a CBA 2 status (terrestrial). Due to the limited impact of the proposed activity, the effect on

Critical Biodiversity Areas will most likely be insignificant. Specific areas identified as being sensitive will be addressed in the Impact and Mitigation sections of the report where necessary.

## 1.7 Implications of Systematic Planning frameworks

The development of the site is unlikely to compromise the vegetation units significantly due to:

- The small and fragmented footprint.
- The generally degraded state of the site and immediate vicinity.
- The general close proximity to the cultivated and transformed and degraded areas.
- The implementation of an Environmental Management Plan.
- The implementation of a flora relocation plan.
- The implementation of a formalized rehabilitation and landscaping plan.

Loss of vegetation cover will thus tend to be highly localised and have a minimal impact (individual and cumulative) at a regional level.

The impact of the agricultural expansion, generally within an intensive citrus area is unlikely to have any significant negative impact on ecological processes occurring at a regional or localised level. The implementation of best practice guidelines (as per the EMP) will most likely be effective management to minimise any negative consequences in localised sensitive areas.

## 1.8 List of Spatial Planning Maps

*Figure 1: Map indicating locality of the site relative to surrounding major roads, towns, etc.*

*Figure 2: Aerial Map (Full Extent and zoomed in to Block A, B and C)*

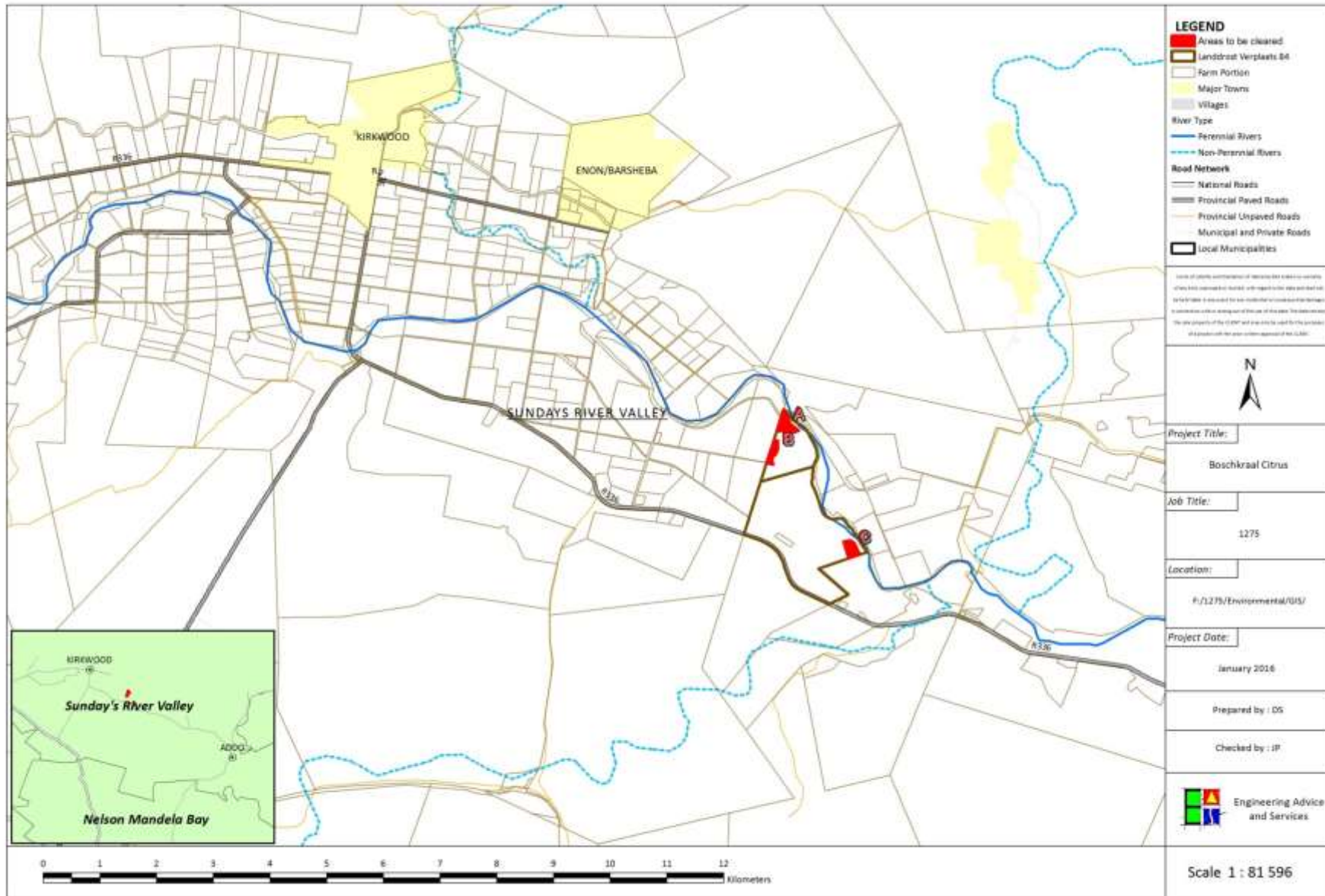
*Figure 3: Geology Map*

*Figure 4: Positioning of the site relative to the NSBA and Vegmap (2006) vegetation types (Mucina & Rutherford, 2006)*

*Figure 5: Critical Biodiversity Areas, as per Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007). CBA 1, 2 & 3 areas as well as Forest pockets and Expert species data are shown*

*Figure 6: Rivers and Wetlands*

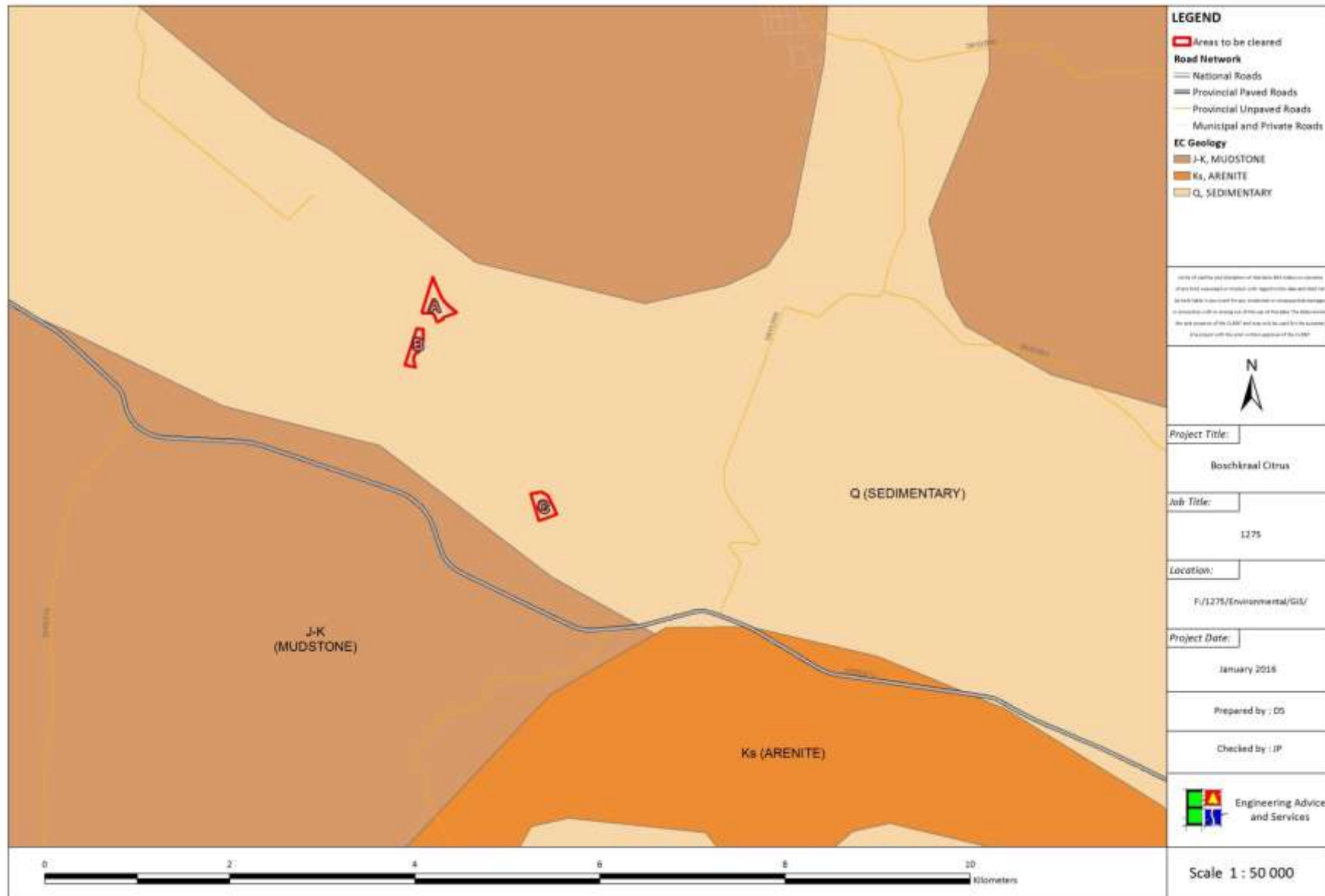
*Figure 7: Land Use – excluding Natural Vegetation (SANBI Landcover, 2006) indicating Plantations, Degraded, Cultivated and Urban/Per-Urban areas*



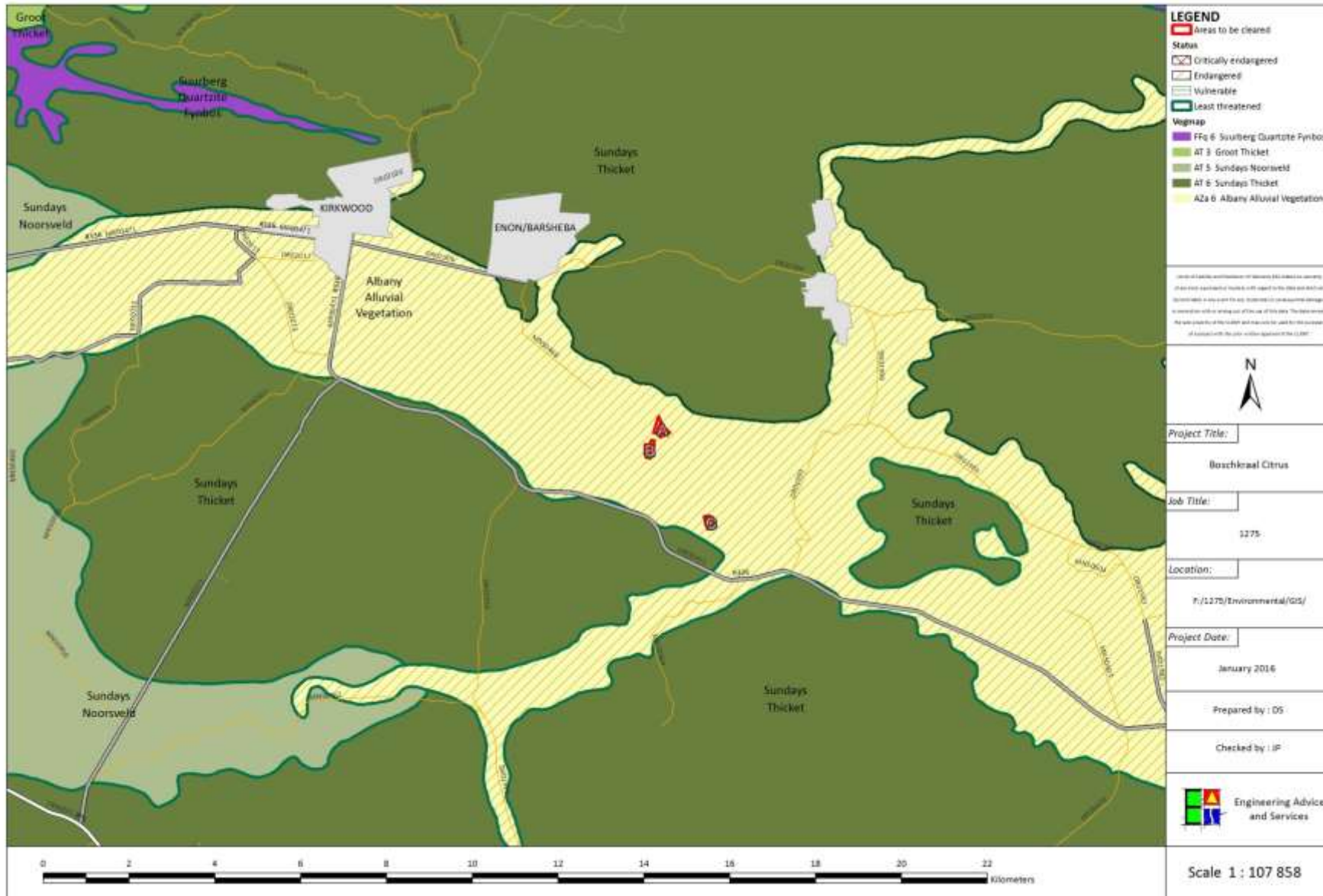
Locality of Boschkraal Citrus Farm



Series of Aerial Maps



Geology Map

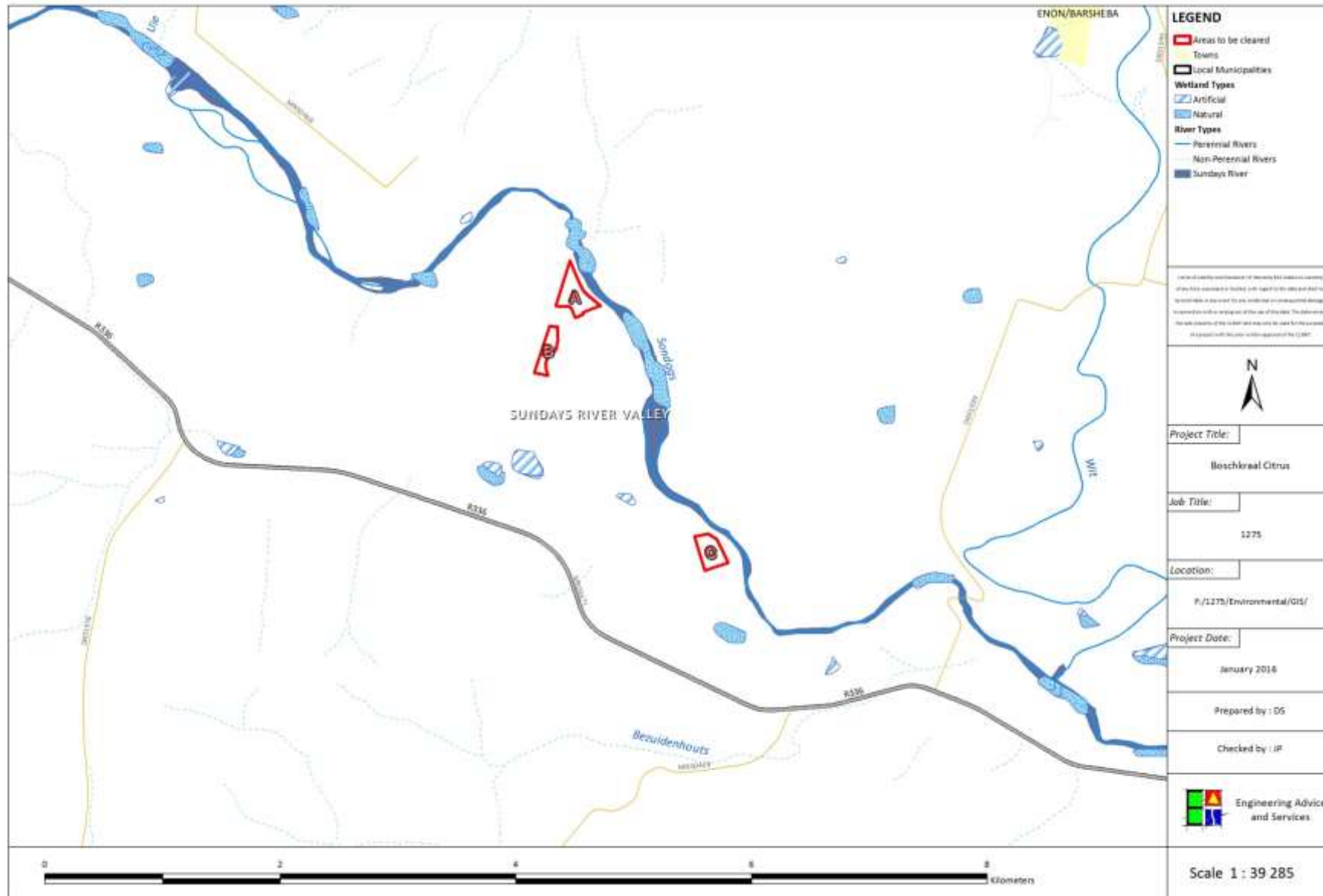


Boschkraal Citrus relative to the Vegmap (2006) vegetation types (Mucina & Rutherford, 2006)

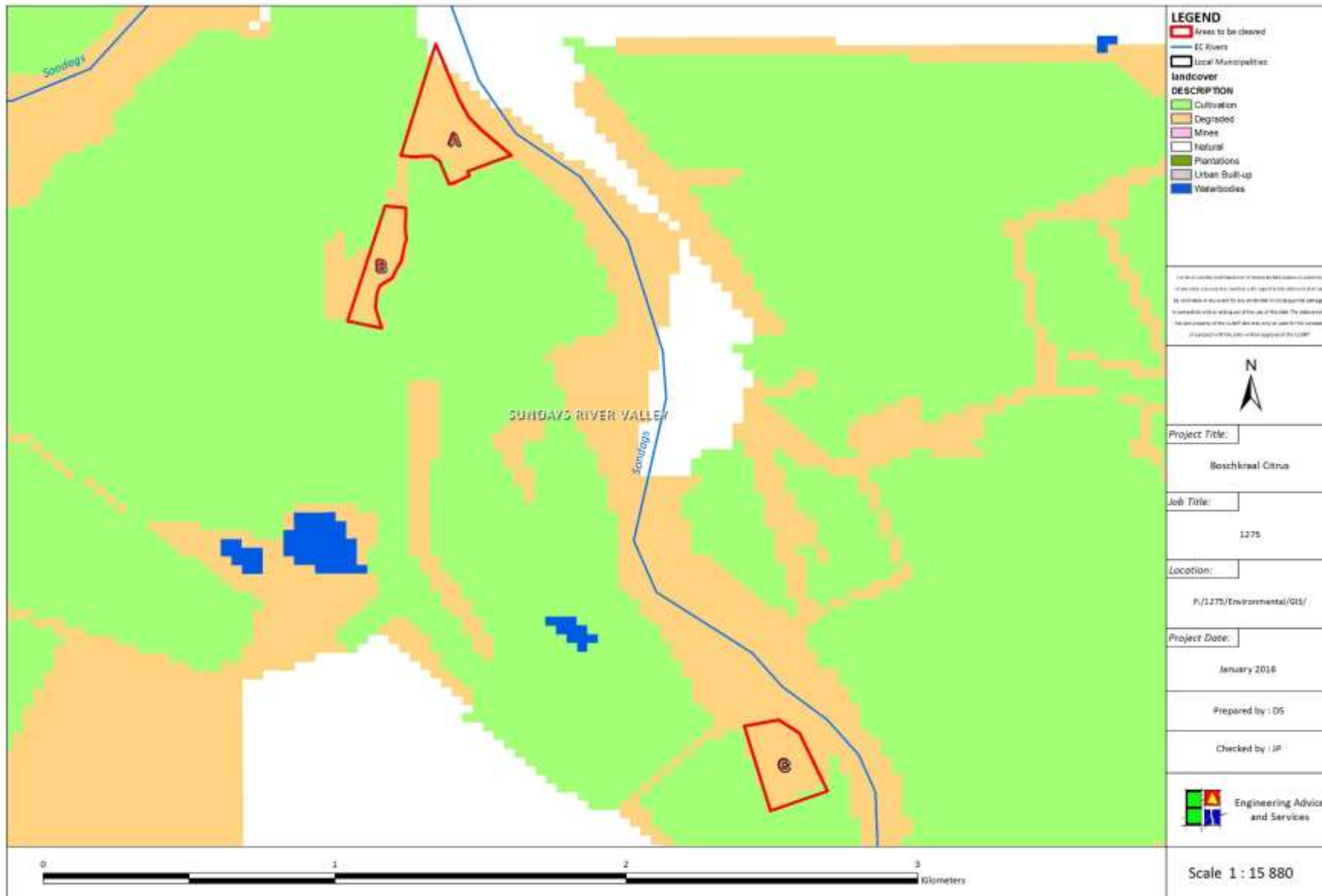




Critical Biodiversity Areas, as per Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007). CBA 1, 2 & 3 areas are shown



Rivers and Wetlands



## 2 Description of the Terrestrial Environment

### 2.1 Site Locality

The agricultural expansion is proposed for three separate Blocks (A, B and C) within the farm boundary. The three sites are generally surrounded by existing citrus orchards, with Blocks A and C bordered on the eastern side by the Sundays River.

The site is bounded on the north, south and western sides by agricultural lands (Orchards) and to the west by natural vegetation along the Sundays River.

### 2.2 Topography and Drainage

The surrounding area can generally be described as flat floodplain of the Sundays River Valley, surrounded by rolling hills vegetated by dense Sundays Thicket.

### 2.3 Vegetation and Flora

#### 2.3.1 Terrestrial vegetation

The site is located on deep alluvial sandy deposits within the Sundays River floodplain. Since the vegetation has historically been exposed to periodic flooding events, it tends to be transitional in nature. The vegetation is dominated by *Acacia karoo*, with a number of other species also present, including *Euclea undulate*, *Grewia occidentalis*, *Carissa bispinosa*, *Gymnosporia heterophylla* and *Azima tetracantha*. The understory is dominated by a variety of grasses and herbs occurring in a mosaic between tree clumps. Solid Thicket elements may colonize the area in, between major flooding events.

In general Albany Alluvial vegetation is comprised of a fairly low diversity assemblage of mostly pioneer tree, shrub, herb and grass species, with Species of Special Concern absent, or present in small numbers.

Also, due to the nature of the floodplain and associated transitional vegetation, natural re-colonization and regeneration after severe disturbance (such as floods, fires and bush clearing) tends to be far more rapid and successful than the surrounding climax vegetation units.

Typical Thicket species that may be present in Albany Alluvial vegetation, but more likely to occur in Sundays Thicket on the periphery of the floodplain include:

**Succulent Trees:** *Portulacaria afra*, *Aloe africana*, *Aloe speciosa*

**Small Trees:** *Apodytes dimidiata*, *Canthium spinosum*, *Maytenus undata*, *Pappea capensis*, *Ptaeroxylon obliquum*, *Schotia afra* var. *afra*, *Sideroxylon inerme* and *Vepris lanceolata*.

**Tall Shrubs:** *Allophylus decipiens*, *Azima tetracantha*, *Carissa bispinosa* subsp. *bispinosa*, *Crotalaria capensis*, *Ehretia rigida*, *Elytropappus rhinocerotis*, *Euclea racemosa*, *Euclea undulata*, *Grewia occidentalis*, *Gymnosporia capitata*, *Gymnosporia heterophylla*, *Gymnosporia polyacantha*, *Hippobromus pauciflorus*, *Maerua cafra*, *Mystroxydon aethiopicum*, *Nylandtia spinosa*, *Olea europaea* subsp. *africana*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Rhus* spp., *Scolopia zeyheri* and *Scutia myrtina*.

The floodplain is largely transformed, under citrus orchards, with some remnant (or regenerated natural and degraded vegetation in patches and along the Sundays River (Figure 10). A portion of intact Sundays Thicket is present on the slopes outside of the floodplain along the southern boundary of the farm. A number of dams are also present within the farm boundary.

Sensitive areas within the site include primarily Riparian Vegetation and Reedbeds along the Sundays River and associated drainage lines. Rocky outcrops are present within the farm, but are located outside of the development footprint area.

#### Block A

Block A, situated along the northern boundary of the farm, is bounded on the west and south sides by citrus orchards and by Riparian vegetation and the Sundays River on the eastern boundary (Figure 11). Vegetation is composed of natural and degraded alluvial pioneer vegetation. There is evidence that the area has been cleared and used historically for agricultural purposes. **Refer to Site Photos in Appendix C.**

#### Block B

Block B is situated on the western boundary and is bounded on all sides by citrus orchards (Figure 12). Vegetation is composed of natural and degraded pioneer alluvial and climax Sundays Thicket vegetation. A few individual protected tree species and other Species of Special Concern were noted to be present. **Refer to Site Photos in Appendix C.**

#### Block C

Block , situated along the south-eastern boundary of the farm, is bounded on the west and south sides by citrus orchards and by Riparian vegetation and the Sundays River on the eastern boundary (Figure 13). Vegetation is composed of natural and degraded alluvial pioneer vegetation. There is evidence that the area has been cleared and used historically for agricultural purposes, which was exposed as a result of a recent intense fire. **Refer to Site Photos in Appendix C.**

### 2.3.2 Alluvial soils and deposited material

Alluvial soils can be defined as relatively recent deposits of sand, mud, etc. set down by flowing water, especially in the valleys and floodplains of large rivers. Riparian areas often, but not always, have alluvial soils. Whilst the presence of alluvial soils cannot always be used as a primary indicator to accurately delineate riparian areas, it can be used to confirm the topographical and vegetative indicators.

Deposited material can also be used to delineate the areas where bank stabilisation, provided by the roots of riparian vegetation, is most important. This material may be deposited adjacent to the macro channel bank during flooding, and can include vegetation debris as well as soil deposits.

### 2.3.3 Riparian Vegetation

Riparian marginal vegetation tends to be colonised by reed beds of *Phragmites australis* and *Arundo donax*, in dense clumps particularly around pools where water remains during low flows. Cobble beds between these pools tend to be colonised by clumps of sedges with scattered reeds occurring along the course. The lower zone tends to be colonised by ruderal pioneer species and grasses, which appear to proliferate towards the end of the dry season when die-back occurs in the reed beds. The upper zone is colonised by typical Albany Alluvial Vegetation, particularly trees species with *Acacia karroo* prevalent, which probably utilise the perched water table. This band of thicket vegetation serves to stabilise the river banks and reduce flow during peak flows and flood events. The thicket component is susceptible to flooding and is likely to be damaged during flood events and will regenerate thereafter through a successional process beginning with *Acacia karroo* colonisation.

Riparian vegetation has been excluded from the proposed orchard sites, and a band of Riparian vegetation an Albany Alluvial vegetation will be retained as an ecological corridor along the eastern boundary of the farm and the western banks of the Sundays River.

### 2.3.4 Species of Special Concern occurring in the region

Based on a desktop Assessment of existing online databases as well as field verification, the potential list of flora species that may occur in the vicinity of the site, is limited. Common flora species such as: *Aloe arborescens*, *Aloe ferox*, *Aloe speciosa*, *Bulbine abyssinica* and *Boophone disticha*, are generally common in areas.

Table 2 provides a detailed list of species protected in term of the P.N.C.O. and NFA, for which permits will be required should they occur and require removal. Due to limited sampling time, presence or absence of all species cannot be confirmed without detailed seasonal site visits, but the risk of any Critically Endangered or Endangered species being present is Low.

Table 2: Flora Species of Special Concern known to occur in the vicinity of the sites.

Botanical Name*	Family	Status**
<i>Aloe ferox</i>	Asphodelaceae	PNCO
<i>Asparagus spp.</i>	Asparagaceae	PNCO
<i>Boophone disticha</i>	Amaryllidaceae	PNCO
<i>Bulbine frutescence</i>	Asphodelaceae	PNCO
<i>Carpobrotus sp.</i>	Mesembryanthemaceae	PNCO
<i>Cotyledon orbiculata var. orbiculata</i>	Crassulaceae	PNCO
<i>Mesembryanthemum spp.</i>	Mesembryanthemaceae	PNCO
<i>Ornithogalum sp.</i>	Hyacinthaceae	PNCO
<i>Schotia afra</i>	Fabaceae	NFA
<i>Sideroxylon inerme</i>	Sapotaceae	NFA

\*\*PNCO – Provincial Nature Conservation Ordinance (19 of 1974); NFA – National Forests Act

The plant Species of Special Concern listed above require permits if any individuals are to be removed, translocated or pruned according to the relevant legislation including the National Forests Act and the Provincial Nature Conservation Ordinance (PNCO). No species listed under Threatened and Protected Species (T.o.P.S.) were noted to be present during the site assessment.

Permits from the relevant authority (Department of Economic Development, Environmental Affairs and Tourism) are required for the removal, translocation or destruction of all plants listed as protected; and all faunal species, in terms of the Provincial Nature and Conservation Ordinance (No. 19 of 1974).

Permits from the relevant authority (The Department of Agriculture, Forestry and Fisheries (DAFF)) are required for the damage, destruction or removal of all trees listed as protected in terms of the National Forests Act (1998).

### 2.3.5 Alien Invasive species

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): Draft 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 allows for more cost effective clearing and maintenance considering aliens seeds as 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 river banks 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. To avoid alien grass invasion a buffer of at least 30 m should be left along the edges between pristine natural areas and vineyards, other agricultural lands & compost or manure piles. This can prevent disturbance, edge effects and nutrient run-off into the veld, which promotes alien grass invasion.

A list of species and their respective NEMBA status occurring within the site is provided in Table 3: Alien Invasive plants and common weeds present and respective NEMBA classifications.. A total of 17 species were identified. The most serious and problematic of the invasive are as follows:

1. *Arundo Donax* - Forming dense clumps, predominantly along river banks, but usually outside of the wet zone. This species should be removed from areas in close proximity to the drainage lines and river banks as a priority during construction phases.
2. *Casuarina equisetifolia* - Originally planted as windbreaks around the citrus orchards, they tend to become invasive into riparian areas. The species is exceptionally problematic upstream of the site forming very dense stands around the Coega River. Over time the site should be cleared of this species and alternatives for use as wind-breaks investigated.
3. *Eucalyptus diversicolor* - probably resulting in the most serious degradation of riparian areas in particular these trees would originally have been planted for shade and as windbreaks along the river banks. The trees have reached immense sizes (>20 m) resulting in serious degradation of the riparian zone mostly restricted to the middle reach of the river. Removal along the river should be a priority during construction phases and trees should be removed over a period of time and replaced by indigenous species. A number of these trees are also located in the vicinity of the homestead and may be considered of heritage importance. Additionally they are reported to provide important roosting sites for avifauna. It is recommended that these trees be replaced over a long-term period with more appropriate species, as *Eucalyptus* trees when growing to a very large size may be prone to falling over and dropping branches and thus pose a health risk. Any trees that would require long term preservation must be located away from rivers and drainage lines and should be suitably fenced off. Additionally the ground should be kept free of accumulated leaf litter, which could increase the fire risk.
4. *Opuntia aurantiaca* - Seriously problematic and found throughout the site, particularly in areas that would have historically been used for livestock. They form dense mats in places making thoroughfare impossible. Management of this species should be a priority during construction and operational phases.
5. *Opuntia ficus-indica* - Prickly Pear is a problem throughout the region and can form dense, usually isolated stands within Sundays Valley Thicket. Stands should be identified and a removal plan implemented. Specific handling procedures must be adhered to and incorporated into the EMP.

Table 3: Alien Invasive plants and common weeds present and respective NEMBA classifications.

Botanical Name	Common name	Family	Status	Extent
<i>Acacia melanoxylon</i>	Blackwood	Fabaceae	NEMBA 2	Localised
<i>Agave sisalana</i>	Sisal	Agavaceae	NEMBA 2	Localised
<i>Arundo donax</i>	Spanish Reed	Poaceae	NEMBA 1b	Localised, riparian
<i>Canna indica</i>	Indian Shot	Cannaceae	NEMBA 1b	Localised, riparian
<i>Casuarina equisetifolia</i>	Beefwood	Casuarinaceae	NEMBA 2	Large individual trees
<i>Cereus jamacaru</i>	Queen of the Night	Cactaceae	NEMBA 1b	Scattered
<i>Cestrum laevigatum</i>	Ink Berry	Solanaceae	NEMBA 1b	Scattered
<i>Datura stramonium</i>	Thorn Apple	Solanaceae	NEMBA 1b	Scattered

Botanical Name	Common name	Family	Status	Extent
<i>Eucalyptus diversicolor</i>	Gum tree	Myrtaceae	NEMBA 2	Large individual trees
<i>Grevillea robusta</i>	Australian Silky Oak	Proteaceae	NEMBA 3	Large individual trees
<i>Lantana camara</i>	Lantana	Verbenaceae	NEMBA 1b	Scattered
<i>Nicotiana glauca</i>	Wild Tobacco	Solanaceae	NEMBA 1b	Scattered
<i>Opuntia aurantiaca</i>	Jointed cactus	Cactaceae	NEMBA 1b	Scattered clumps
<i>Opuntia ficus-indica</i>	Prickly Pear	Cactaceae	NEMBA 1b	Moderate, localised
<i>Pennisetum clandestinum</i>	Kikuyu grass	Poaceae	NEMBA 1b (wetlands)	Scattered
<i>Pinus sp.</i>	Pine	Pinaceae	NEMBA 2	Localised
<i>Ricinus communis</i>	Cast Oil Plant	Euphorbiaceae	NEMBA 2	Scattered, Localised

**NEMBA:** Alien and Invasive Species as per National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Draft Alien and Invasive Species Lists (GN R598 and GN R599 of 2014 (category 1, 2 or 3)

### Eradication protocol

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A comprehensive management plan should be incorporated into the EMP and a detailed action plan compiled and implemented by the ECO.

## 3 Fauna

The site under assessment lies adjacent to the Sundays River and is surrounded by predominantly citrus producing farms. Some intact Thicket vegetation is present, which provides transient habitat for a number of large mammals such as Kudu, bushbuck, blue duiker, porcupine and warthog. Smaller mammals include Baboons and monkeys. It is anticipated that there is also a variety of bird and reptile species to be found on the site.

The proposed clearing of vegetation for the establishment of citrus orchards does not fall within any official national, provincial or municipal protected areas, nor is it included within an Important Bird Area (Birdlife South Africa, Barnes 1998) or Ramsar wetland site (Ramsar 2007). However, it lies within close proximity to Addo Elephant National Park as well as a number of private game farms and lodges. It therefore does form part of an important corridor for faunal movement and other ecological processes. That being said, due to the fragmented nature of the floodplain (due to intensive citrus cultivation), the main ecological corridor will run along drainage lines and the banks of the Sundays River however, it does lose some of its effectiveness to function as a corridor because of the gravel Zuurberg Road (R335) which runs along the eastern boundary.

### 3.1 Protected areas

No formalised protected areas fall within the property. However, the Greater Addo Elephant Park is located to the east of the site on the opposite side of the Sundays River.

### 3.2 Invertebrates

No Rare or Endangered Butterfly species are expected to occur in the study area.

The Addo Flightless Dung Beetle (*Circellium bacchus*) which is endemic to the region may occur on the site, but in unconfirmed.



### 3.3 Amphibians and Reptiles

No Rare or Endangered species from these groups have distribution ranges that overlap with the study area.

Table 4: Amphibian and Reptile Species of Special Concern known to occur in the vicinity of the sites.

SPECIES	COMMON NAME	HABITATS	RDB/SSC
<b>Amphibians</b>			
<i>Amietophrynus pardalis</i>	Leopard toad	Grasslands and thicket; winter breeder	
<i>Amietophrynus rangeri</i>	Raucous toad	Grasslands and thicket; summer breeder	
<i>Breviceps adpersus pentheri</i>	Penther's rain frog	Grasslands and thicket; terrestrial breeder	
<i>Cacosternum nanum</i>	Bronze caco	Grasslands and thicket; opportunistic breeder	
<i>Hyperolius marmoratus</i>	Painted reed frog	Grasslands and thicket; still water with reed beds	
<i>Kassina senegalensis</i>	Bubbling Kassina	Grasslands and thicket; burrowing	
<i>Pyxicephalus adpersus</i>	African giant bullfrog	Widespread, thicket and grassland	NT (Regional)
<i>Semnodactylus wealii</i>	Rattling kassina	Grasslands and thicket; burrowing	
<i>Tomopterna delandii</i>	Cape sand frog	Vleis and grassland; burrower	
<b>Snakes</b>			
<i>Aspidelapse lubricus</i>	Coral Snake	Thicket, terrestrial	
<i>Bitis arietans</i>	Puff adder	Widespread, terrestrial	
<i>Causus rhombeatus</i>	Night adder	Widespread, terrestrial	
<i>Crotaphopeltis hotamboeia</i>	Red-lipped snake	Marshes in Grasslands and thicket, terrestrial	
<i>Dasypeltis scabra</i>	Common egg-eater	Widespread, terrestrial	
<i>Dispholidus typus</i>	Boomslang	Forest and thicket; arboreal	
<i>Duberria lutrix</i>	Common slug eater	Grasslands and thicket terrestrial	
<i>Homoroselapse lacteus</i>	Harlequin snake	Grasslands, fynbos and thicket; semi-burrowing	
<i>Lamprophis aurora</i>	Aurora house snake	Thicket, terrestrial	
<i>Lamprophis capensis</i>	Brown house snake	Widespread, terrestrial	
<i>Lamprophis inornatus</i>	Olive house snake	Grasslands and thicket, Terrestrial	
<i>Leptotyphlops nigricans</i>	Black thread snake	Grasslands and thicket; burrowing	
<i>Lycodonomorphus rufulus</i>	Common water snake	Marshes, semi-aquatic	
<i>Lycophidion capense</i>	Cape wolf snake	Widespread, terrestrial	
<i>Naja nivea</i>	Cape cobra	Thicket, terrestrial	
<i>Philothamnus hoplogaster</i>	Common green snake	Marshes in Grasslands and thicket, terrestrial	
<i>Philothamnus natalensis</i>	Natal green snake	Grasslands and thicket terrestrial	
<i>Philothamnus semivariiegatus</i>	Spotted bush snake	Thicket, arboreal	
<i>Psammophis notostictus</i>	Karoo sand snake	Thicket, terrestrial	

SPECIES	COMMON NAME	HABITATS	RDB/SSC
<i>Psammophylax rhombeatus</i>	Rhombic skaapsteker	Grasslands and thicket, terrestrial	
<i>Pseudaspis cana</i>	Mole snake	Grasslands and thicket; burrowing	
<i>Rhinotyphlops lalandei</i>	De Lalande's blind snake	Grasslands, fynbos and thicket, burrowing	
<b>Lizards</b>			
<i>Acontias meleagris/tasmani</i>	Cape legless skink	Widespread, fynbos, thicket and grassland	
<i>Acontias orientalis/lineicauda</i>	Algoa legless skink	Subterranean	IUCN NT
<i>Bradypodion ventrale</i>	Southern dwarf chameleon	Forest and thicket; arboreal	Cites 2
<i>Cordylus tasmani</i>	Tasman's girdled lizard	Thicket, arboreal	Endemic, Cites 2
<i>Gerrhosaurus flavigularis</i>	Yellow-throated plated lizard	Grasslands, fynbos and thicket; terrestrial	
<i>Hemidactylus mabouia</i>	Tropical house gecko	Introduced, widespread, arboreal and commensal	
<i>Lygodactylus capensis</i>	Cape dwarf gecko	Introduced, arboreal, commensal	
<i>Nucras lalandei</i>	De Lalande's sandveld lizard	Grasslands and thicket; terrestrial	
<i>Pachydactylus maculatus</i>	Spotted gecko	Widespread, terrestrial	
<i>Scelotes anguineus</i>	Algoa dwarf burrowing skink	Subterranean	IUCN LC
<i>Trachylepis capensis</i>	Cape skink	Widespread, terrestrial	
<i>Trachylepis homalocephala</i>	Red-sided skink	Grasslands, fynbos and thicket; terrestrial	
<i>Trachylepis variegata</i>	Variegated skink	Grasslands and thicket; terrestrial	
<i>Varanus albigularis</i>	Whitethroated monitor	Widespread, terrestrial	Cites 2
<i>Varanus niloticus</i>	Water monitor	Widespread, aquatic	Cites 2
<b>Chelonians</b>			
<i>Chersina angulata</i>	Angulate tortoise	Grassland and thicket; terrestrial	Cites 2
<i>Geochelone pardalis</i>	Leopard tortoise	Widespread, terrestrial	Cites 2
<i>Homopus areolatus</i>	Parrot-beaked padloper	Widespread, terrestrial	Cites 2
<i>Homopus boulengeri</i>	Karoo padloper	Widespread, terrestrial	Cites 2
<i>Pelomedusa subrufa</i>	Marsh terrapin	Widespread aquatic	Cites 2

No threatened amphibians or SSC have been recorded on the development site. The Giant African Bullfrog (*Pyxicephalus adspersus*) has been classified as regionally Near Threatened (Minter et al. 2004) and reaches its southern limit in the Algoa Bay area. It is known from temporary pans in the near-by Addo Elephant National Park (Branch & Braack 1987) and Port Elizabeth region (Bridgemedad). Therefore it is NOT anticipated that this species would occur on the site. No alien or extralimital amphibian species are known in the region.

Three reptiles are endemic to the Algoa Bay region and of potential conservation concern as their ranges extend into the site area.

- Algoa legless skink (*Acontias orientalis/lineicauda*): It is protected in a number of conserved areas, including Addo Elephant National Park (Branch and Braack, 1987).
- Algoa dwarf burrowing skink (*Scelotes anguineus*): It is well protected in a number of conserved areas, including the Addo Elephant National Park (Branch and Braack, 1987).
- Tasman's girdled lizard (*Cordylus tasmani*): It has a preference for sheltering under dead bark on trees and in the apron of dead leaves of large *Aloe* spp., particularly *A. ferox*. It is threatened by habitat loss from

farming activities resulting in large scale clearance of Thicket for the production of pasture and arable land. The informal and formal collection of aloe leaves for their sap also destroys its specific habitat, although the aloe plants themselves remain. It is protected in a number of conserved areas, including Addo Elephant National Park (Branch and Braack, 1987).

Nine reptile species are also listed in CITES Appendix II, including a chameleon (*Bradypodion ventrale*), two monitors (*Varanus albigularis* and *Varanus niloticus*), two girdled lizard (*Cordylus cordylus* and *C. tasmani*), and three tortoises (*Stigmochelys pardalis*, *Homopus areolatus* and *Chersina angulata*). All are common throughout much of the Algoa Bay region, including the site area, and only Tasman's girdled lizard (*Cordylus tasmani*) is endemic to the region. All are well protected in existing conserved areas with no evidence of illegal or unsustainable exploitation in the region. Their inclusion on CITES Appendix II is a precautionary measure covering all members of groups that are regularly involved in the international skin (monitor lizards) or pet trade (tortoises, chameleons and girdled lizards).

A number of reptiles are undergoing range expansions, via human translocations, in the Eastern Cape, including:

- Tropical house gecko (*Hemidactylus mabouia*). This nocturnal gecko is well established in numerous coastal towns (Port Elizabeth, Port Alfred, East London, etc), having expanded its range southwards from northern KwaZulu-Natal since 1960 (Bourquin 1987).
- Cape dwarf day gecko (*Lygodactylus capensis*). This diurnal dwarf gecko is also expanding its range in the region, and established populations are known in Port Elizabeth and Grahamstown.

### 3.4 Birds

Bird species of special concern which have been recorded in the general area, and which may frequent the site were identified using data from the South African Bird Atlas Project. No Critically Endangered or Endangered bird species are expected to breed or forage in the study area.

The table below lists bird species regarded as Vulnerable and Near Threatened that may occur at the site. It is highly likely that the species listed below will be attracted to the area once it is converted to agriculture, as they tend to prefer agricultural lands as habitat.

Table 5: Bird Species of Special Concern known to occur in the vicinity of the sites.

SPECIES	COMMON NAME	RDB
<i>Anthropoides paradiseus</i>	Blue Crane	Vulnerable
<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	Near Threatened
<i>Campethera notata</i>	Knysna Woodpecker	Near Threatened South African Endemic
<i>Falco biarmicus</i>	Lanner Falcon	Near Threatened
<i>Falco peregrinus</i>	Peregrine Falcon	Near Threatened
<i>Neotis denhami</i>	Denham's Bustard	Vulnerable
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable
<i>Sagittarius serpentarius</i>	Secretarybird	Near Threatened

#### 3.4.1 Important Bird Areas (IBA)

The Important Bird Areas of Southern Africa directory was compiled in 1998 and identified within South Africa 122 IBAs containing 59 threatened and 64 near-threatened bird species. The site does not fall within recognized IBAs.

### 3.5 Mammals

No mammal species listed as Vulnerable, Endangered or Critically Endangered in the Red Data Book for South African Mammals (Friedmann and Daly 2004) are expected to occur at the study site. The table below lists mammal species that may occur in the vicinity of the site.

Table 6: Mammal Species of Special Concern known to occur in the vicinity of the sites.

SPECIES	COMMON NAME	RDB
<i>Aethomys namaquensis</i>	Namaqua rock rat	
<i>Amblysomus hottentotus</i>	Hottentot golden mole	Data Deficient
<i>Atilax paludinosus</i>	Water mongoose	
<i>Canis mesomelas</i>	Black-backed jackal	
<i>Cercopithecus aethiops</i>	Vervet monkey	
<i>Crocidura cyanea</i>	Reddish-grey musk shrew	Data Deficient
<i>Crocidura flavescens</i>	Greater musk shrew	
<i>Cryptomys hottentotus</i>	Common mole-rat	
<i>Cynictis penicillata</i>	Yellow mongoose	
<i>Dendromus mesomelas</i>	Brant's climbing mouse	
<i>Erinaceous frontalis</i>	African hedgehog	Near Threatened
<i>Felis caracal</i>	Caracal	
<i>Felis lybica</i>	African wild cat	
<i>Galerella pulverulenta</i>	Small grey mongoose	
<i>Genetta genetta</i>	Small spotted genet	
<i>Genetta tigrina</i>	Large spotted genet	
<i>Georychus capensis</i>	Cape mole rat	
<i>Grammomys dolichocheirus</i>	Woodland Mouse	Data Deficient
<i>Graphiurus murinus</i>	Woodland dormouse	
<i>Herpestes ichneumon</i>	Large grey mongoose	
<i>Hystrix africaeaustralis</i>	Porcupine	
<i>Ictonyx striatus</i>	Striped polecat	
<i>Lepus saxatilis</i>	Scrub hare	
<i>Mastomys natalensis</i>	Multimammate mouse	
<i>Mellivora capensis</i>	Honey badger	Near Threatened
<i>Mus minutoides</i>	Dwarf mouse	
<i>Myosorex varius</i>	Forest shrew	Data Deficient
<i>Orycteropus afer</i>	Aardvark	
<i>Otocyon megalotis</i>	Bat eared fox	
<i>Otomys unisulcatus</i>	Bush Karoo rat	
<i>Papio ursinus</i>	Chacma baboon	
<i>Pedetes capensis</i>	Springhare	
<i>Philantomba monticola</i>	Blue duiker	
<i>Poecilogleale albinucha</i>	African weasel	Data Deficient
<i>Potamochoerus porcus</i>	Bush pig	
<i>Raphicerus campestris</i>	Steenbok	
<i>Raphicerus melanotis</i>	Cape grysbok	
<i>Rhabdomys pumilio</i>	Striped field mouse	
<i>Saccostomus campestris</i>	Pouched mouse	
<i>Suncus infinitesimus</i>	Least dwarf shrew	Data Deficient
<i>Sylvicapra grimmia</i>	Common duiker	
<i>Tragelaphus scriptus</i>	Bushbuck	
<i>Tragelaphus strepsiceros</i>	Kudu	

Alien mammals in the region include feral domestic cats, dogs and cattle, and introduced urban rodent pests such as the house mouse (*Mus musculus*), house rat (*Rattus rattus*) and the Norwegian rat (*Rattus norvegicus*).

### 3.6 Recommendation

- Most of the mobile fauna are expected to vacate the area that is to be developed once vegetation clearing and other site preparation activities commence and will seek refuge in intact natural or near-natural surrounding areas.

- Measures should be implemented to ensure that fauna on site are not harmed during site preparation or operational phase activities associated with the development, e.g. environmental induction process for construction personnel and / or farm workers.
- Removal of animals from the affected areas before the start of site clearing and relocating these to safe areas would only be a valid mitigation option in the case of tortoises.
- All other reptile and small mammal species are extremely difficult to catch and it would be a futile attempt to try and relocate them. Before doing site clearing, affected areas should be thoroughly searched for tortoises.
- Tortoises found must be released in the no-go areas.
- A professional reptile remover (with the necessary permits) needs to be contacted to remove dangerous reptiles when in conflict with the workers.
- Search and rescue operations before and during the site preparation phase will decrease the impacts considerably.

### 3.7 Permit Requirements

- Permits from the relevant authority (Department of Economic Development, Environmental Affairs and Tourism) are required for the removal, translocation or destruction of protected faunal species, in terms of the Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).

### 3.8 List of Site Maps

*Figure 7: Aerial Photo – Block A*

*Figure 8: Aerial Photo – Block B*

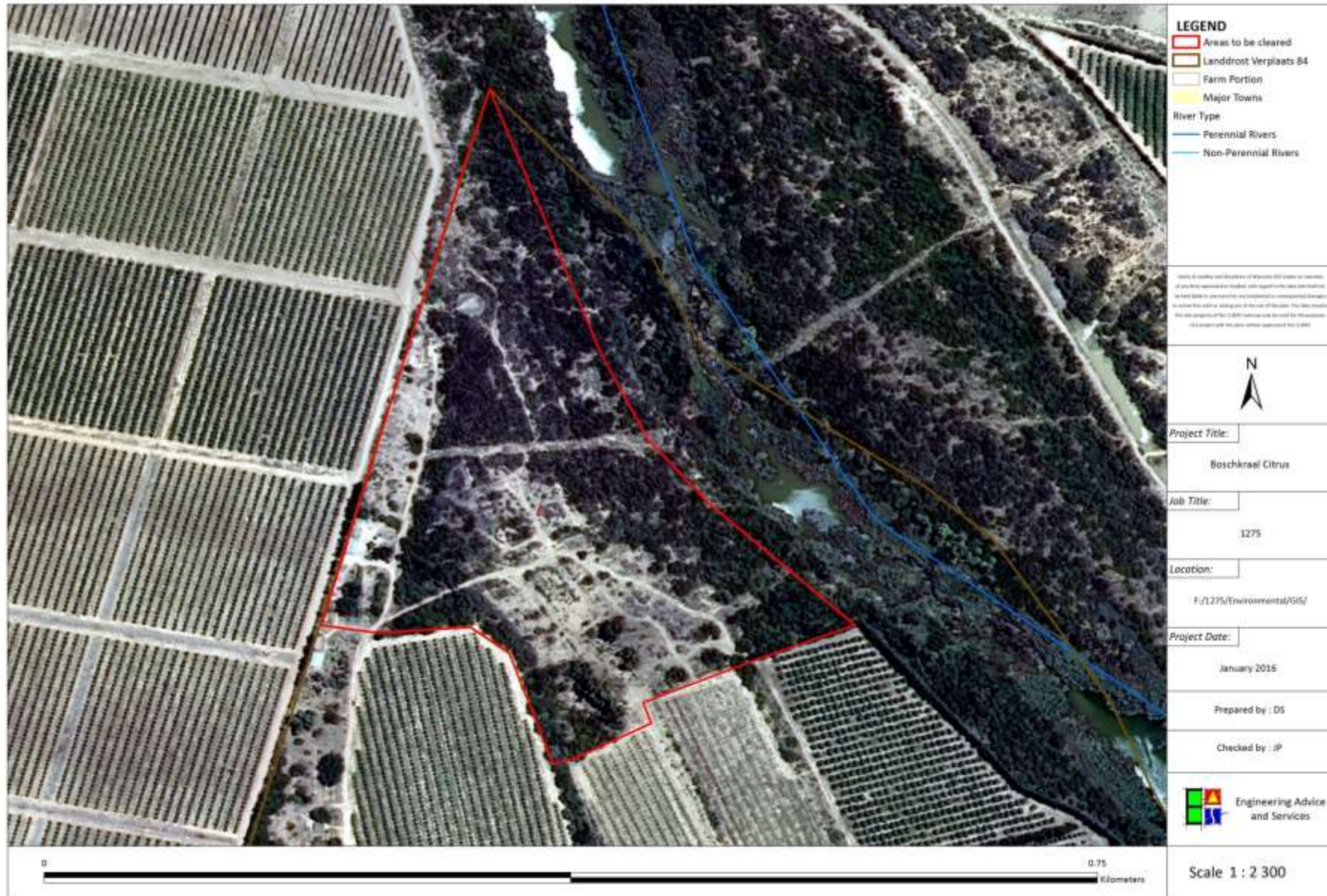
*Figure 9: Aerial Photo – Block C*

*Figure 10: Vegetation Sensitivity – Overall*

*Figure 11: Vegetation Sensitivity – Block A*

*Figure 12: Vegetation Sensitivity – Block B*

*Figure 13: Vegetation Sensitivity – Block C*



Series of Aerial Maps (A)

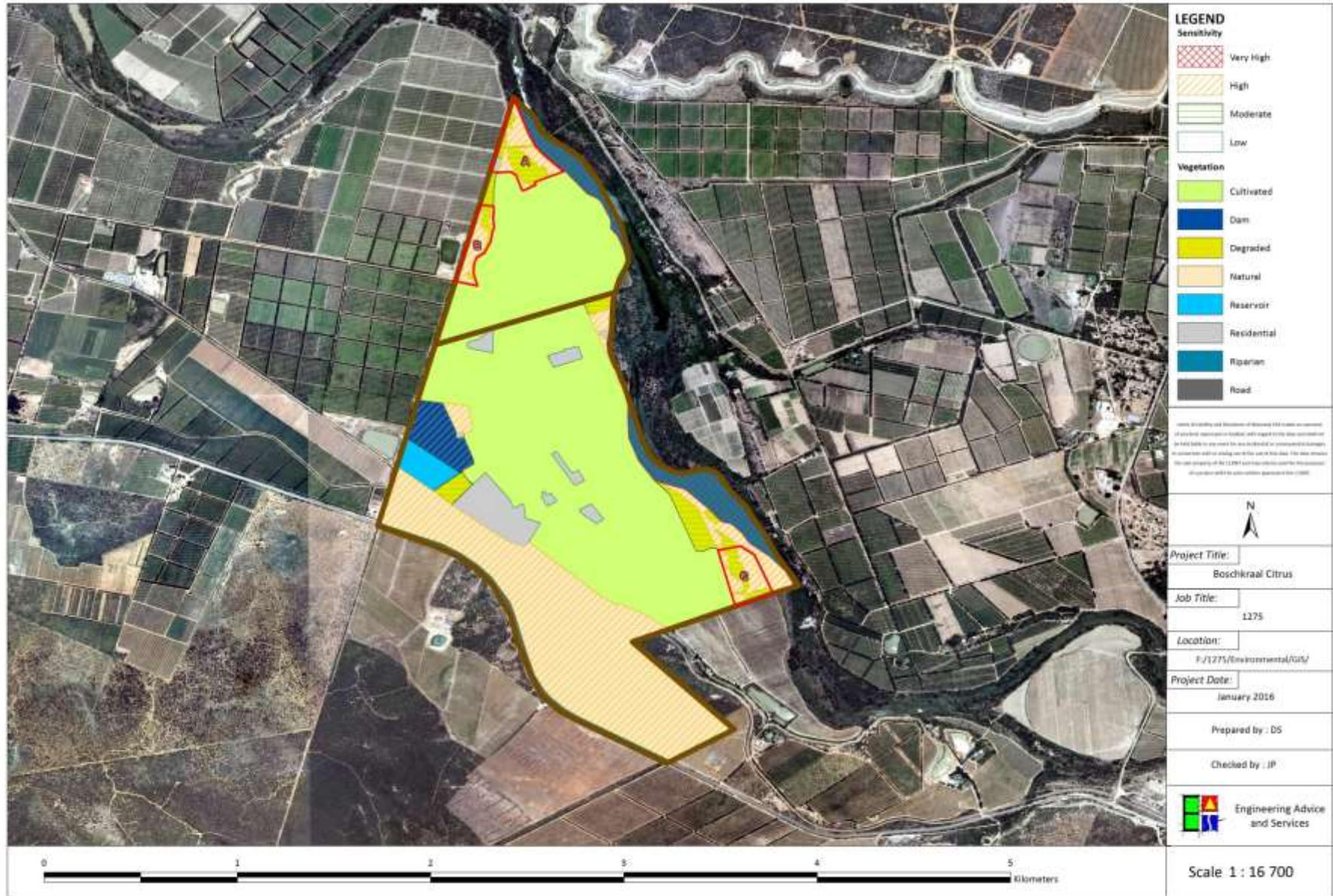


Series of Aerial Maps (B)

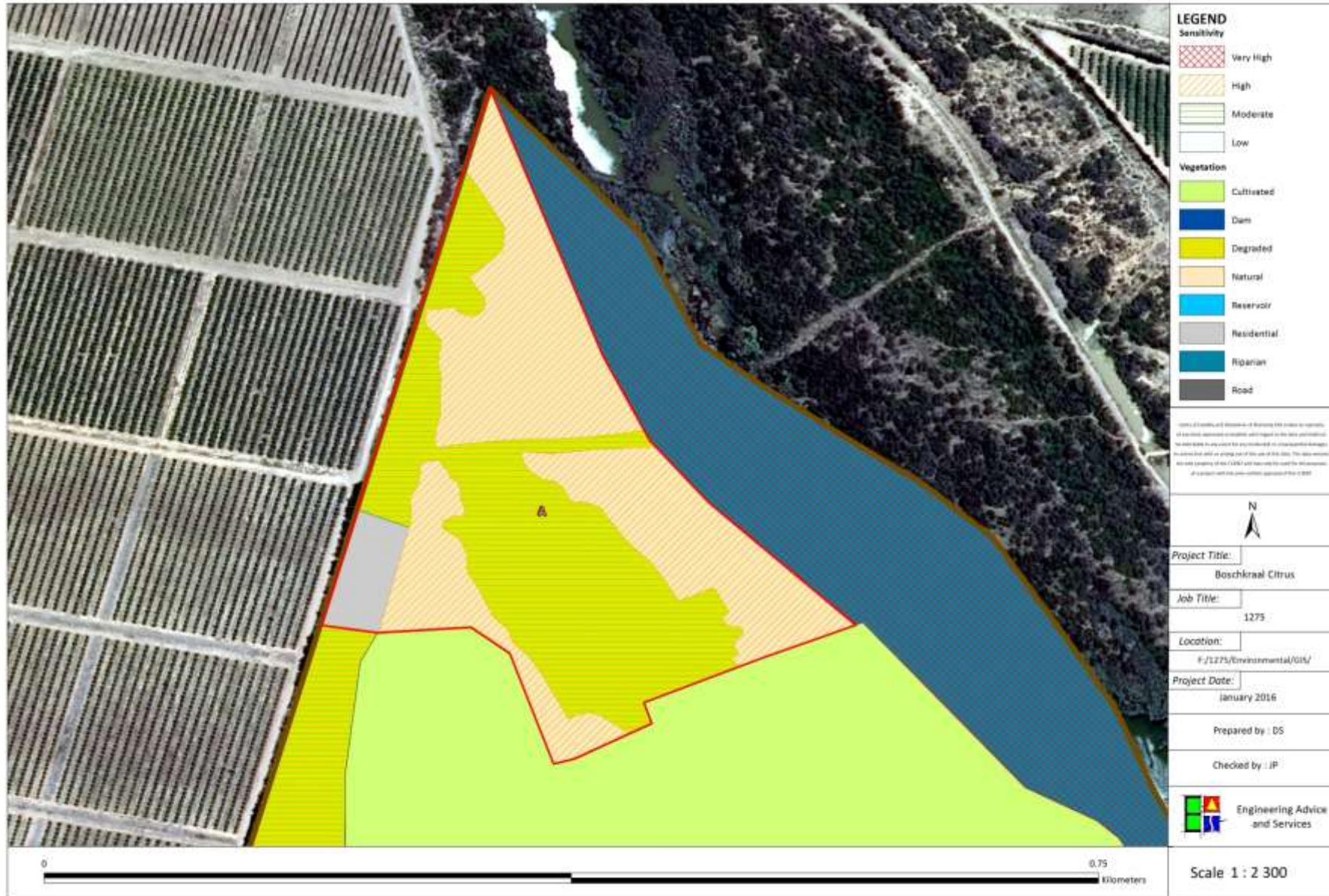


Series of Aerial Maps (C)





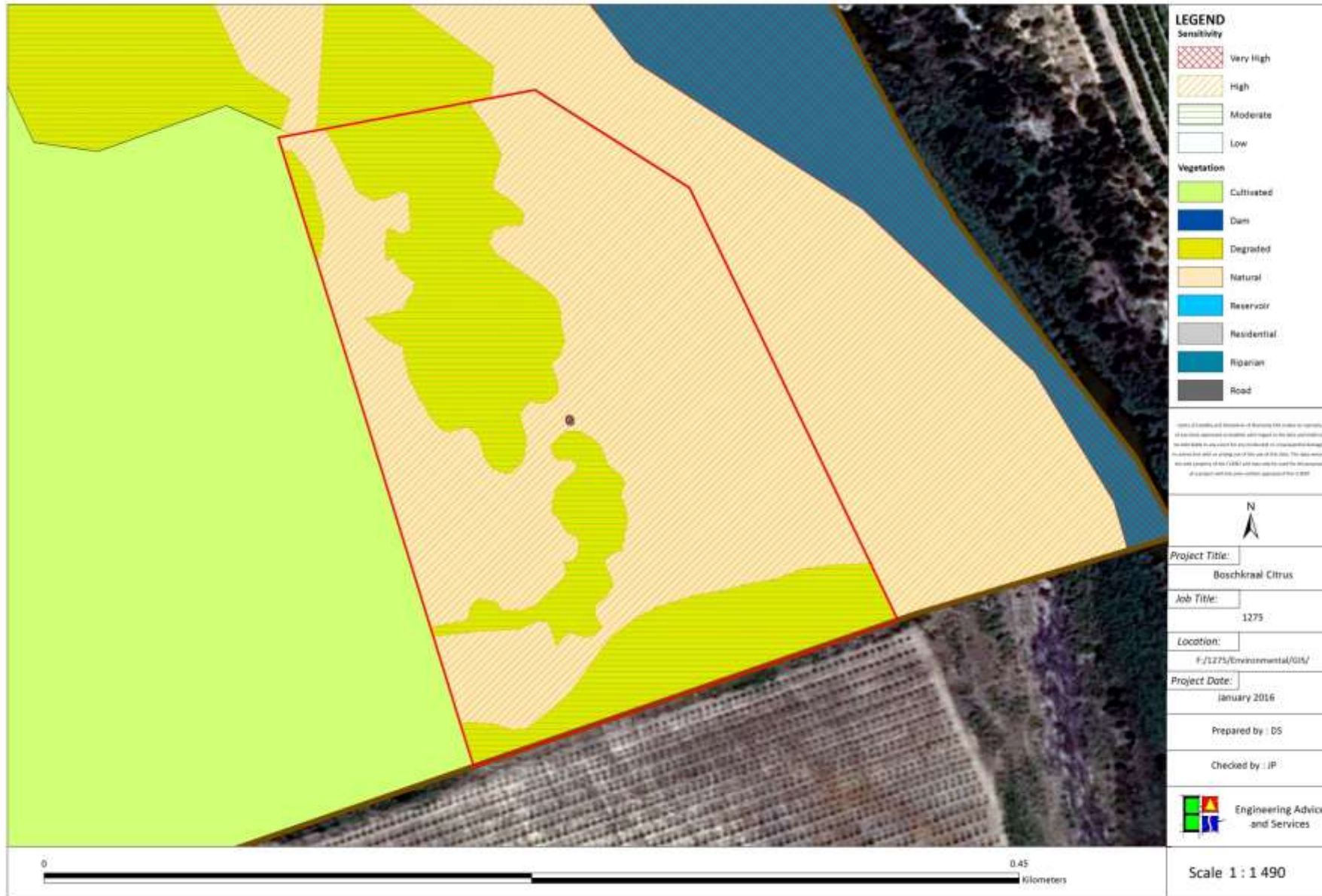
Series of Sensitivity Maps



Series of Sensitivity Maps (A)



Series of Sensitivity Maps (B)



Series of Sensitivity Maps (C)

## 4 Impact Assessment

### 4.1 Assessment of the significance of the potential impacts

#### 4.1.1 Criteria of assigning significance to potential impacts

The following methodology is to be applied in the specialist studies for the assessment of potential impacts.

Criteria	Explanation
<b>Nature of impact</b>	Review the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”
<b>Extent</b>	Indicate whether the impact will be: <ul style="list-style-type: none"> <li>• (S) local and limited to the immediate area of development (the site);</li> <li>• (L) limited to within 5 km of the development; or</li> <li>• (R) whether the impact may be realized regionally, nationally or even internationally.</li> </ul>
<b>Duration</b>	Review the lifetime of the impact, as being: <ul style="list-style-type: none"> <li>• (V) very short term (0 - 1 years),</li> <li>• (S) short term (1 - 5 years),</li> <li>• (M) medium (5 - 15 years),</li> <li>• (L) long term (&gt;15 years but where the impacts will cease after the operation of the site), or</li> <li>• (P) permanent.</li> </ul>
<b>Intensity</b>	Establish whether the impact is destructive or innocuous and should be described as either: <ul style="list-style-type: none"> <li>• (L) low (where no environmental functions and processes are affected)</li> <li>• (M) medium (where the environment continues to function but in a modified manner) or</li> <li>• (H) high (where environmental functions and processes are altered such that they temporarily or permanently cease).</li> </ul>
<b>Probability</b>	Consider the likelihood of the impact occurring and should be described as: <ul style="list-style-type: none"> <li>• (I) improbable (low likelihood)</li> <li>• (P) probable (distinct possibility)</li> <li>• (H) highly probable (most likely) or</li> <li>• (D) definite (impact will occur regardless of prevention measures).</li> </ul>
<b>Status of the impact</b>	Description as to whether the impact will be positive (a benefit), negative (a cost), or neutral.
<b>Degree of confidence</b>	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low. <ul style="list-style-type: none"> <li>• (L) Low: Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design</li> </ul>
<b>Significance</b>	<ul style="list-style-type: none"> <li>• (M) Medium: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation;</li> <li>• (H) High: Where it could have a ‘no-go’ implication for the project unless mitigation or re-design is practically achievable.</li> </ul>

#### 4.1.2 Significance Rating

		Duration				
		Permanent	Long term	Medium term	Short term	Very short term
Extent	<b>High Intensity</b>					
	National	High	High	High	High	Medium
	Regional	High	High	High	High	Medium
	Local	High	High	Medium	Medium	Medium
Extent	<b>Medium Intensity</b>					
	National	High	High	High	Medium	Medium
	Regional	High	High	High	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Medium
Extent	<b>Low Intensity</b>					
	National	Medium	Medium	Medium	Medium	Medium
	Regional	Medium	Medium	Medium	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Low
Extent	<b>Site specific</b>	Medium	Medium	Medium	Low	Low

Furthermore, the following must be considered:

- 1) Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- 2) All impacts should be evaluated for both the construction, operation and decommissioning phases of the project, where relevant.
- 3) The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.
- 4) Management actions: Where negative impacts are identified, specialists must specify practical mitigation objectives (i.e. ways of avoiding or reducing negative impacts). Where no mitigation is feasible, this should be stated and the reasons given. Where positive impacts are identified, management actions to enhance the benefit must also be recommended.

## 4.2 Identification of potential impacts

### 4.2.1 Possible impacts on biodiversity during construction and operations

Construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not properly managed. Table 7 describes impacts that may potentially occur in the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these are summarised in Table 7, where **SB** = Significance BEFORE mitigation and **SA** = Significance AFTER mitigation. No significant ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected other than minor access roads.

### 4.2.2 Summary of actions, activities, or processes that have sufficiently significant impacts to require mitigation

The main impacts as a result of the proposed activity include the following:

1. Permanent or temporary loss of vegetation cover as a result of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
2. Loss of species of special concern during pre-construction site clearing activities. Numerous species of special concern are present within the affected area, which will be destroyed during site preparation.
3. Susceptibility of some areas to erosion as a result of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
4. Susceptibility of post construction disturbed areas to invasion by exotic and alien species. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
5. Disturbances to ecological processes. Activity may result in disturbances to ecological processes.
6. Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
7. Loss of faunal SSC due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

### 4.2.3 Potential cumulative impacts

No cumulative impacts are expected as a result of the expansion of the site, due to the limited disturbance area.

Table 7: Summary indicating significance of potential impacts (*SB = Significance BEFORE Mitigation; SA = Significance AFTER Mitigation*)

Impact	Comment	Extent	Duration	Intensity	Probability	SB	SA
Vegetation	Permanent or temporary loss of vegetation cover as a result of site clearing	Site	Long	Low	Definite	Low	Negligible
Flora	Loss of species of special concern during pre-construction site clearing activities	Site	Long	Low	Definite	Low	Negligible
Alien species	Susceptibility of post construction disturbed areas to invasion by exotic and alien species	Site	Med	Low	Probable	Low	Negligible
Erosion	Susceptibility of some areas to erosion as a result of construction related disturbances	Site	Med	Low	Probable	Mod	Low
Ecological Processes	Disturbances to ecological processes	Site	Short	Low	Probable	Low	Negligible
Faunal Habitat	Activity will result in the loss of habitat for faunal species	Site	Long	Low	Definite	Low	Negligible
Faunal Species	Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species	Site	Long	Low	Probable	Low	Negligible
<b>OVERALL</b>						<b>Low</b>	Negligible

## 5 Mitigation and Management

The following mitigation measures are recommended:

Impact	Mitigation Measures
Vegetation	Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. No clearing outside of planting area and infrastructure to take place. Final siting of footprints should be undertaken in consultation with respective specialists, including a botanist.
Flora	Respective permits must be obtained timeously (1 – 2 months) before bush clearing commences and a flora search and rescue plan must be implemented. Rescued plants should be replanted into a nearby disturbed area of similar habitat. Permits from DEDEAT and DAFF must be kept on site and in the possession of the flora search and rescue team at all times. Once flora search and rescue is complete, a certificate of clearance must be issued by the botanist and copies supplied to DEDEAT
Alien species	Alien trees must be removed from the site as per NEMBA requirements. A suitable weed management strategy to be implemented in construction and operation phases. After clearing is completed, an appropriate cover crop should be planted where any weeds or exotic species are removed from disturbed areas, should establishment of orchards not commence immediately.
Erosion	Suitable measures must be implemented in areas that are susceptible to erosion, including but not limited to gabions and runoff diversion berms (if necessary). Areas must be rehabilitated and a suitable cover crop planted once construction is completed. If orchard establishment does not occur soon after preparation of the site, a suitable cover crop to be established as a temporary measure.
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. No clearing outside of planting area and infrastructure to take place. Riparian buffer to be retained along river, outside of planting area.
Faunal Habitat	Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences Riparian buffer to be retained along river, outside of planting area.
Faunal Species	Permits from DEDEAT and DAFF must be kept on site and in the possession of the fauna search and rescue team at all times. Faunal search and rescue to be undertaken before bush clearing by a competent person, especially for reptiles and amphibians. Once fauna search and rescue is complete, a certificate of clearance must be issued by the faunal specialist and copies supplied to DEDEAT.

### 5.1 Vegetation and Flora Clearing and Relocation Plan

The following flora relocation plan is recommended:

- Once the final planting plan has been determined the botanist will be consulted in order to finalise the plant 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 special 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 in particular once species of special concern have been relocated for that area.



6. 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.
7. 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.
8. Small trees and shrubs (<1 m in height), where possible will be rescued and planted temporarily in potting bags for later use.
9. Arboreal species (orchids), if identified, will be collected attached to the substrate (i.e. branch) they are growing on and stored (hung) in a moist, lightly shaded area for later relocation or relocated immediately into a similar environment.
10. 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.
11. 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.
12. Should site construction occur in a phased manner, then clearing activities should take place also in a phased manner, ahead of construction work.
13. 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.
14. Succulent species can be temporarily stored for no more than 2 weeks in a suitable area before replanting. The contractor will be responsible for periodic watering of the replanted flora until such time as they become acclimatised and some rain occurs.

## 6 Conclusions

The clearing of vegetation from the proposed sites to establish citrus orchards will result in the localised loss of vegetation cover as well as the potential destruction of a few species of special concern, within the affected footprints. The impacts will be confined to the construction footprint, having a limited area. In addition, any species of special concern that are present have widespread distributions, and any losses are unlikely to result in any significant impacts to populations after the implementation of a flora search and rescue plan.

Although the site is generally flat, the clearing of vegetation to establish orchards may also result in a temporary increase in erosion and erosion risk in some areas of the site during construction. Adequate measures must be implemented to stabilise areas having an erosion risk using appropriate means as necessary, including contouring and cut off drains. Since the alluvial vegetation is pioneer in nature, any areas outside of the orchard footprint that are disturbed during vegetation clearing are likely to regenerate naturally. Should any problematic areas be identified after completion, additional measures may be necessary to establish plant growth. Measures should be implemented to eradicate any weeds and invasive species that may regenerate after disturbance.

These impacts of the proposed agricultural expansion to terrestrial vegetation and flora are likely to be of low to negligible significance with the implementation of the recommended mitigation measures. Impacts noted in this assessment report are likely to have negligible residual impacts if mitigation measures are implemented. Furthermore based on the fact that the alluvial vegetation is of a pioneer nature and supported by observations on site, it is evident that the proposed activity is highly reversible. Should the orchards be removed in the future, it is highly likely that natural regeneration of Albany Alluvial vegetation will occur to its pre-development state.

## 7 Appendix B: References

- Acocks, J. P. H. 1988. Veld Types of South Africa. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Batten, H., and Bokelmann, H. 2001. Eastern Cape: South African Wild Flower Guide 11. The Botanical Society of South Africa. pp 306.
- Berliner D. & Desmet P. 2007. Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry Project No 2005-012, Pretoria. 1 August 2007
- Bourquin, O. 1987. The recent geographical range extension of *Hemidactylus mabouia mabouia*. *Lammergeyer* 38: 12-14.
- Branch, W. R. and H. Braack, 1987. The reptiles and amphibians of the Addo Elephant National Park. *Koedoe* 30: 61-112.
- Branch, W.R. (ed.) 1988. South African Red Data Book - Reptiles and Amphibians. South African National Science Programme Report 151: i-iv, 242p.
- Branch, W.R., 1998a. Field Guide to the Snakes and other Reptiles of Southern Africa. Rev ed. Struiks Publ., Cape Town, 399 pp, num. maps, 112 col. pls.
- Bromilow, C. 2001. Problem Plants of South Africa. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. pp 258
- Bruton, M. N., and Gess, F. W. 1988. Towards and Environmental Plan for the Eastern Cape. Conference proceedings from Rhodes University. Grocott and Sherry, Grahamstown.
- De Villiers C.C., Driver A., Clark B., Euston-Brown D.I.W., Day E.G., Job N., Helme N.A., Holmes P.M., Brownlie S. and Rebelo A.B. 2005. Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum and Botanical Society of South Africa, Kirstenbosch, 94p.
- Friedmann, Y. and Daly, B. (eds.) 2004. Red Data Book of the Mammals of South Africa: A Conservation Assessment. CBSG Southern Africa, Conservation Breeding Specialist Group (SSG/IUCN), Endangered Wildlife Trust, South Africa. 722p.
- Fuggle, R. F. and Rabie, M. A. 2003. Environmental Management in South Africa. Juta & Co, Johannesburg.
- Gledhill, E. 1981. Veldblomme van Oos-Kaapland. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Golding, J. (Ed.) 2002. Southern African Plant Red Data Lists. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. Alien Weeds and Invasive Plants. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. pp 300.
- Henning, G.A., Terblanche, R.F. and Ball, J.B (eds) 2009. South African Red Data Book: Butterflies. SANBI Biodiversity Series 13. South African National Biodiversity Institute, Pretoria.
- Hilton-Taylor, C. 1996. Red Data List of Southern African Plants. National Botanical Institute..
- Köpke, D. 1988. The Climate of the Eastern Cape. In: Bruton, M. N., and Gess, F. W. (Eds). Towards and Environmental Plan for the Eastern Cape. Conference proceedings from Rhodes University. Grocott and Sherry, Grahamstown.
- Low, A. B., and Rebelo, A. 1988. Vegetation of South Africa, Lesotho and Swaziland. A Companion to the Vegetation Map of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.
- Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J & Kloepfer, D. (eds.) 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland, SI/MAB Series 9. Smithsonian Institute, Washington D.C., 360p.
- Pienaar, K. 2000. The South African What Flower is That? Struik Publishers (Pty) Ltd. Cape Town.

- Pierce, S. M. 2003. The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development. Terrestrial Ecological Research Unit Report No 47. University of Port Elizabeth, South Africa.
- Pierce SM and Mader AD. 2006. The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development. Centre for African Conservation Ecology (ACE). Report Number 47 (Second Edition). Nelson Mandela Metropolitan University, South Africa.
- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component. Pretoria: South African National Biodiversity Institute. Skead, C.J. 2007. Historical incidence of the larger land mammals in the broader Eastern Cape. 2nd ed. (eds. Boshoff, A.F., Kerley, G.I.H. and Lloyd, P.H.), Port Elizabeth, Centre for African Conservation Ecology, Nelson Mandela Metropolitan University, 570 p.
- Soil Classification Working Group (SCWG), 1991. Soil Classification, A Taxonomic System for South Africa. Memoirs on the Agricultural Natural Resources of South Africa, No 15. Department of Agricultural Development, Pretoria.
- Stirton, C. H. 1987. Plant Invaders : Beautiful, but Dangerous. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Vlok, J, H, J., Euston-Brown, D.I.W. 2002. The patterns within, and the ecological processes that sustain, the subtropical thicket vegetation in the planning domain for the Subtropical Thicket Ecosystem Planning (STEP) project. TERU Report 40. University of Port Elizabeth.
- Weather Bureau. 1988. Climate of South Africa - Climate statistics up to 1984 (WB40). Government Printer, Pretoria.

## 8 Appendix C: Site Photographic Record

### 8.1 BLOCK A



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

## 8.2 BLOCK B



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12

### 8.3 BLOCK C



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18

## **APPENDIX E**

### **COMMENTS AND RESPONSES REPORT**



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## **CHF WOOLLEY TRUST**

# **COMMENTS AND RESPONSES REPORT FOR THE PROPOSED BOSCHKRAAL CITRUS FARM PROJECT, EASTERN CAPE PROVINCE**

**JULY 2016**

### **PREPARED FOR:**

**CHF Woolley Trust  
PO Box 208  
Kirkwood  
6120**



## TABLE OF CONTENTS

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
<b>2</b>	<b>Public Consultation Process .....</b>	<b>2</b>
2.1	Identification of Interested and Affected Parties (IAPs).....	2
2.2	Media Notice.....	4
2.3	Site Notices .....	4
2.4	IAP Registration .....	4
2.5	Background Information Document.....	4
2.6	Commenting Period .....	4
2.7	Comments and Issues Trail.....	5

## TABLES

Table 1: Issues trail .....	6
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## APPENDICES

Appendix 1:	IAP database
Appendix 2:	Proof of media notice publication
Appendix 3:	Site notice locations
Appendix 4:	BID

## LIST OF ACRONYMS

<b>BAR</b>	Basic Assessment Report
<b>BID</b>	Background Information Document
<b>CRR</b>	Comments and Responses Report
<b>DAFF</b>	Department of Agriculture, Fisheries and Forestry
<b>DEDEAT</b>	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism: Cacadu Region
<b>DRDAR</b>	Department of Rural Development and Agrarian Reform: Province of the Eastern Cape
<b>DWS</b>	Department of Water and Sanitation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECPHR</b>	Eastern Cape Provincial Heritage Resources Authority
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>IAPs</b>	Interested and Affected Parties
<b>NEMA</b>	National Environmental Management Act No. 107 of 1998

# 1 INTRODUCTION

CHF Woolley Trust “the Applicant” owns the farm portions 3 and 5 of Landdrost Veeplaats No. 84, collectively referred to as “Boschkraal”, near Kirkwood under the jurisdiction of the Sundays River Valley Municipality in the Eastern Cape. Most of the farm has been cultivated since the 1920’s. However, there are portions of the farm, surrounded by cultivated areas, which have not yet been cultivated (approximately 14 ha in extent). The Applicant is proposing to cultivate these remaining areas, which will be referred to as Blocks A, B and C. Environmental Authorisation in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) is required for the land clearing activity associated with cultivating these areas. Prime Resources (Pty) Ltd has thus been appointed as the Environmental Assessment Practitioner (EAP) to facilitate the Environmental Authorisation process for the proposed Boschkraal Citrus Farm Project.

The applicable listed activities require that a Basic Assessment process be undertaken for the project. As such, as per the NEMA requirements, a Basic Assessment Report (BAR) and an Environmental Management Programme (EMPr) has been compiled in support of the application for Environmental Authorisation.

## 2 PUBLIC CONSULTATION PROCESS

This report details the public consultation process followed for the proposed Boschkraal Citrus Farm Project. The public consultation process was aligned to meet the requirements in terms of the NEMA and the NEMA Environmental Impact Assessment (EIA) Regulations (GNR982 of 2014) and as such must include:

- Fixing a notice board at a place conspicuous to and accessible by the public at the development boundary or along a corridor of the development;
- Placing an advertisement in a local newspaper (or regional if the development will have a regional scale impact);
- Giving written notice to:
  - Landowners or lawful occupiers of the land where the listed activity is to take place;
  - Adjacent land owners or lawful occupiers;
  - The municipal ward councilor for the area where the activity is to take place;
  - The municipality in which the activity is to take place;
  - Any organisation of ratepayers that represent the community in the area;
  - Any State Department having jurisdiction in respect of any aspect of the activity;
- Allowing Interested and Affected Parties (IAPs) and relevant State Departments the opportunity to review and comment on the environmental documentation for a period of at least 30 days, facilitated in such a manner that all potential or registered IAPs are provided with a reasonable opportunity to comment;
- Maintaining a register of the contact details of all registered IAPs and relevant State Departments;
- Any comments received from IAPs and State Departments, as well as responses to such comments, must be included in the environmental documentation; and
- Where a person desires but is unable to participate due to lack of literacy, disability or any other disadvantage, reasonable other methods of allowing for participation and recording comments must be allowed for.

### 2.1 Identification of Interested and Affected Parties (IAPs)

The relevant State Departments identified (and consequently consulted) included:

- Eastern Cape Department of Economic Development, Environmental Affairs and Tourism: Cacadu Region (DEDEAT, as the Competent Authority for activities listed in terms of NEMA);
- Department of Water and Sanitation (DWS, as the custodians of water resources);
- Eastern Cape Provincial Heritage Resources Authority (ECPHRA, as custodians of all cultural and heritage resources);
- Department of Agriculture, Fisheries and Forestry (DAFF, as custodians of forestry);
- Department of Rural Development and Agrarian Reform: Province of the Eastern Cape

(DRDAR, as custodians of the soil resources); and

- Sunday's River Valley Municipality (including the ward councilors for wards 7 and 8).

The following surrounding landowners were identified as IAPs:

<b>SURROUNDING LANDOWNER</b>	<b>SURROUNDING FARM</b>
Mr Nellis Meiring	Apapanzi:Original Farm Strathsomers Estate 42 portions 3; 436; 437
Mr Johnny Ferreira	Junkyard: Original Farm Strathsomers Estate 42 portion 291
Mr Jannie Potgieter	Tweeling Plaas: Original Farm Strathsomers Estate 42 portion 427
Mr Vaughn Attwell	Attwell Citrus: Original Farm Strathsomers Estate 42 portions 219; 312
Mr Lesley Krause	Original Farm Landdrost Veeplaats 84 portion19
Mr Andre Serfontein	Attmar: Original Farm Attmar 85
Mr Rory Niven	San Miguel: Original Farm Landdrost Veeplaats 84 portions 22; 30
Dr Kobus Odendal	Original Farm Landdrost Veeplaats 84 portions 14; 15

The following ratepayers association was identified as an IAP:

- Kirkwood Farmer's Association.

A copy of the IAP database is attached as Appendix 1.

## **2.2 Media Notice**

A media notice, which provided a brief description of the proposed project, the environmental process, as well as contact details for the EAP, how to register as an IAP and how further information could be obtained, was published in the Herald newspaper on 21 June 2016. Refer to Appendix 2 for a proof of publication.

## **2.3 Site Notices**

A2 site notices, in English, which provided a brief description of the proposed project, the environmental process to be followed, contact details for the EAP, how to register as an IAP and where further information could be obtained, were posted up for display at the Boschkraal farm entrance and the Humansdorp Co-op in Kirkwood on 26 May 2016. Refer to Appendix 3 for a copy of the site notice, a map indicating the locations where the site notices were posted and photographs of the posted site notices.

## **2.4 IAP Registration**

The site notice and media notice provided information on how to register as an IAP, to receive further information regarding the proposed project and of opportunities to participate.

## **2.5 Background Information Document**

A Background Information Document (BID), in English, which briefly described the background to the project, the proposal in brief, the environmental process, where the BAR could be viewed, the commenting period and the contact details of whom to contact should queries arise, was made available to registered IAPs, surrounding landowners, the representative from the ratepayers association and the ward councillors for the area on 7 July 2016. Refer to Appendix 4 for a copy of the BID.

## **2.6 Commenting Period**

The representatives from the relevant State Departments were provided with a copy of BAR for comment on or before 7 July 2016 either via email or hard copy, as per their preference, which was indicated to the EAP through prior communication.

The BID disseminated to surrounding landowners, the representative from the ratepayers association, the ward councillors, and registered IAPs provided information on where the BAR could be viewed, namely on the Prime Resources website, and indicated that comments should be submitted before the end of the commenting period.

A commenting period of 30 days was held from 8 July 2016 to 8 August 2016. The commenting period provided State Departments and IAPs with 30 calendar days during which any comments, concerns, issues and requests for more information could be raised. After the commenting period,

this Comments and Responses Report (CRR) will be updated to include any comments, issues or queries received during the commenting period as well as responses thereto. The BAR including this CRR will be submitted to the DEDEAT: Cacadu Region for final consideration on or before 9 September 2016.

## **2.7 Comments and Issues Trail**

An issues trail (refer to Table 1) will be compiled detailing the name of all IAPs and all comments raised during the commenting period as well as the responses thereto.

**Table 1: Issues trail**

NAME	METHOD AND DATE COMMENT MADE	COMMENT	RESPONSE	ADDRESSED IN / RELEVANT SECTION IN BAR / EMPr

## **APPENDIX 1**

### **IAP DATABASE**



	Name	Department / Community	Designation	Telephone	Fax line	Email	Physical / Postal Address
State Departments	Ms Indira George	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEA)	Environmental Officer: EIM	041 5085805	0415085865	Indira.George@dedea.gov.za	Collegiate House, Cnr Belmont Terrace & Castle Hill Central, Port Elizabeth, 6001
	Mr Phumlani Mbulawa	Sundays River Valley Municipality	Director: Infrastructure, Planning and Development	042 230 0077		<a href="mailto:phumlanisrvm@gmail.com">phumlanisrvm@gmail.com</a>	23 Middle St, Kirkwood, 6120
	Ms Cllr Isabella Wagenaar		Ward Councillor (Ward 7)	084 642 8179		<a href="mailto:isabellawagenaar@yahoo.co.za">isabellawagenaar@yahoo.co.za</a>	
	Ms Cllr Bukelwa Snoek		Ward Councillor (Ward 8)	073 853 3614		<a href="mailto:bukelwa.srvm@gmail.com">bukelwa.srvm@gmail.com</a>	
	Ms Marisa Bloem	Department of Water and Sanitation (DWS)	Water Use Catchment Regulation: Port Elizabeth	041 501 0717/ 083 232 9822	086 537 4689	<a href="mailto:bloemm@dwa.gov.za">bloemm@dwa.gov.za</a>	140 Govan Mbeki Avenue, 6th Floor Starport Building, Central Port Elizabeth, 6000
	Mr Gcinile Dumse	Department of Agriculture, Fisheries and Forestry (DAFF)	Regional Manager: Land Use & Soil Management	043 704 6810 / 078 418 1723	043 704 6812	<a href="mailto:GcinileD@daff.gov.za">GcinileD@daff.gov.za</a>	9 Arundel Crescent, Stirling, East London, 5214
	Mr Ruffus Maloma	Department of Rural Development and Agrarian Reform (DRDAR) - Province of the Eastern Cape	Soil Scientist	040 609 3471	040 635 0604	<a href="mailto:Ruffus.Maloma@drdar.gov.za">Ruffus.Maloma@drdar.gov.za</a>	64 Govan Mbeki Avenue, Old Mutual Building 8th Floor, Office No. 803, Central Port Elizabeth, 6000
	Mr Sello Mokhanya	Eastern Cape Provincial Heritage Resources Authority (ECPHRA)	Heritage Officer	043 745 0888	043 745 0889	<a href="mailto:smokhanya@ecphra.org.za">smokhanya@ecphra.org.za</a>	Corner Scholl and Amalinda Drive, East London, 5247
Associations	Mr Deon Yuberg	Kirkwood Farmer's Association	Chairperson			<a href="mailto:deon@dunbrodyestates.co.za">deon@dunbrodyestates.co.za</a>	
	Mr Harms Du Plessis	Lower Sundays Rive Water Users Association	Service Provider	042 230 1412		<a href="mailto:srib@worldonline.co.za">srib@worldonline.co.za</a>	
Landowner	Ms Marisa Woolley	CHF Woolley Trust: Landdrost Veeplaats 84 portions 3; 5	Landowner			<a href="mailto:cbwool@srvalley.co.za">cbwool@srvalley.co.za</a>	
Adjacent Landowners	Mr Nellis Meiring	Apapanzi: Original Farm Strathsomers Estate 42 portions 3; 436; 437	Landowner	0849519612		<a href="mailto:nellis@srvalley.co.za">nellis@srvalley.co.za</a>	
	Mr Johnny Ferreira	Junkyard: Original Farm Strathsomers Estate 42 portion 291	Landowner	0824876533		<a href="mailto:junky@srvalley.co.za">junky@srvalley.co.za</a>	
	Mr Jannie Potgieter	Tweeling Plaas: Original Farm Strathsomers Estate 42 portion 427	Landowner	082 560 2179		<a href="mailto:jan@srvalley.co.za">jan@srvalley.co.za</a>	
	Mr Vaughn Attwell	Attwell Citrus: Original Farm Strathsomers Estate 42 portions 219; 312	Landowner	0828207060		<a href="mailto:attwellcitrus@srvalley.co.za">attwellcitrus@srvalley.co.za</a>	
	Mr Lesley Krause	Original Farm Landdrost Veeplaats 84 portion 19	Landowner	0422300531		<a href="mailto:lesleykwd@gmail.com">lesleykwd@gmail.com</a>	
	Mr Andre Serfontein	Attmar: Original Farm Attmar 85	Landowner	0422300447		<a href="mailto:atmar@srvalley.co.za">atmar@srvalley.co.za</a>	
	Mr Rory Niven	San Miguel: Original Farm Landdrost Veeplaats 84 portions 22; 30	Landowner	0716123450		<a href="mailto:rnien@sanmiguelglobal.com">rnien@sanmiguelglobal.com</a>	
	Dr Kobus Odendal	Original Farm Landdrost Veeplaats 84 portions 14; 15	Landowner	082 731 8069		<a href="mailto:kobus@gamtoos.co.za">kobus@gamtoos.co.za</a>	

## **APPENDIX 2**

### **MEDIA NOTICE AND PROOF OF PUBLICATION**



## **APPENDIX 3**

### **SITE NOTICE LOCATIONS**



Prime Resources (Pty) Ltd  
The Workshop 70–7th Avenue Parktown North 2193  
PO Box 2316 Parklands 2121  
T [011] 447 4888 F [011] 447 0355 E [prime@resources.co.za](mailto:prime@resources.co.za)  
[www.resources.co.za](http://www.resources.co.za)



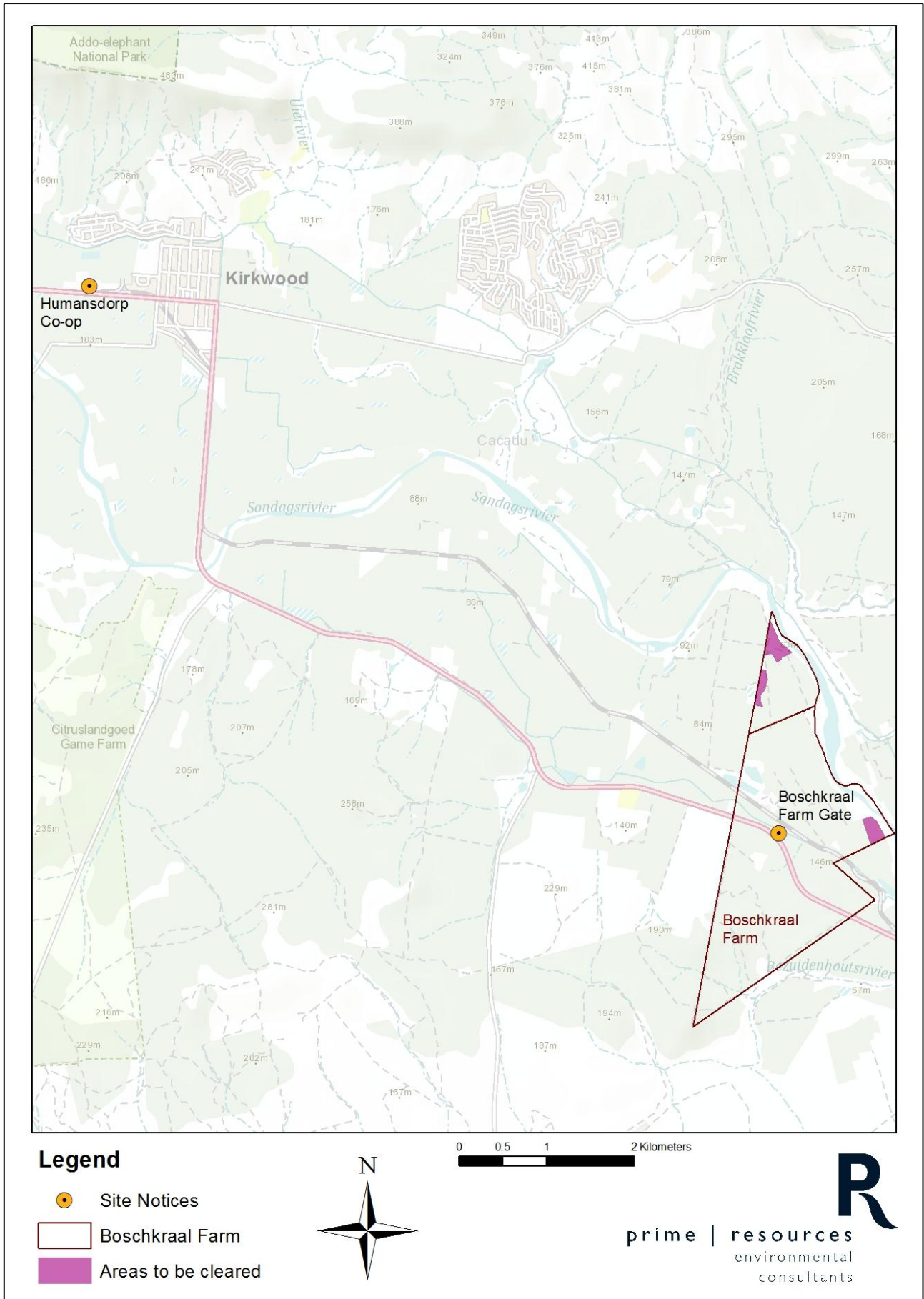
## **CHF WOOLLEY TRUST**

# **PUBLIC PARTICIPATION PROCESS: SITE NOTICE LOCATIONS FOR THE PROPOSED BOSCHKRAAL CITRUS FARM PROJECT, EASTERN CAPE PROVINCE**

**MAY 2016**

## **PREPARED FOR:**

**CHF Woolley Trust  
PO Box 208  
Kirkwood  
6120**



**Figure 1: Site notice locations**

**Boschkraal Farm Entrance**



**Humansdorp Co-op in Kirkwood**



# **NOTIFICATION: PUBLIC CONSULTATION PROCESS FOR THE BOSCHKRAAL CITRUS FARM PROJECT PROPOSED BY THE CHF WOOLLEY TRUST**

Notice is hereby given of the public participation process for the Boschkraal Citrus Farm Project proposed by the CHF Woolley Trust "the Applicant". The Applicant owns the farm portions 3 and 5 of Landdrost Veeplaats No. 84, collectively referred to as "Boschkraal". Most of the farm has been cultivated and the Applicant is proposing to cultivate citrus on portions of the remaining areas, with a combined extent of 14 ha, referred to as Blocks A, B and C.

## **PROJECT DESCRIPTION**

The construction phase of the proposed project will entail the clearing of vegetation, landscaping of the site to minimise runoff from the cultivated areas, the installation of a micro irrigation system followed by the planting of citrus saplings and establishment of windbreaks using indigenous species. The existing farm roads provide access to the areas to be cleared.

The operation phase of the project will entail the orchards being allowed time to establish, after which they will be used to cultivate citrus for export. The citrus from these orchards will supplement the citrus already produced on the farm.

The Applicant is a member of the Sunday's River Citrus Company (SRCC) and during harvesting season, citrus is transported directly from the farm to the SRCC for processing, packaging and export. Therefore, no additional infrastructure associated with the processing will be required.

The orchards are to remain in place for the foreseeable future.

Water for irrigation is supplied by the Lower Sunday's River Water Users Association (LSRWUA). The current entitlement is sufficient to supply the additional areas to be irrigated.

## **LEGISLATIVE PROCESS**

Environmental authorisation in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) and the Environmental Impact Assessment (EIA) Regulations (GNR982 of 2014) and 2014 Listing Notices is required for the following listed activities: GNR983, Activity No.27; and GNR985, Activity No.12 triggered by the land clearing activities. The listed activities triggered require that a Basic Assessment process be undertaken in support of the application for environmental authorisation. An application for environmental authorisation has been submitted to the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism: Cacadu Region. The Basic Assessment process has been conducted as per Regulations 19 and 20 of the NEMA EIA Regulations.

An application for the cultivation of land in terms of the Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA) has also been submitted to the Department of Rural Development and Agrarian Reform (DRDAR).

Prime Resources (Pty) Ltd has been appointed as the Environmental Assessment Practitioner (EAP) to facilitate the above processes.

## **LOCATION**

Boschkraal falls within the jurisdiction of the Sunday's River Valley Municipality in the Eastern Cape. The nearest town is Kirkwood, which is situated 7.5 km to the north-west of the nearest point to be cleared.

## **OPPORTUNITIES TO COMMENT**

Any interested or affected individuals are invited to register on the database by submitting your contact details to Prime Resources (contact details provided below). Those registered will be notified of the availability of the Basic Assessment Report and Environmental Management Programme for review and comment.

To register, please:

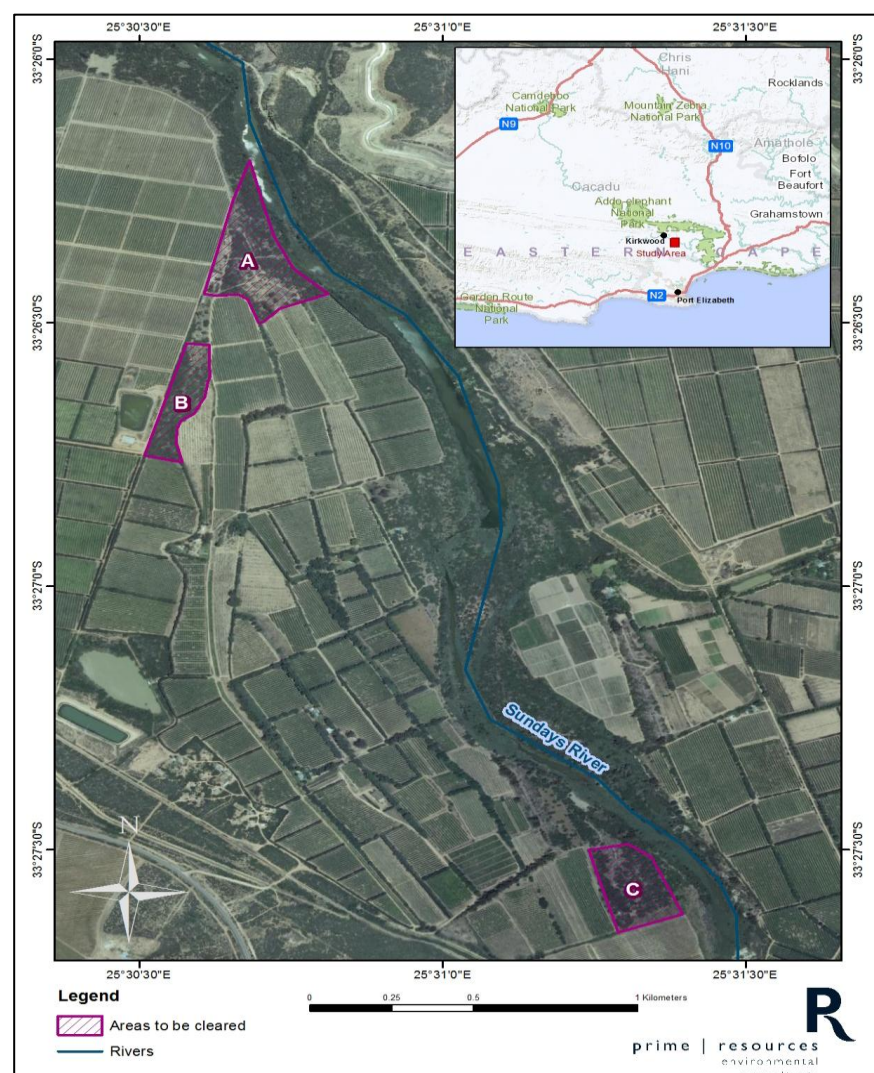
- SMS the word "**Boschkraal**" followed by your name and contact number to 072 436 3335; or
- Contact Romy Antrobus-Wuth or Amanda Mooney from Prime Resources at:

**Tel:** 011 447 4888

**Fax:** 011 447 0355

**Email:** [prime@resources.co.za](mailto:prime@resources.co.za) /

(with the subject-line "**Boschkraal**")





## **APPENDIX 4**

### **BACKGROUND INFORMATION DOCUMENT**

# BACKGROUND INFORMATION DOCUMENT

## PROPOSED BOSCHKRAAL CITRUS FARM PROJECT, EASTERN CAPE

### PUBLIC PARTICIPATION PROCESS



## CONTENTS

1. Introduction
2. Legislative Process
3. Project Description
4. Potential Impacts Identified
5. Location
6. Opportunity to Comment

### 1. INTRODUCTION

CHF Woolley Trust "the Applicant" owns the Boschkraal Citrus Farm near Kirkwood. Most of the farm has been cultivated since the 1920's. However, there are portions of the farm, surrounded by cultivated areas, which have not yet been cultivated (with a combined extent of 14 ha). The Applicant is proposing to cultivate portions of these remaining areas, which will be referred to as Blocks A, B and C.

### 2. LEGISLATIVE PROCESS

Environmental authorisation in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) is required for the the following activities listed in terms of the NEMA Environmental Impact Assessment (EIA) Regulations (GNR982 of 2014) and 2014 listing notices (GNR983 and GNR985) :

Notice No.	Activity No.	Applies to:
983	27	Areas to be cleared (with a combined extent of 14 ha) consisting of indigenous plant species occurring naturally in the area. The areas are located within Critical Biodiversity Areas.
985	12	

The listed activities triggered require that a Basic Assessment process be undertaken in support of the application for environmental authorisation.

An application for environmental authorisation has been submitted to the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism: Cacadu Region. The Basic Assessment process has been conducted as per:

- Regulations 19 and 20 of the NEMA EIA Regulations (GNR982 of 2014).

An application for the cultivation of land in terms of the Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA) has also been submitted to the Department of Rural Development and Agrarian Reform (DRDAR).

### 3. PROJECT DESCRIPTION

The construction phase of the proposed project will entail the clearing of vegetation, landscaping of the site to minimise runoff from the cultivated areas, the installation of a micro irrigation system followed by the planting of citrus saplings and establishment of windbreaks using indigenous species. The existing farm roads provide access to the areas to be cleared.

The operation phase of the project will entail the orchards being allowed time to establish, after which they will be used to cultivate citrus for export. The citrus from these orchards will supplement the citrus already produced on the farm.

The Applicant is a member of the Sunday's River Citrus Company (SRCC) and during harvesting season, citrus is transported directly from the farm to the SRCC for processing, packaging and export. Therefore, no additional infrastructure associated with the processing will be required.

The orchards are to remain in place for the foreseeable future.

Water for irrigation is supplied by the Lower Sunday's River Water Users Association (LSRWUA). The current entitlement is sufficient to supply the additional areas to be irrigated.

#### 4. POTENTIAL IMPACTS IDENTIFIED

The potential impacts which may occur due to the clearing of the remaining portions of the farm to accommodate citrus orchards have been identified and summarised below. These impacts are further detailed in the Basic Assessment Report and measures to mitigate these impacts have been included in the Environmental Management Programme.

The proposed Boschkraal Citrus Farm Project may result in the:

- Generation of localised noise from machinery used for clearing activities. It has been recommended that clearing activities be limited to daytime hours to limit nuisance to neighbours.
- Generation of localised dust as a result of clearing activities. Dust suppression has been recommended, to limit nuisance to neighbours.
- Temporary increase in erosion potential of soil in cleared areas until the orchards and windbreaks are planted. Erosion monitoring, prevention and repair measures have been recommended.
- Pollution of the soil by hydrocarbons (i.e. oil and diesel) as a result of potential leaking machinery used for clearing activities. Spill prevention and clean up measures have been recommended.
- Loss of plant species of conservation importance. The relocation of these species to adjacent undisturbed areas of the farm prior to clearing has been recommended.
- Damage to adjacent graves. The demarcation and fencing-off of the graves as well as an implementation of a buffer zone prior to clearing has been recommended.
- Positive impact of additional permanent employment opportunities, sustained temporary employment opportunities during harvesting season as well as increased amount of produce for export.

3

#### 5. LOCATION

The proposed project areas are located on farm portions 3 and 5 of Landdrost Veeplaats No. 84, collectively referred to as "Boschkraal", which fall within the jurisdiction of the Sunday's River Valley Municipality in the Eastern Cape.



#### 6. OPPORTUNITY TO COMMENT

As affected individuals, we would like to hereby notify you of the availability of the Basic Assessment Report (including the Environmental Management Programme) for review and comment. The documentation can be viewed from **8 July 2016 to 8 August 2016** on the Prime Resources website [www.resources.co.za](http://www.resources.co.za) or a copy can be provided via email upon request (contact details below). Please note that the deadline for providing comments is **8 August 2016**. If you have any questions or would like to provide comments please contact Romy Antrobus-Wuth or Amanda Mooney from Prime Resources, at:

**Tel:** 011 447 4888

**Email:** [romy@resources.co.za](mailto:romy@resources.co.za) / [amanda@resources.co.za](mailto:amanda@resources.co.za)

**Fax:** 011 447 0355

(please insert "Boschkraal" in the subject-line)

4

## **APPENDIX F**

# **ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)**



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## **CHF WOOLLEY TRUST**

# **ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE PROPOSED BOSCHKRAAL CITRUS FARM PROJECT, EASTERN CAPE PROVINCE**

**JULY 2016**

### **PREPARED FOR:**

**CHF Woolley Trust  
PO Box 208  
Kirkwood  
6120**

# TABLE OF CONTENTS

<b>1. Introduction and Background .....</b>	<b>1</b>
1.1 Applicant Details.....	1
1.2 Environmental Assessment Practitioner Details .....	1
<b>2. Project Characterisation .....</b>	<b>3</b>
2.1 Location.....	3
2.2 Activity Description .....	6
<b>3. Legislative Requirements .....</b>	<b>8</b>
3.1.1 <i>National Environmental Management Act, No. 107 of 1998 (NEMA)</i> .....	8
3.1.2 <i>The National Environmental Management: Air Quality Act, No. 39 of 2004 (NEM:AQA)</i> ..	10
3.1.3 <i>The National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)</i> ..	10
3.1.4 <i>The Provincial Nature Conservation Ordinance No. 19 of 1974 (PNCO)</i> .....	14
3.1.5 <i>The National Environmental Management: Protected Areas Act, No. 57 of 2003</i> <i>(NEM:PAA)</i> .....	14
3.1.6 <i>The National Environmental Management: Waste Act, No. 59 of 2008 (NEM:WA)</i> .....	15
3.1.7 <i>The National Forest Act, No. 84 of 1998 (NFA)</i> .....	15
3.1.8 <i>The Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)</i> .....	15
3.1.9 <i>The National Water Act, No. 36 of 1998 (NWA)</i> .....	17
3.1.10 <i>The National Heritage Resources Act, No. 25 of 1999 (NHRA)</i> .....	17
<b>4. Management of Potential Impacts .....</b>	<b>20</b>
4.1 Sensitive Areas.....	20
4.2 Potential Impacts.....	25
4.3 Impact Assessment.....	28
4.4 Impact Management Objectives and Outcomes.....	32
4.5 Impact Management Actions and Time Periods for Implementation .....	34
<b>5. Monitoring of Management Action Implementation .....</b>	<b>58</b>
5.1 Monitoring Method .....	58
5.2 Responsibility .....	58
5.3 Monitoring Frequency .....	58
5.4 Mechanism for Monitoring Compliance .....	58
5.5 Reporting.....	58
<b>6. Environmental Awareness Plan .....</b>	<b>60</b>

## FIGURES

Figure 1: Location of the blocks to be cleared for the proposed Boschkraal Citrus Farm Project.....	5
Figure 2: Critical Biodiversity Areas associated with the blocks to be cleared .....	12
Figure 3: Location of the graves within Block B .....	22
Figure 4: Overview of sensitive areas .....	24
Figure 5: Ring barking (Working for Water, 2011).....	43
Figure 6: <i>Acacia melanoxylon</i> (Australian Blackwood) (Henderson, 2001; van Wyk and van Wyk, 2013) .....	44
Figure 7: <i>Agave sisalana</i> (Sisal) (Henderson, 2001) .....	45
Figure 8: <i>Arundo donax</i> (Spanish Reed) (Henderson, 2001) .....	45
Figure 9: <i>Canna indica</i> (Indian Shot) (Henderson, 2001) .....	46
Figure 10: <i>Casuarina equisetifolia</i> (Beefwood) (Henderson, 2001).....	47
Figure 11: <i>Cereus jamacara</i> (Queen of the Night) (Henderson, 2001).....	48
Figure 12: <i>Cestrum laevigatum</i> (Ink Berry) (Henderson, 2001).....	49
Figure 13: <i>Datura stramonium</i> (Common Thorn Apple) (Henderson, 2001) .....	49
Figure 14: <i>Eucalyptus diversicolor</i> (Gum Tree) (Henderson, 2001) .....	50
Figure 15: <i>Grevillea robusta</i> (Australian Silky Oak) (Henderson, 2001).....	51
Figure 16: <i>Lantana camara</i> (Lantana) (Henderson, 2001) .....	52
Figure 17: <i>Nicotiana glauca</i> (Wild Tobacco) (Henderson, 2001).....	53
Figure 18: <i>Opuntia aurantiaca</i> (Jointed Cactus) (Henderson, 2001).....	53
Figure 19: <i>Opuntia ficus-indica</i> (Prickly Pear) (Henderson, 2001).....	54
Figure 20: <i>Pennisetum clandestinum</i> (Kikuyu Grass) (Henderson, 2001).....	55
Figure 21: <i>Ricinus communis</i> (Castor Oil Plant) (Henderson, 2001) .....	56

## TABLES

Table 1: Coordinates of the vertices of the blocks to be cleared	3
Table 2: Listed activities applicable to the proposed Boschkraal Citrus Farm Project	8
Table 3: Faunal TOPS which may occur in the blocks to be cleared	13
Table 4: NEM:BA listed alien and invasive species	13
Table 5: CARA listed alien and invasive species	16
Table 6: Soil Management Plan	34
Table 7: Archaeological and Paleontological Management Plan	36
Table 8: Waste Management Plan	36
Table 9: Hydrocarbon Management Plan	37
Table 10: Water Resources Management Plan	38
Table 11: Biodiversity Management Plan	39
Table 12: Dust Management Plan	57

# APPENDICES

Appendix 1: EAP CVs

## ACRONYMS

CARA	Conservation of Agricultural Resources Act, No. 43 of 1983
DAFF	Department of Agriculture, Forestry and Fisheries
DEDEAT	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism
DRDAR	Department of Rural Development and Agrarian Reform
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IAPs	Interested and Affected Parties
LUSM	Land Use and Soil Management
NEM:AQA	National Environmental Management: Air Quality Act, No. 39 of 2004
NEM:BA	National Environmental Management: Biodiversity Act, No. 10 of 2004
NEM:WA	National Environmental Management: Waste Act, No. 59 of 2008
NEMA	National Environmental Management Act, No. 107 of 1998
NWA	National Water Act, No. 36 of 1998
PNCO	Provincial Nature Conservation Ordinance No. 19 of 1974
SAHRA	South African Heritage Resources Association
SANBI	South African National Biodiversity Institute
SIZA	Sustainability Initiative of South Africa
TOPS	Threatened or Protected Species



# 1. INTRODUCTION AND BACKGROUND

CHF Woolley Trust "the Applicant" owns the farm portions 3 and 5 of Landdrost Veeplaats No. 84, collectively referred to as "Boschkraal", near Kirkwood, under the jurisdiction of the Sunday's River Valley Municipality in the Eastern Cape. Most of the farm has been cultivated since the 1920's. However, there are portions of the farm, surrounded by cultivated areas, which have not yet been cultivated (approximately 14 ha in extent). The Applicant is proposing to cultivate portions of these remaining areas, which will be referred to as Blocks A, B and C (refer to Figure 1). Environmental Authorisation in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) is required for the land clearing activity associated with cultivating these areas. Prime Resources (Pty) Ltd has thus been appointed as the Environmental Assessment Practitioner (EAP) to facilitate the Environmental Authorisation process for the proposed Boschkraal Citrus Farm Project.

## 1.1 Applicant Details

<b>Name of Trust:</b>	CHF Woolley Trust
<b>Physical Address:</b>	Farm portions 3 and 5 of Landdrost Veeplaats No. 84 "Boschkraal" Kirkwood, 6120
<b>Postal Address:</b>	PO Box 208, Kirkwood, 6120
<b>Contact Person:</b>	Mr Charles Woolley
<b>Designation:</b>	Farm Manager / Administrator of the Trust
<b>Telephone Number:</b>	042 230 1488
<b>Email:</b>	<a href="mailto:cbwool@srvalley.co.za">cbwool@srvalley.co.za</a>

## 1.2 Environmental Assessment Practitioner Details

<b>Name of Firm:</b>	Prime Resources (Pty) Ltd
<b>Physical Address:</b>	70 - 7th Avenue, Parktown North, Johannesburg
<b>Postal Address:</b>	PO Box 2316, Parklands, 2121
<b>Project Manager:</b>	Ms Romy Antrobus-Wuth
<b>Telephone Number:</b>	011 447 4888
<b>Fax Number:</b>	011 447 0355
<b>Email:</b>	<a href="mailto:romy@resources.co.za">romy@resources.co.za</a>

Prime Resources is a specialist Environmental Consulting Firm providing environmental and related services, which was established in 2003. Prime Resources was founded by Peter Theron (PrEng, SAImm), the Managing Director and Principal Environmental Consultant of the firm, who has a GDE Environmental Engineering from the University of Witwatersrand and 30 years' experience in the field of environmental science and engineering.

Mrs Romy Antrobus-Wuth, an environmental scientist and project manager for the project, has a M.Sc. (Conservation Biogeography) from the University of the Witwatersrand and six years' experience in the field of environmental science. Refer to Appendix 1 for the curriculum vitae of Ms Romy Antrobus-Wuth.

Ms Amanda Mooney, an environmental scientist, has a M.Sc. (Zoology) as well as a M.Sc. (Environmental Management) from the University of Johannesburg and four years' experience in the field of environmental science. Refer to Appendix 1 for the curriculum vitae of Ms Amanda Mooney.

## 2. PROJECT CHARACTERISATION

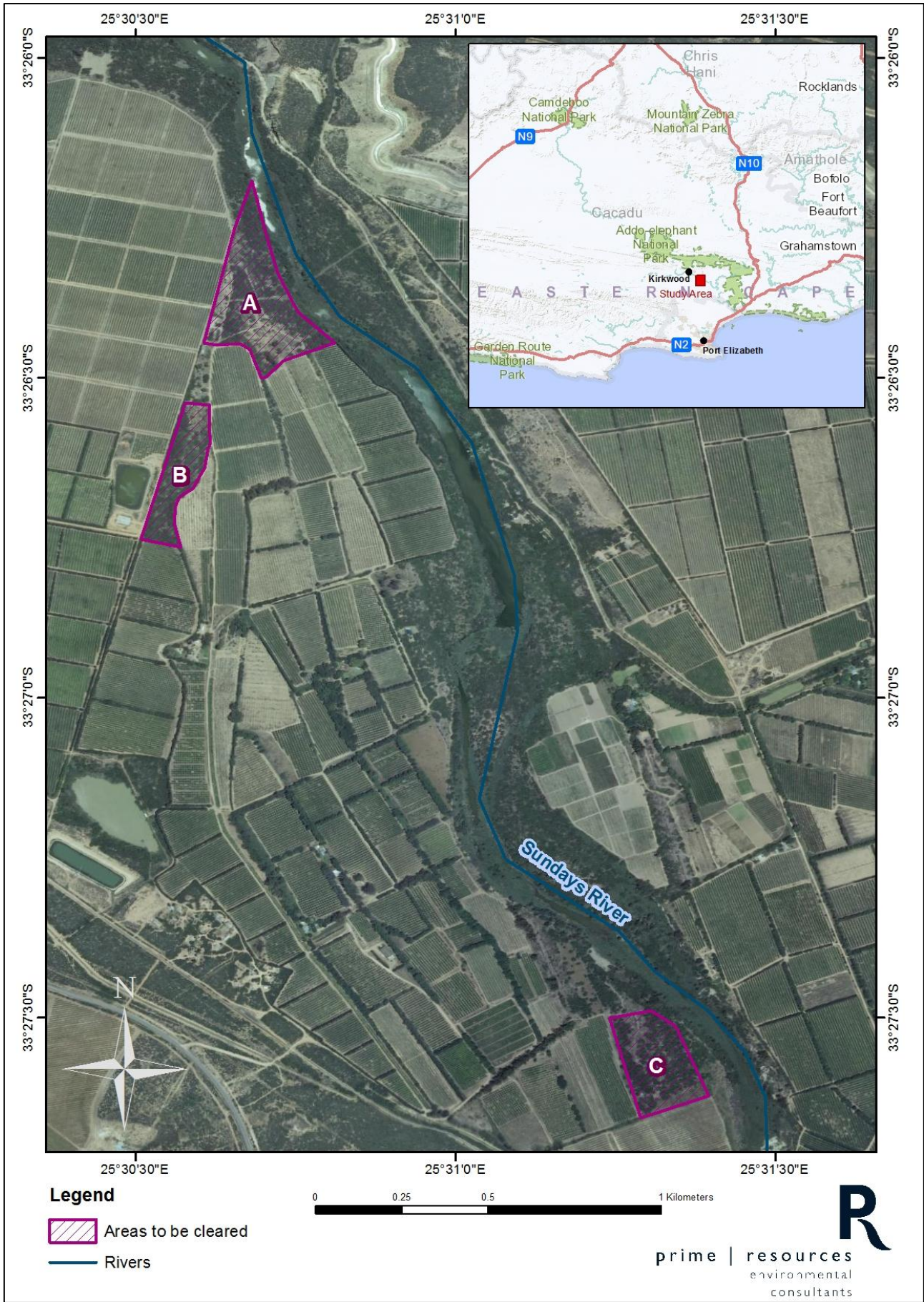
### 2.1 Location

The blocks to be cleared are located on the farm Boschkraal within the Sundays River Valley Municipality (refer to Table 1). The farm borders the Sunday's River. The nearest town is Kirkwood, which is situated 7.5 km to the north-west of the nearest point to be cleared. Refer to the Figure 1 below.

**Table 1: Coordinates of the vertices of the blocks to be cleared**

Block	Vertex	East	South
A	1	25°30'40.25"	33°26'14.42"
	2	25°30'42.84"	33°26'20.54"
	3	25°30'43.92"	33°26'22.52"
	4	25°30'45.29"	33°26'23.93"
	5	25°30'48.67"	33°26'26.77"
	6	25°30'46.48"	33°26'27.53"
	7	25°30'43.81"	33°26'28.54"
	8	25°30'43.99"	33°26'29.04"
	9	25°30'42.19"	33°26'29.83"
	10	25°30'41.72"	33°26'29.98"
	11	25°30'40.72"	33°26'27.42"
	12	25°30'39.81"	33°26'26.81"
	13	25°30'37.66"	33°26'26.95"
	14	25°30'36.39"	33°26'26.77"
	15	25°30'39.67"	33°26'16.12"
B	1	25°30'36.9"	33°26'32.60"
	2	25°30'36.97"	33°26'33.04"
	3	25°30'36.86"	33°26'34.69"
	4	25°30'37.00"	33°26'36.17"
	5	25°30'36.83"	33°26'36.64"
	6	25°30'36.47"	33°26'38.54"
	7	25°30'35.93"	33°26'39.34"
	8	25°30'35.42"	33°26'40.38"
	9	25°30'34.09"	33°26'41.21"
	10	25°30'33.73"	33°26'42.04"
	11	25°30'33.59"	33°26'43.66"
	12	25°30'34.24"	33°26'45.92"
	13	25°30'30.49"	33°26'45.17"
	14	25°30'34.67"	33°26'32.35"

Block	Vertex	East	South
C	1	25°31'14.48"	33°27'30.17"
	2	25°31'18.3"	33°27'29.45"
	3	25°31'20.64"	33°27'30.92"
	4	25°31'23.77"	33°27'37.40"
	5	25°31'17.4"	33°27'39.49"



**Figure 1: Location of the blocks to be cleared for the proposed Boschkraal Citrus Farm Project**

## 2.2 Activity Description

Boschkraal is zoned for agricultural land use and the application is therefore in line with the existing land use. The proposed agricultural activities will be an extension of the existing agricultural activities currently taking place on the farm.

Water for irrigation of the existing orchards on the farm is supplied by the Lower Sunday's River Water Users Association (LSRWUA) via a canal. Water for irrigation of the additional areas to be cleared on the farm will also be sourced from the LSRWUA. The current allocation (142.3 ha entitlement) is sufficient to supply the additional areas to be irrigated, as at the time of compilation of this report (July 2016) only 100 ha of the entitlement was being utilised. Micro irrigation will be utilised, which reduces water loss through evaporation, thereby reducing the water requirements.

The Applicant is a member of the Sunday's River Citrus Company (SRCC) and during harvesting season, citrus is transported directly from the farm to the SRCC for processing, packaging and export. Therefore, no additional infrastructure associated with the processing will be required.

There are existing farm roads providing access to the areas to be cleared which have been in place since the 1920's. Therefore, no new access roads are required for the project.

### Construction Phase

The construction phase of the proposed project will entail the clearing of vegetation, landscaping of the site to minimise runoff from the cultivated areas, the installation of a micro irrigation system followed by the planting of citrus saplings and establishment of windbreaks using indigenous species. Vegetation clearing, landscaping and planting will be carried out both by hand and using suitable earth moving machinery. Two additional employment opportunities will be created during the construction phase.

Waste to be generated from construction (i.e. clearing and site preparation) activities includes biodegradable plant material from clearing activities and general waste generated by personnel which is to be removed by municipal refuse services.

### Operation Phase

The orchards will be allowed time to establish, after which they will be used to cultivate citrus for export. The citrus from these orchards will supplement the citrus already produced on the farm. During harvesting season, citrus is transported from the farm to the SRCC for processing, packaging and export. Harvesting is undertaken by hand. Approximately 75 temporary seasonal employment opportunities are created during harvesting season (between April and October). Two additional permanent employment opportunities will be created during the operation phase.

Waste to be generated from the project includes biodegradable plant material which will be left to decompose in the orchards after harvesting and general waste generated by personnel which is to be removed by municipal refuse services.

The orchards are to remain in place for the foreseeable future.

### Project Schedule

The project schedule is dependent on the granting of Environmental Authorisation and a permit in terms of CARA and the most suitable period for planting. The clearing is planned to commence once the necessary authorisations and permits are obtained. After the land has been cleared trees are to be ordered (the availability is determined by the nursery). The soil will be prepared and the irrigation system installed. The land is to be cleared and prepared in stages. Block B will be cleared first, followed by Block A and lastly Block C. Trees are to be ordered (the availability is dependent on the nursery stock). The most suitable period for planting is between November and January annually. The estimated timeframe from land clearing to planting is three years.

### 3. LEGISLATIVE REQUIREMENTS

In order to ensure that the project is undertaken in an environmentally responsible manner, the following pertinent laws apply. The information provided in this EMPr below is as per environmental legislation at the time of compilation. Legislation is continuously updated. We recommend that the Applicant remain informed regarding updates to relevant legislation.

#### 3.1.1 National Environmental Management Act, No. 107 of 1998 (NEMA)

The NEMA is the enabling legislation intended to provide a framework for integrating environmental management into all developmental activities. It provides a code of practice for ensuring that environmental considerations are fully integrated into all stages of development, by providing a procedural and regulatory mechanism for Environmental Impact Assessments (EIAs). These regulatory mechanisms are supplied in the form of the EIA Regulations (GNR982 of 2014). The listing notices (GNR983, GNR984 and GNR985, all of 2014) list activities which may have a detrimental impact on the environment, which therefore require Environmental Authorisation before they may commence. Table 2 lists the listed activities applicable to the proposed Boschkraal Citrus Farm Project.

**Table 2: Listed activities applicable to the proposed Boschkraal Citrus Farm Project**

Listing Notice	Activity No.	Activity	Description
GNR983 of 2014	27	The clearance of an area of 1 Ha or more, but less than 20 Ha of indigenous vegetation.	Areas on the farm Boschkraal (with a combined extent of approximately 14 ha) consisting of indigenous vegetation species occurring naturally in the area, where the topsoil has not been lawfully disturbed during the preceding ten years are to be cleared to accommodate citrus orchards.
GNR985 of 2014	12	The clearance of an area of 300 m <sup>2</sup> or more of indigenous vegetation within critical biodiversity areas identified in bioregional plans.	According to the SANBI spatial database the farm is located within Critical Biodiversity Areas.

The applicable listed activities require that a Basic Assessment process be undertaken for the project. As such, as per the NEMA requirements, a Basic Assessment Report (BAR) has been compiled (in the prescribed template) and an Environmental Management Programme (this document) has been compiled in support of the application for Environmental Authorisation. Appendix 4 of the NEMA EIA Regulations (GNR982 of 2014) prescribes the required content of an EMPr and this report has been aligned to meet the content requirements, as detailed below:



<b>NEMA EIA Regulations (GNR982 of 2014) - "Contents of an EMPr"</b>	<b>[Relevant section of this document where addressed]</b>
(a) details of - (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	1.2 Appendix 1
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	1.1
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	4.1 Figure 4
(d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including - (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	4.1
(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	4.2
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	4.5
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	5.1
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	5.3
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	5.2
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	4.5
(k) the mechanism for monitoring compliance with the impact management actions	5.4

<b>NEMA EIA Regulations (GNR982 of 2014) - "Contents of an EMPr"</b>	<b>[Relevant section of this document where addressed]</b>
contemplated in paragraph (f);	
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	5.5
(m) an environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	6
(n) any specific information that may be required by the competent authority.	None requested

The BAR and this EMPr have been submitted to the Competent Authority namely the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT): Cacadu Region for comment and will be submitted for final consideration on or before 9 September 2016.

### **3.1.2 The National Environmental Management: Air Quality Act, No. 39 of 2004 (NEM:AQA)**

The NEM:AQA is the NEMA management tool for air quality management. GN893 of 2013 provides the list of activities in terms of Section 21(1)(a) for which licensing is required in terms of Chapter 5 of the Act. This notice further establishes minimum emission standards for the listed activities. The Boschkraal Citrus Farm Project does not trigger a listed activity in terms of NEM:AQA, therefore an Atmospheric Emission Licence is not required.

The National Dust Control Regulations (GNR827 of 2013) prescribe general measures for the control of dust in all areas. Dust generation from site clearing and site preparation activities is expected. However, these activities will be temporary and it is unlikely that these activities will give rise to dust in quantities and concentrations exceeding the dustfall standards at any sensitive receptors as the blocks to be cleared are surrounded by orchards or natural vegetation which acts as a dust barrier between the areas and any sensitive receptors. Therefore, it is not foreseen that the Applicant will be requested to undertake a dustfall monitoring programme by the relevant air quality officer. Dust management however does form part of this EMPr, refer to Section 4.5.

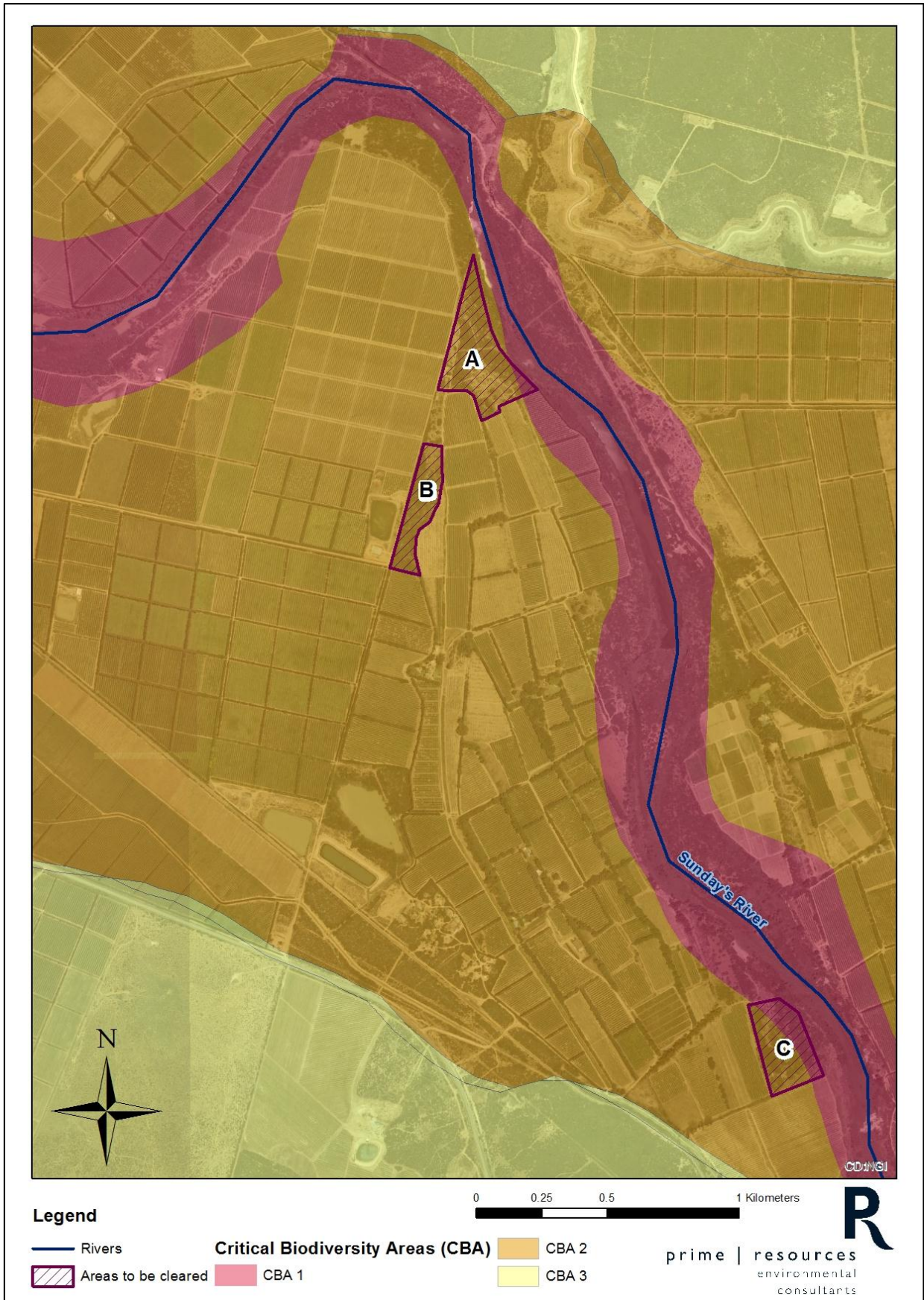
### **3.1.3 The National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEM:BA)**

The purpose of the NEMBA is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. This includes: the protection of species and ecosystems; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and the establishment of a South African National Biodiversity Institute (SANBI).

Section 52 of NEM:BA provides for listing of threatened or protected ecosystems, in one of four

categories: Critically Endangered, Endangered, Vulnerable or Protected. The main purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction and includes the prevention of further degradation and loss of structure, function and composition of threatened ecosystems. Threatened terrestrial ecosystems have been delineated based on the South African Vegetation Map, national forest types and priority areas identified in a provincial systematic biodiversity plan and a national list of threatened ecosystems has been published (GN1002 of 2011). The proposed Boschkraal Citrus Farm Project is located within the Albany Alluvial Vegetation ecosystem which is currently listed as Endangered in terms of Section 52 of NEM:BA.

According to the Eastern Cape Biodiversity Conservation Plan the proposed Boschkraal Citrus Farm Project falls within Critical Biodiversity Areas (CBAs), refer to Figure 2. All three blocks are situated within areas designated a CBA 2 status (terrestrial), with a portion of Block A situated within a CBA 1 area. Blocks A and C also fall within areas designated a CBA 2 status (aquatic).



**Figure 2: Critical Biodiversity Areas associated with the blocks to be cleared**

Chapter 4, Part 2 of the Act provides for listing of species as threatened or protected. If a species is listed as threatened, it should be further classified as critically endangered, endangered or vulnerable. A list of Threatened or Protected Species (TOPS) has been published (GNR151 of 2007). The Act also defines restricted activities in relation to a TOPS specimen (GNR152 of 2007 as amended) requiring a permit. No TOPS were identified in the blocks to be cleared for the proposed Boschkraal Citrus Farm Project. However, the faunal TOPS which may occur within the areas to be cleared based on their distribution range are listed in Table 3.

**Table 3: Faunal TOPS which may occur in the blocks to be cleared**

Species	Common Name	Status
<b>Reptiles</b>		
<i>Acontias orientalis/lineocauda</i>	Algoa Legless Skink	Near threatened
<b>Birds</b>		
<i>Anthropoides paradiseus</i>	Blue Crane	Vulnerable
<i>Buphagus erythrorhynchus</i>	Red-billed Oxpecker	Near threatened
<i>Campethera notata</i>	Knysna Woodpecker	Near threatened
<i>Falco biarmicus</i>	Lanner Falcon	Near threatened
<i>Falco peregrinus</i>	Peregrine Falcon	Near threatened
<i>Neotis denhami</i>	Denham's Bustard	Vulnerable
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable
<i>Sagittarius serpentarius</i>	Secretary bird	Near threatened
<b>Mammals</b>		
None		
<b>Insects</b>		
None		

The Act also provides for listing of alien invasive species (GN599 of 2014), listed alien invasive species have been classified as into categories 1a, 1b, 2 or 3. As a result certain activities are: restricted or prohibited in terms of Section 71A(1); exempted in terms of Section 71(3); or require a permit in terms of Section 71(1) of the Act. Regulations in this regard (GNR598 of 2014) have also been published and require that permits are obtained for restricted activities relating to listed alien and invasive species. The regulations also provide for prohibited activities. The proposed Boschkraal Citrus Farm Project does not trigger any restricted or prohibited activities in terms of the above. It is the intention that indigenous species are to be used for windbreaks. If alien species are planted, the required permits will be applied for.

Spreading or allowing the spread of any specimen of a listed invasive species in terms of NEM:BA is prohibited. Listed species in terms of NEM:BA were identified within the proposed project area and are listed in Table 4 below.

**Table 4: NEM:BA listed alien and invasive species**

Botanical Name	Common Name	NEMBA Category	Extent
<i>Acacia melanoxylon</i>	Blackwood	2	Localised
<i>Agave sisalana</i>	Sisal	2	Localised
<i>Arundo donax</i>	Spanish Reed	1b	Localised, riparian
<i>Canna indica</i>	Indian Shot	1b	Localised, riparian

Botanical Name	Common Name	NEMBA Category	Extent
<i>Casuarina equisetifolia</i>	Beefwood	2	Large individual trees
<i>Cereus jamacaru</i>	Queen of the Night	1b	Scattered
<i>Cestrum laevigatum</i>	Ink Berry	1b	Scattered
<i>Datura stramonium</i>	Thorn Apple	1b	Scattered
<i>Eucalyptus diversicolor</i>	Gum Tree	2	Large individual trees
<i>Grevillea robusta</i>	Australian Silky Oak	3	Large individual trees
<i>Lantana camara</i>	Lantana	1b	Scattered
<i>Nicotiana glauca</i>	Wild Tobacco	1b	Scattered
<i>Opuntia aurantiaca</i>	Jointed Cactus	1b	Scattered clumps
<i>Opuntia ficus-indica</i>	Prickly Pear	N1b	Moderate localised
<i>Pennisetum clandestinum</i>	Kikuyu Grass	1b (wetlands)	Scattered
<i>Pinus sp.</i>	Pine	2	Localised
<i>Ricinus communis</i>	Castor Oil Plant	2	Scattered, localised

Specific eradication and management procedures for the above mentioned alien invasive species are stipulated in this EMPr. Refer to Section 4.5.

### 3.1.4 The Provincial Nature Conservation Ordinance No. 19 of 1974 (PNCO)

#### Flora

Vegetation species of provincial conservation concern listed in terms of the PNCO namely *Aloe ferox*, *Asparagus spp.*, *Boophone disticha*, *Bulbine frutescens*, *Carpobrotus sp.*, *Cotyledon orbiculata var. orbiculata* and *Mesembryanthemum spp.* were identified within the proposed project area. Species listed above require permits from DEDEAT if any individuals are to be removed, relocated or pruned.

#### Fauna

Although not confirmed on site during the site survey, the *Circellium bacchus* (Addo Flightless Dung Beetle) listed in terms of the PNCO may occur on site due to their known distribution area. Permits are required from DEDEAT for the removal, translocation or destruction of faunal species of provincial conservation concern.

### 3.1.5 The National Environmental Management: Protected Areas Act, No. 57 of 2003 (NEM:PAA)

NEM:PAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. In addition, it provides for the establishment of a national register of all national, provincial and local protected areas, the management of those areas in accordance with the norms and standards for the management of protected areas (GN528 of 2014) and for intergovernmental co-operation and public consultation in matters concerning protected areas.

A protected area in terms of NEM:PAA is located in the vicinity of the proposed project area, namely Addo Elephant Park, which is 9.1 km NNW from Block A, 9.4 km NNW from Block B and 11.4 km NNW from Block C. This has been taken into account when determining the listed

activities in terms of NEMA GNR985 of 2014.

### **3.1.6 The National Environmental Management: Waste Act, No. 59 of 2008 (NEM:WA)**

The NEM:WA serves to reform the laws regulating waste management in order to protect public and environmental health by providing measures for the prevention of pollution and ecological degradation, and to provide defining requirements for the licensing and control of waste management activities. The list of waste management activities (GN921 of 2013) provides for activities listed as either Category A and Category B which require a Waste Management Licence and details the associated Environmental Authorisation in terms of NEMA which is required for said activities. Activities listed as Category C require compliance with the National Norms and Standards for the Storage of Waste (GN926 of 2013). The proposed Boschkraal Citrus Farm Project does not trigger any listed activities in terms of NEM:WA, therefore, a Waste Management Licence is not required.

The Waste Classification and Management Regulations (GNR634 of 2013) provide for waste classification and state that all waste is to be classified in terms of SANS 10234 with the exception of waste listed in Annexure 1 of the Regulations. The waste to be generated from the proposed Boschkraal Citrus Farm Project will mainly consist of biodegradable plant material and general waste. The waste to be generated falls within Annexure 1 of the Waste Classification and Management Regulations (GNR634 of 2013), and will therefore not require classification.

Best practice waste management is addressed in this EMP, refer to Section 4.5.

### **3.1.7 The National Forest Act, No. 84 of 1998 (NFA)**

The main objective of the NFA is to promote the sustainable management and development of forests and to provide protection for certain forests and trees. The NFA provides for the listing of protected tree species in GN650 of 2014. In terms of the Act these trees may not be cut, destroyed, damaged or removed. Neither may the tree or their products be collected, removed, exported or donated, unless a licence has been granted by the provincial office of DAFF. In terms of Section 15(3) of the Act, a list of all protected trees belonging to a particular species has also been published (GN1161 of 2015). Species of special concern in terms of the NFA, namely *Ornithogalum sp.* and *Schotia afra* were identified to be present within the project area. Permits will need to be obtained from Department of Fisheries and Forestry (DAFF) for the removal, translocation or pruning of these species.

### **3.1.8 The Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA)**

The CARA allows the Minister to publish certain regulations that achieve the objectives of the Act, which are to provide for the conservation of the natural agricultural resources by maintaining the agricultural potential of land, combating and preventing erosion, maintaining the integrity of water resources and protecting vegetation through appropriate agricultural practices. According to the CARA Regulations (GNR1048 of 2001) written permission is required from the Land Use and Soil Management (LUSM) Directorate of the provincial office of the DAFF for: the denuding of virgin

soils (i.e. land which has at no time during the preceding ten years been cultivated); damaging or destroying of vegetation in a natural water course flood area; cultivation of virgin soil by disturbing the topsoil mechanically; damaging or destroying of vegetation within 10 m horizontally outside a watercourse flood area; cultivation by mechanically disturbing the topsoil of land with a slope of more than 20%; mechanically disturbing the topsoil in flood area of a watercourse; burning of crop residue and other organic material on lands; and mechanically disturbing the topsoil within 10 m horizontally outside a watercourse.

Denuding virgin soils and the cultivation of virgin soil by disturbing the topsoil mechanically are applicable to the Boschkraal Citrus Farm Project. A permit application (in the prescribed application form obtained from the LUSM Directorate of the provincial office of DAFF, was thus submitted to the Department of Rural Development and Agrarian Reform (DRDAR) on 1 June 2016.

The CARA Regulations (GNR1048 of 2001) also provide for appropriate agricultural management measures for maintaining the agricultural potential of land. These measures have been taken into account in the compilation of this EMPr. Refer to Section 4.5.

CARA also provides for the management of alien invasive vegetation species in agricultural areas. CARA was amended in 2001 to make provision for four plant groups: Category 1 plants (declared weeds), Category 2 and 3 plants (plant invader species), and indicators of bush encroachment. Categories 1 through 3 consist of undesirable alien vegetation species and are covered by Section 15 of the Act. A total of 17 species listed as invasive in terms of CARA were identified within the proposed project area (refer to Table 5).

**Table 5: CARA listed alien and invasive species**

Botanical Name	Common Name	CARA Category	Extent
<i>Acacia melanoxylon</i>	Blackwood	2	Localised
<i>Agave sisalana</i>	Sisal	2	Localised
<i>Arundo donax</i>	Spanish Reed	1	Localised, riparian
<i>Canna indica</i>	Indian Shot	1	Localised, riparian
<i>Casuarina equisetifolia</i>	Beefwood	2	Large individual trees
<i>Cereus jamacaru</i>	Queen of the Night	1	Scattered
<i>Cestrum laevigatum</i>	Ink Berry	1	Scattered
<i>Datura stramonium</i>	Thorn Apple	1	Scattered
<i>Eucalyptus diversicolor</i>	Gum Tree	2	Large individual trees
<i>Grevillea robusta</i>	Australian Silky Oak	3	Large individual trees
<i>Lantana camara</i>	Lantana	1	Scattered
<i>Nicotiana glauca</i>	Wild Tobacco	1	Scattered
<i>Opuntia aurantiaca</i>	Jointed Cactus	1	Scattered clumps
<i>Opuntia ficus-indica</i>	Prickly Pear	1	Moderate, localised
<i>Pennisetum clandestinum</i>	Kikuyu Grass	Weed	Scattered
<i>Pinus sp.</i>	Pine	2	Localised



Botanical Name	Common Name	CARA Category	Extent
<i>Ricinus communis</i>	Castor Oil Plant	2	Scattered, localised

Eradication and management procedures for alien invasive species are stipulated in this EMP, refer to Section 4.5.

### **3.1.9 The National Water Act, No. 36 of 1998 (NWA)**

The NWA regulates all matters relating to inland water resources. It thus operates as a management instrument with the authority being the Department of Water and Sanitation (DWS). Section 19 of the NWA, states that an owner of land, a person in control of land or a person who occupies or uses the land on which any activity or process is or was performed or undertaken which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. Measures to prevent the pollution of the surrounding water resources have been included in this EMP. Section 21 of the NWA lists water uses for which authorisation is required from the DWS. The Boschkraal Citrus Farm Project does not require licensing in terms of Section 21 of the NWA. Section 39 relates to general authorisations which allow for the use of water under certain circumstances, which would otherwise require a licence. The Boschkraal Citrus Farm Project does not require any general authorisations.

Water supply for the Boschkraal Citrus Farm Project will be sourced from the LSRWUA. The Applicant has a current allocation (142.3 ha entitlement) which is sufficient to supply the additional areas to be irrigated, as at the time of compilation of this report only 100 ha was under irrigation.

### **3.1.10 The National Heritage Resources Act, No. 25 of 1999 (NHRA)**

The NHRA serves to protect and manage South African heritage and cultural resources, which include places, buildings, structures and equipment of cultural significance, historical settlements and townscapes, archaeological and paleontological sites, graves and burial grounds. The Act protects any heritage resources from damage by developments by stipulating in Section 38 that any person intending on undertaking any form of development which involves the activities listed below must, at the earliest stage of initiation, notify the South African Heritage Resources Association (SAHRA) and the provincial association, in this case the Eastern Cape Provincial Heritage Resources Authority (ECPHRA):

- A. the construction of a road, wall, powerline, 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 a site—
  - i. exceeding 5 000 m<sup>2</sup> in extent; or
  - ii. involving three or more existing 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 heritage resources authority;
- D. the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- E. any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

The Boschkraal Citrus Farm Project will change the character of a site exceeding 5 000 m<sup>2</sup> in extent. Section 38(8) of the Act states that if heritage considerations are taken into account as part of an application process undertaken in terms of NEMA and the Environmental Authorisation process, there is no need to undertake a separate application in terms of the NHRA. Archaeological and paleontological considerations were taken into account as part of the proposed Boschkraal Citrus Farm Project NEMA Environmental Authorisation process to fulfil the requirements in this regard.

A specialist was appointed to conduct a Phase 1 Archaeological Impact Assessment, the findings of which indicated that no archaeological finds of significance are present within Blocks A and C and that it is unlikely that any sensitive archaeological remains will be exposed during the cultivation of these areas. However, at least 14 graves were identified within Block B, with the potential of more being present in the vicinity. Through discussions between the Applicant and the farm workers it was determined that the graves are that of previous farm workers and their relatives. Graves are considered sensitive archaeological finds which are of high significance and require protection (refer to Figure 3). Management measures, as recommended by the specialist, have been included in Section 4.5 of this EMPr. Refer to Appendix D of the BAR for a copy of the specialist study.

According to the SAHRA paleontological sensitivity map the areas to be cleared fall within an area of moderate sensitivity requiring a desktop study. As such using the geology of the area (obtained from the 1: 250 000 geological map 3324 Port Elizabeth Council for Geoscience, Pretoria) and previous paleontological studies conducted in the area (Almond, 2012) it was determined that the blocks to be cleared are completely underlain by Early Cretaceous sediments of the Kirkwood Formation mantled by Late Caenozoic alluvium. According to field observations and test pits dug within the area, Kirkwood sandstones and mudrocks are not exposed at surface and were not encountered within 2 to 2.5 m of the ground surface in trial. Test pits show buff, brown to orange-brown hued fine-grained superficial sediments, with sparse gravel clasts towards the surface. *In situ* weathered Kirkwood mudrocks would probably resemble unconsolidated soils or alluvium but may in some instances be recognised by their variegated hues (grey-green, brick red etc.), polymict pebbles (often showing a very high surface polish), as the Kirkwood Formation bedrocks appear to lie beneath a thick (2 m or more) superficial cover of soils, alluvium and colluvium of low palaeontological sensitivity and due to the nature of the activity (i.e. only the topsoil is to be disturbed), it is unlikely that any paleontological resources will be disturbed. However, in the unlikely event that paleontological resources are unearthed during activities a chance finds protocol has been included in this EMPr, refer to Section 4.5.

The archaeological specialist study and the BAR were provided to SAHRA for comment via the web based system SAHRIS. The BAR was also provided to a representative of the ECPHRA for comment via email as part of the required public consultation process.

## 4. MANAGEMENT OF POTENTIAL IMPACTS

### 4.1 Sensitive Areas

#### Ecologically Sensitive Areas

The potential list of vegetation species that may occur in the vicinity of the site is limited. Although no TOPS were identified, species of conservation concern in terms of the NFA, namely *Ornithogalum sp.* and *Schotia afra* and in terms of the PNCO namely *Aloe ferox*, *Asparagus spp.*, *Boophone disticha*, *Bulbine frutescenc*, *Carpobrotus sp.*, *Cotyledon orbiculata var. orbiculat* and *Mesembryanthemum spp.* were identified within the blocks. The above listed species require permits if any individuals are to be removed, relocated or pruned according to the relevant legislation. Refer to sections 3.1.4 and 3.1.7 for details.

Surrounding land use is mostly cultivated agriculture, but also natural and degraded areas. Land use within each of the blocks to be cleared, was ground-truthed by the ecology specialist and is detailed in the paragraphs below.

Block A, situated along the northern boundary of the farm, is bounded on the west and south sides by citrus orchards and by riparian vegetation and the Sunday's River on the eastern boundary. Vegetation is composed of natural and degraded alluvial pioneer vegetation. There is evidence that the area has been cleared and used historically for agricultural purposes.

Block B is situated on the western boundary and is bounded on all sides by citrus orchards. Vegetation is composed of natural and degraded pioneer alluvial and climax Sundays Thicket vegetation. A few individual protected tree species and other species of special concern were noted to be present.

Block C, situated along the south-eastern boundary of the farm, is bounded on the west and south sides by citrus orchards and by riparian vegetation and the Sunday's River on the eastern boundary. Vegetation is composed of natural and degraded alluvial pioneer vegetation. There is evidence that the area has been cleared and used historically for agricultural purposes, which was exposed as a result of a recent intense fire.

As mentioned above, the blocks to be cleared are situated within CBAs (refer to Figure 2). Due to the limited impact of the proposed activity the effect on CBAs will most likely be insignificant. To ensure that no significant biodiversity impacts arise due to the proposed activities mitigation measures have been included in the EMPr. Refer to Section 4.5.

#### *Fauna*

Blocks A and C lie adjacent to the Sunday's River and are surrounded by citrus orchards. Block B is completely surrounded by citrus orchards. Some intact thicket vegetation is present within the blocks which provides transient habitat for a number of large mammals such as kudu, bushbuck, blue duiker, porcupine and warthog. Smaller mammals include baboons and monkeys. It is anticipated that there is also a variety of bird and reptile species to be found on the site. The potential list of fauna species that may occur in the vicinity of the site is limited. Although no TOPS were identified, some bird and reptile species may occur on site based on their known distribution

range (refer to Section 3.1.3). Provincial species of conservation concern in terms of the PNCO namely the *Circellium bacchus* (Addo Flightless Dung Beetle) may occur within the blocks. Refer to Section 3.1.4.

The proposed clearing of vegetation for the establishment of citrus orchards does not fall within any official national, provincial or municipal protected areas, nor is it included within an Important Bird Area or Ramsar wetland site. However, it lies within close proximity to Addo Elephant National Park as well as a number of private game farms and lodges. It therefore does form part of an important corridor for faunal movement and other ecological processes. However, due to the fragmented nature of the floodplain (due to intensive citrus cultivation), the main ecological corridor will run along drainage lines and the banks of the Sunday's River which is to remain intact as a buffer area is to be implemented. This corridor has lost effectiveness to function as a corridor because of the gravel Zuurberg Road (R335) which runs along the eastern boundary. Most of the mobile fauna are expected to vacate the area that is to be developed once vegetation clearing and other site preparation activities commence and will seek refuge in intact natural or near-natural surrounding areas.

#### Surface Water

Riparian vegetation associated with the Sunday's River has been excluded from the proposed blocks to be cleared, and a band (32 m) of riparian vegetation and terrestrial vegetation will be retained as an ecological corridor along the eastern boundary of the farm and the western banks of the Sunday's River (refer to Figure 1). To ensure that no significant surface water impacts arise due to the proposed activities mitigation measures have been included in the EMPr. Refer to Section 4.5.

#### Archaeological Sensitive Areas

At least 14 graves were observed within Block B at the following general GPS coordinates 33°26.566'S; 25°30.591'E (refer to Figure 3), with the potential for several more to be present in the vicinity, which were covered by dense vegetation at the time of the survey. There are no headstones or any other information on the origin or age of the graves. Most of the graves composed of earth mounds, but a few are marked by river cobbles; refer to photographs 1 and 2 below. Through discussions between the Applicant and the farm workers it was determined that the graves are of previous farm workers and their relatives.

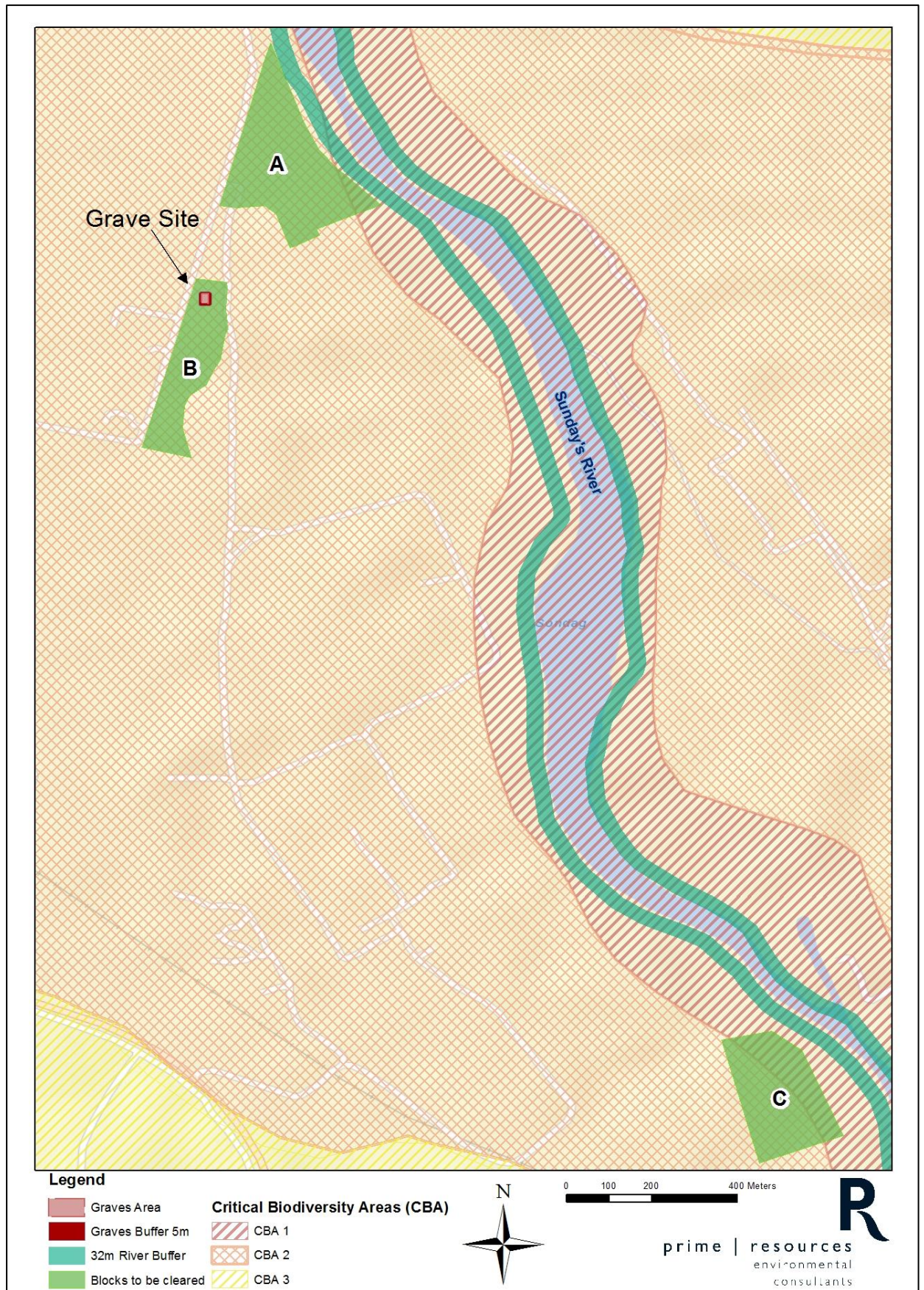


**Figure 3: Location of the graves within Block B**



Blocks A and C may contain buried freshwater mussel middens along the banks of the Sunday's River as freshwater middens were observed along the embankments of the Sunday's River near Barkly Bridge, but it is unknown to what distance they would be situated from the river. 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<sup>2</sup> in extent, should be reported to an archaeologist. Mitigation measures have been included in the EMPr. Refer to Section 4.5.

Refer to Figure 4 for an overview map of the sensitive areas and buffers recommended by specialists, associated with the proposed clearing of Blocks A, B and C.



**Figure 4: Overview of sensitive areas**



## 4.2 Potential Impacts

The proposed Boschkraal Citrus Farm Project may result in the following potential impacts:

### Air Quality

- Generation of dust from denuded areas, prior to planting of orchards and windbreaks, due to wind erosion.

The above negative impact is likely to be of low to negligible significance with the implementation of the recommended dust suppression measures as per this EMPr. The proposed project is likely to have negligible residual impacts on air quality as dust generated from wind erosion will cease once the orchards and windbreaks are in place.

### Archaeology and Palaeontology

- Damage to the graves in close proximity to Block B from clearing activities during site preparation.
- Damage to buried archaeological and paleontological resources from clearing activities during site preparation.

The above negative impacts are likely to be of low to negligible significance as a buffer zone around the graves has been recommended in this EMPr as per specialist recommendations. It is unlikely that any buried archaeological or palaeontological resources occur within the blocks to be cleared and as the topsoil will be retained for the planting of orchards it is unlikely that any potential buried resources will be unearthed. However, in the unlikely event that the impact occurs, damage to archaeological and paleontological resources is irreversible. A chance finds procedure has also been included in this EMPr should any resources be unearthed. The proposed project is likely to have negligible residual impacts on archaeological or palaeontological resources any impacts to these resources would only occur during the construction phase (i.e. site clearing and site preparation).

### Biodiversity

#### Flora

- The clearing of vegetation during site preparation may result in the localised loss of vegetation cover as well as the potential destruction of vegetation species of conservation concern, within the blocks to be cleared. Due to the limited impact of the proposed activity, the effect of vegetation loss on CBAs will most likely be insignificant. Any species of conservation concern that are present have widespread distributions, and any losses are unlikely to result in any significant impacts to populations after the implementation of the plant relocation plan as per this EMPr.
- Spread of weeds and alien invasive species due to disturbance during site preparation. Measures to eradicate any weeds and alien invasive species that may regenerate after disturbance are to be implemented, as per this EMPr.

The above negative impacts are likely to be of low to negligible significance with the implementation of the recommended mitigation measures. The proposed project is likely to have

negligible residual impacts if mitigation measures are implemented. Furthermore based on the fact that the alluvial vegetation is of a pioneer nature and supported by observations on site, it is evident that the proposed activity is highly reversible. Should the citrus orchards be removed in the future, it is highly likely that natural regeneration of Albany Alluvial vegetation will occur to its pre-development state.

#### Fauna

- Clearing activities will result in the loss of habitat for faunal species as well as mortalities to slow moving fauna not able to escape and the intentional killing of perceived dangerous fauna by workers.

The above negative impacts are likely to be of low to negligible significance with the implementation of the recommended mitigation measures. The proposed project is likely to have negligible residual impacts if mitigation measures are implemented. Furthermore, most of the mobile fauna are expected to vacate the area that is to be developed once vegetation clearing and other site preparation activities commence and will seek refuge in intact natural or near-natural surrounding areas. It is likely that bird species however will be attracted to the area once it is converted to agriculture, as they tend to prefer agricultural lands as habitat.

#### Noise

- The activity will generate noise during the construction phase when earth moving machinery is operated to facilitate site clearing and site preparation.

Noise generated during construction, however, will be temporary as it will only occur during the construction phase (i.e. site clearing and site preparation) and only occur during daylight hours. It is unlikely that the noise generated from these activities will result in a nuisance to surrounding landowners due to the distance (> 500 m from Blocks A and C and > 100 m from Block B) between the blocks to be cleared and surrounding farm residences. The existing orchards between the blocks to be cleared and surrounding farm residences also act as noise attenuation barriers. The impact is therefore likely to be of negligible significance. The proposed project is likely to have negligible residual impacts as during the operational phase the noise will be limited to typical agricultural sounds which will conform to the surrounding noise character.

#### Soil

- Although the site is generally flat and the soil has low erosion potential, the clearing of vegetation during site preparation may result in a temporary increase in erosion potential until the orchards and windbreaks are in place.
- Pollution of the soil resources by hydrocarbons (i.e. oil and diesel) as a result of potential leaks in machinery used for clearing activities during site preparation.

The above negative impacts are likely to be of low to negligible significance with the implementation of the recommended erosion prevention measures and hydrocarbon management measures, as per this EMPr. The proposed project is likely to have negligible residual impacts on soil as erosion potential will decrease once the orchards and windbreaks are in place and

machinery used for clearing activities will only be utilised during the construction phase (i.e. site clearing and site preparation).

#### Socio-economic

- The Sundays River Valley Municipality Integrated Development Plan (2015/2016) indicates that agriculture is a key driving force in the local economy. The proposed expansion of agricultural activities is in line with the land use and will result in the optimal use of the remaining uncultivated areas of the farm. Proposed activities will result in additional produce available for export which will have a positive impact on the economy.

The above positive impact is likely to be of medium significance. The contribution to the economy will be long-term as the orchards are to remain in place for the foreseeable future. Therefore, it is considered a positive residual impact.

- The proposed Boschkraal Citrus Farm Project will also create additional permanent and temporary employment opportunities. Two additional permanent employment opportunities will be created during the construction and operation phases. The proposed project will also support temporary seasonal employment opportunities during harvesting season (between April and October) of approximately 75 seasonal employees. The employment opportunities will improve the buying power of the employees and their families in the local communities, which in turn, may provide a boost for the local economy and enable these individuals to improve their standard of living.

The above positive impact is likely to be of low significance overall but will be of high significance to the individuals provided with the employment as well as their families. The employment opportunities will be long-term as the orchards are to remain in place for the foreseeable future. Therefore, it is considered a positive residual impact.

#### Surface Water

- Sedimentation of the Sunday's River as a result of potential erosion in blocks A and C, until the orchards and windbreaks are in place.

The above negative impact is likely to be of low to negligible significance with the implementation of the recommended erosion prevention measures and recommended buffer zone between the Sunday's River and areas to be cleared, as per this EMPr. The proposed project is likely to have negligible residual impacts on surface water as erosion potential will decrease once the orchards and windbreaks are in place.

### 4.3 Impact Assessment

Below is an assessment of the nature, extent, duration, probability and significance of the identified potential impacts of the proposed Boschkraal Citrus Farm Project. The significance of the potential impacts was determined through the evaluation of impact consequence and likelihood of occurrence.

The following risk assessment model was used for determination of the significance of impacts.

**SIGNIFICANCE = (MAGNITUDE + DURATION + SCALE) X PROBABILITY**

The maximum potential value for significance of an impact is 100 points. Potential impacts can therefore be rated as high, medium or low significance on the following basis:

- High environmental significance 60 – 100 points
- Medium environmental significance 30 – 59 points
- Low environmental significance 0 – 29 points

<b>Magnitude (M)</b>	<b>Duration (D)</b>
10 – Very high (or unknown)	5 – Permanent
8 – High	4 – Long-term (ceases once activities cease)
6 – Moderate	3 – Medium-term (ceases once orchards establish)
4 – Low	2 – Short-term (ceases at the end of construction)
2 – Minor	1 – Immediate
0 – None	0 – None
<b>Scale (S)</b>	<b>Probability (P)</b>
5 – International	5 – Definite (or unknown)
4 – National	4 – High probability
3 – Regional	3 – Medium probability
2 – Local	2 – Low probability
1 – Site	1 – Improbable
0 – None	0 – None

Where mitigation was recommended these have been included and the significance of the particular impact then determined following mitigation (the mitigated values are indicated within the square brackets).

Aspect	Process	Impact	Magnitude (M)	Duration (D)	Scale (S)	Probability (P)	Significance	
							Rating	Value
<b>Construction Phase (i.e. site clearing and site preparation)</b>								
Air quality		<ul style="list-style-type: none"> <li>Generation of dust from denuded areas, prior to planting of orchards and windbreaks, due to wind erosion</li> </ul>	4 [2]	3 [2]	2 [1]	3 [2]	Low (-) [Low (-)]	27 [10]
Archaeology and palaeontology		<ul style="list-style-type: none"> <li>Damage to the graves in close proximity to Block B from clearing activities during site preparation</li> </ul>	8 [8]	5 [0]	1 [1]	4 [1]	Medium (-) [Low (-)]	56 [8]
Biodiversity	<ul style="list-style-type: none"> <li>Land clearing activities</li> <li>Site preparation</li> </ul>	<ul style="list-style-type: none"> <li>Impact on biodiversity of permanent or temporary loss of vegetation cover as a result of site clearing</li> </ul>	2	5	1	4	Medium (-)	32
		<ul style="list-style-type: none"> <li>Loss of faunal habitat as a result of site clearing</li> </ul>	2	5	1	4	Medium (-)	32
		<ul style="list-style-type: none"> <li>Loss of species of conservation concern during site clearing activities</li> </ul>	2 [2]	5 [0]	1 [1]	4 [1]	Medium (-) [Low (-)]	32 [2]
		<ul style="list-style-type: none"> <li>Susceptibility of post construction disturbed areas to invasion by alien invasive species</li> </ul>	2 [2]	3 [1]	1 [1]	3 [2]	Low (-) [Low (-)]	18 [8]
		<ul style="list-style-type: none"> <li>Mortalities to slow moving fauna or fauna intentionally killed by workers as they are perceived to be dangerous</li> </ul>	2 [2]	5 [0]	1 [1]	4 [2]	Medium (-) [Low (-)]	32 [6]

Aspect	Process	Impact	Magnitude (M)	Duration (D)	Scale (S)	Probability (P)	Significance	
							Rating	Value
Noise		▪ Generation of nuisance noise from machinery used for clearing activities during site preparation	4	2	2	3	Low (-)	24
Soil		▪ Increased susceptibility of cleared areas to erosion	4 [2]	3 [2]	1 [1]	3 [2]	Low (-) [Low (-)]	24 [10]
		▪ Pollution of the soil resources by hydrocarbons (i.e. oil and diesel) as a result of potential leaks in machinery used for clearing activities during site preparation	6 [4]	5 [2]	1 [1]	3 [2]	Medium (-) [Low (-)]	36 [14]
Socio-economic		▪ Creation of additional permanent employment opportunities	2	2	2	5	Medium (+)	30
Surface water		▪ Sedimentation of the Sunday's River as a result of potential erosion in blocks A and C	4 [2]	3 [2]	2 [1]	3 [2]	Medium (-) [Low (-)]	36 [10]
<b>Operation Phase</b>								
Biodiversity	▪ Citrus farming	▪ Spread of weeds and alien invasive species due to disturbance during site preparation	2 [2]	5 [1]	1 [1]	3 [2]	Low (-) [Low (-)]	24 [8]
Socio-economic		▪ Proposed activities will result in additional produce available for export which will have a positive impact on the economy	4	5	2	5	Medium (+)	55

Aspect	Process	Impact	Magnitude (M)	Duration (D)	Scale (S)	Probability (P)	Significance	
							Rating	Value
		<ul style="list-style-type: none"> <li>▪ Creation of additional permanent and temporary employment opportunities</li> </ul>	4	5	2	5	Medium (+)	55

#### 4.4 Impact Management Objectives and Outcomes

Potential Impacts	Impact Management Objectives	Impact Management Outcomes	Impact Management Actions
Increased susceptibility of cleared areas to erosion and subsequent sedimentation of the Sunday' River	Minimise, and where possible, avoid potential negative impacts on soil and agricultural potential of the receiving environment	No erosion taking place on site	Table 6 contains soil management actions to meet the management objectives
	Minimise, and where possible, avoid, potential negative impacts on water resources characterising the receiving environment	No sedimentation of the Sunday's River and associated wetlands Wetland habitats associated with the Sunday's River remain undisturbed	Table 10 contains water management actions to meet the management objectives
Pollution of soil by hydrocarbons used on site	Minimise, and where possible, avoid potential negative impacts hydrocarbons pose on the receiving environment	No hydrocarbon contamination of the surrounding environment	Table 9 contains hydrocarbon management actions to meet the management objectives
Damage to the graves in close proximity to Block B from clearing activities during site preparation	Avoid potential negative impacts on archaeological and paleontological resources characterising the receiving environment and any buried resources	Graves identified in proximity to the areas to be cleared in Block B remain undisturbed	Table 7 contains management actions to meet the management objectives relating to archaeological and paleontological resources
Damage to potentially buried archaeological and paleontological resources from clearing activities during site preparation		Any potentially buried archaeological and paleontological resources remain undamaged	
Generation of dust from denuded areas due to wind erosion	Minimise, and where possible, avoid the generation of nuisance dust	No nuisance dust generated on site	Table 12 contains dust management actions to meet the management objectives
Localised loss of vegetation cover (faunal habitat) as well as the potential destruction of a few vegetation species of conservation concern from clearing activities during site	Minimise loss of vegetation species of conservation concern	Successful relocation of vegetation species of conservation concern to adjacent areas prior to the commencement of clearing activities	Table 11 contains biodiversity management actions to meet the management objectives



Potential Impacts	Impact Management Objectives	Impact Management Outcomes	Impact Management Actions
preparation			
Spread of weeds and alien invasive species due to disturbance during site preparation	Prevent the spread of weeds and invasive species	Any alien and invasive vegetation species have been eradicated	
Mortalities to slow moving fauna or fauna intentionally killed by workers as they are perceived to be dangerous	Prevent faunal mortalities	No fauna harmed during clearing activities	

## 4.5 Impact Management Actions and Time Periods for Implementation

**Table 6: Soil Management Plan**

Aspect	Management Action	Time Period for Implementation
Erosion through the action of water	Suitable soil conservation works shall be constructed and thereafter be maintained in order to divert run-off water from other land or to restrict the run-off speed of run-off water.	During construction (i.e. site preparation); maintained throughout the life of the project
	The land concerned shall be cultivated in accordance with such a method or be laid out in such a manner that the run-off speed of run-off water is restricted.	During construction (i.e. site preparation and planting)
Erosion through the action of wind	Suitable soil conservation works shall be constructed and thereafter be maintained in order to restrict the surface movement of soil particles through the action of wind.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	The land concerned shall be cultivated in accordance with such method or be laid out in such manner that the surface movement of soil particles through the action of wind is restricted.	During construction (i.e. site preparation); maintained throughout the life of the project
	Where possible, strips of natural vegetation shall be left at right angles to the prevailing wind direction, a suitable windbreak shall be constructed or suitable vegetation shall be established to serve as a windbreak. Indigenous vegetation is to be used for windbreaks. If alien or invasive species are to be used at any point the necessary permits must be obtained from DAFF prior to planting.	During construction (i.e. site preparation and planting)
	The cultivation of the land concerned during periods of high winds must be avoided.	During construction (i.e. site preparation and planting)
Erosion repair	All areas susceptible to erosion (including roads and bare areas) must be monitored to ensure that there is no undue soil erosion resultant from activities. If erosion is identified it must not be allowed to develop on a large scale before effecting repairs.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Waterlogging and salination	<p>Every land user shall by means of as many of the following measures as are necessary in his situation, protect the irrigated land on his farm unit effectively against waterlogging and salination:</p> <ul style="list-style-type: none"> <li>• Feeder channels, irrigation furrows and storage and catchment dams for irrigation water shall be made impermeable.</li> <li>• The land concerned shall not be irrigated excessively or with water with too high a salt content.</li> </ul>	During construction (i.e. site preparation and planting); maintained throughout the life of the project

Aspect	Management Action	Time Period for Implementation
	<ul style="list-style-type: none"> <li>Suitable soil conservation works shall be constructed and thereafter maintained in order to draw off excess surface and subterranean water and to dispose thereof safely to prevent the waterlogging and salination of lower lying land.</li> <li>If the land concerned shows signs of salination, a suitable soil ameliorant shall be applied in order to improve the production potential of that land.</li> </ul>	
	The land user must not drain or cultivate any vlei, marsh or water sponge or a portion thereof on his farm unit; or cultivate any land on his farm unit within the flood area of a water course or within 10 m horizontally outside the flood area of a watercourse.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Water diversion and obstruction	No land user shall in any manner whatsoever divert any run-off water from a water course on his farm unit to any other water course, except on authority of a written permission by DAFF and DWS. This does not apply in respect of run-off water that is diverted from one watercourse to another in terms of the provisions of a water run-off control plan approved by the DWS.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	No land user shall effect an obstruction that will disturb the natural flow pattern of run-off water on his farm unit or permit the creation of such obstruction unless the provision for the collection, passing through and flowing away of run-off water through, around or along that obstruction is sufficient to ensure that it will not be a cause for excessive soil loss due to erosion through the action of water or the deterioration of the natural agricultural resources.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	The land user must not remove the vegetation in a watercourse on his farm unit to such an extent that it will no longer serve as flood attenuation during a flood that could result excessive soil loss as a result of erosion through the action of water.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Veld burning	Except on authority of a written permission by DAFF, no land user shall actively burn any veld on his farm unit. An application to burn any veld must be submitted at least 30 days prior to the intended date of burning.	Prior to construction (i.e. site preparation)
Denuding of land	Denuding must be done systematically from a specified point.	Prior to construction (i.e. site preparation)
	The area of land that is to be denuded must not at any time exceed one ha or such larger area as DAFF may approve in the application submitted in terms of CARA.	Prior to construction (i.e. site preparation)

**Table 7: Archaeological and Paleontological Management Plan**

Aspect	Management Action	Time Period for Implementation
Awareness	Employees must be educated regarding the possible presence of buried archaeological and paleontological resources.	Prior to construction (i.e. site preparation)
Graves	Vegetation covering the graves in Block B and in the immediate vicinity must be carefully removed to expose and to establish the location of all possible graves in the area. The vegetation must be removed by hand and must be cut not pulled from the ground.	Prior to construction (i.e. site preparation)
	The graves must be fenced-off with the fence not closer than two metres to the graves.	Prior to construction (i.e. site preparation)
	No development may take place within five metres from the fence.	Throughout the life of the project
Chance finds	If any unmarked archaeological or paleontological findings are discovered during activities, the activities must cease and ECPHRA must be notified immediately to investigate the findings.	During construction (i.e. site preparation and planting)
	The proposed development will take place in close vicinity of the Sunday's River, in an area where one would expect to find freshwater mussel middens. If such features or any other concentrations of archaeological material are exposed, then work must cease in the immediate area of the finds and ECPHRA must be notified immediately to investigate the findings.	During construction (i.e. site preparation and planting)
	Activities at the area will be allowed to recommence once ECPHRA has investigated the site and given their permission to remove the findings and/or to allow the continuation of the activities. Any measures recommended by ECPHRA must be implemented.	During construction (i.e. site preparation and planting)

**Table 8: Waste Management Plan**

Aspect	Management Action	Time Period for Implementation
Awareness	Employees must be educated regarding effective waste management to avoid contamination of the surrounding environment by waste.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Waste drums / bins / skips	The land user must ensure that an adequate number of waste drums / bins / skips are available for domestic waste on the farm. Domestic waste includes, but is not limited to plastics, cans, food remains and glass. Waste must be stored in a manner that it cannot be washed or blown into the environment.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Burning waste	No waste must be burned on site.	During construction (i.e.

Aspect	Management Action	Time Period for Implementation
		site preparation and planting); maintained throughout the life of the project
Litter	The site must be kept clean and litter removed and stored in the waste bins provided.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Recycling	Waste streams must be recycled or re-used (where possible) before disposal is considered.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Disposal	Waste drums / bins / skips must be emptied regularly and disposed of at a licensed landfill facility or via the municipal refuse collection services.	During construction (i.e. site preparation and planting); maintained throughout the life of the project

**Table 9: Hydrocarbon Management Plan**

Aspect	Management Action	Time Period for Implementation
Drip trays	Any pumps, machinery or other equipment that require oil, diesel, etc., that are to remain in one position for longer than two days, if not parked on an impermeable surface, will be placed on drip trays which are to be emptied regularly.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	The servicing or maintenance of vehicles and machinery must only take place over a plastic tarpaulin or steel drip trays.	
	Any effluent from the drip trays and any spilled oils and fuels will be collected and stored in drums to be disposed of at a licensed landfill facility.	
Storage	Fuel, oils and other lubricants to be stored in a bunded area with a capacity to contain 110% of the total stored volume.	During construction (i.e. site preparation and planting); maintained throughout the life of the project

Aspect	Management Action	Time Period for Implementation
Vehicle and machinery maintenance	Ensure that all mechanical equipment and vehicles used are kept in good working order to prevent any leakage of oil, petrol, diesel, hydraulic and other associated fluids.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Spills	Should an oil spill occur as a result of leaking equipment, machinery or vehicles, it is to be cleaned utilising oil remediation solvents.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Contaminated soil	Soil contaminated with hydrocarbons must be moved to an allocated area where it will be rehabilitated and soil that cannot be rehabilitated must be disposed of at an appropriate landfill facility.	During construction (i.e. site preparation and planting); maintained throughout the life of the project

**Table 10: Water Resources Management Plan**

Aspect	Management Action	Time Period for Implementation
Riparian zone and wetland buffer	A 32 m buffer from the banks of the Sunday's River in the areas to be cleared must be clearly demarcated.	Prior to construction (i.e. site preparation)
	No clearing must be allowed within the 32 m buffer from the banks of the Sunday's River to prevent disturbance of the wetland associated with the Sunday's River.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
Pollution	Hydrocarbons must be managed according to the Hydrocarbon Management Plan to avoid pollution of the surrounding water resources.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	Waste must be managed according to the Waste Management Plan to avoid pollution of the surrounding water resources.	During construction (i.e. site preparation and planting); maintained throughout the life of the project

**Table 11: Biodiversity Management Plan**

Aspect	Management Action	Time Period for Implementation
Species of conservation concern	Areas to be cleared must be clearly demarcated.	Prior to construction (i.e. site preparation and planting)
	A botanist must be employed to demarcate the species of special concern in terms of the NFA and the Provincial Nature Conservation Ordinance identified within the demarcated areas.	
	Permits must be obtained from DAFF for the removal or relocation of the <i>Ornithogalum sp.</i> and <i>Schotia afra</i> individuals identified.	
	Permits must be obtained from DEDEAT for the removal or relocation of the <i>Aloe ferox</i> , <i>Asparagus spp.</i> , <i>Boophone disticha</i> , <i>Bulbine frutescenc</i> , <i>Carpobrotus sp.</i> , <i>Cotyledon orbiculata var. orbiculat</i> and <i>Mesembryanthemum spp</i> individuals identified.	
	After permits for removal and relocation have been obtained the demarcated species of conservation concern must be relocated under the supervision of a botanist who will and advise on the procedure for the correct removal of these individuals and indicate suitable adjacent positions for relocation (i.e. plant relocation plan).	
	Once plant relocation is complete, a short audit report and certificate of clearance must be issued by the botanist.	
Alien invasive vegetation species management	After clearing is completed, an appropriate cover crop should be planted and a suitable after care period allowed where any weeds or exotic species are removed from disturbed areas, should establishment of orchards not commence immediately.	During construction (i.e. site preparation and planting); maintained throughout the life of the project
	Weeds and alien invasive species must be cleared by hand according to CARA and the Working for Water Guidelines. Refer to the Alien and Invasive Vegetation Monitoring and Eradication Plan below.	
	Demarcation permits are to be obtained from DAFF for any listed alien invasive tree species to remain on site.	
Fauna management	Construction personnel and / or farm workers must be educated regarding causing no harm to fauna, even species perceived as pests or dangerous.	Prior to construction (i.e. site preparation and planting)
	Affected areas should be thoroughly searched and slow moving animals (i.e. tortoises) must be relocated from the affected areas to the adjacent naturally vegetated areas on the farm.	Prior to construction (i.e. site preparation and planting)
	A professional reptile remover (with the necessary permits where required) needs to be contacted to remove dangerous reptiles when in conflict with the workers.	During construction (i.e. site preparation and planting); maintained throughout the life of the project

## **Alien and Invasive Vegetation Monitoring and Eradication Plan**

The purpose of this plan is to ensure that the Boschkraal Citrus Farm employees are aware of the alien invasive vegetation species on site, and to identify the appropriate methods to be used for the eradication of these species.

<p><b>Category 1 in terms of CARA</b></p>	<p>Category 1 plants (declared weeds) are prohibited and must be controlled. Category 1 invaders are prohibited in rural and urban areas, except with written permission or in an approved biocontrol reserve. For the purposes of this plan, they will be considered prohibited. These species may not be planted or propagated, and all trade in their seeds, cuttings or other propagative material is prohibited. They may not be transported or allowed to disperse. Category 1 plants might pose a health risk to humans or livestock, cause serious financial losses to land users, invade undisturbed environments and transform or degrade natural plant communities, use more water than the plant communities they replace, or be particularly difficult to control. Most of the plants in this category produce copious numbers of seeds, are wind or bird dispersed, or have highly efficient means of vegetative reproduction.</p>
<p><b>Category 1a in terms of NEMBA</b></p>	<p>Invasive species listed in terms of Section 70(1)(a) of NEMBA as an invasive species requiring compulsory control.</p>
<p><b>Category 1b in terms of NEMBA</b></p>	<p>Invasive species listed in terms of Section 70(1)(a) of NEMBA as an invasive species that require control by means of an invasive species management programme.</p>
<p><b>Category 2 in terms of CARA</b></p>	<p>Category 2 plants are declared invader species; however they are commercially used plants that may be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread. Category 2 Plants have the proven potential of becoming invasive, but also have certain beneficial properties that warrant their continued presence and use in some circumstances. These plants serve a commercial or utility purpose, such as a woodlot, shelter belt, building material, animal fodder, soil stabilisation or medicinal purposes. They may only be cultivated under controlled conditions and all reasonable steps have to be taken to limit their spread. CARA makes provision for Category 2 plants to be retained in special areas such as biocontrol reserves, but those occurring outside demarcated areas have to be controlled. Category 2 plants may not occur within 30 m of the 1:50 year floodline of watercourses and/or wetlands unless authorisation has been obtained in terms of the NWA. A land user must control any Category 2 plants that occur on any land or inland water surface by means of the methods prescribed in Regulation 15E of CARA and The Department of Water Affairs' Working for Water documentation.</p>



<b>Category 3 in terms of CARA</b>	Category 3 plants are alien plants used for ornamental purposes, and they may no longer be planted; existing plants may remain as long as steps are taken to prevent their spread. Category 3 plants are undesirable because they have the proven potential of becoming invasive, but most of them are nevertheless popular ornamentals or shade trees. Category 3 plants are not allowed to occur anywhere except in biocontrol reserves, unless they were already in existence when Regulation 15 of CARA came into effect. They may remain if they do not grow within 30 m of the 1:50 year floodline of watercourses and/or wetlands or if all reasonable steps are taken to keep them from spreading. Propagative material of these plants, such as seeds or cuttings, may not be planted, propagated, imported, bought, sold or traded in any way. It is, however, legal to trade in the wood of Category 3 plants, or in other products that do not have the potential to grow or multiply.
<b>Declared Invader Species in terms of CARA</b>	Plants of the kind specified in Category 1 and 2 in Regulation 15 of the Conservation of Agricultural Resources Act, No. 43 of 1983.
<b>Indigenous Species</b>	Species that have occurred in a region for thousands of years and have not been brought there directly or indirectly.
<b>Alien Invasive Species</b>	Alien invasive plants are plants that are 1) non-indigenous and have been brought in from another area, and 2) species that are able to rapidly colonise disturbed/undisturbed areas.
<b>Potential Transformers</b>	Species that have the potential to transform natural or semi-natural ecosystems, but have not had a marked effect as yet.
<b>Transformer Species</b>	Species that dominate and/or replace a vegetation within a natural/ or semi-natural ecosystem, thereby altering its structure, integrity and functioning. They often form monocultures, allowing no other species to grow amongst them.

The following alien and invasive species were identified on site and are addressed in this plan:

<b>Botanical Name</b>	<b>Common Name</b>	<b>Category</b>	<b>Extent</b>
<i>Acacia melanoxylon</i>	Blackwood	NEMBA/CARA Category 2	Localised
<i>Agave sisalana</i>	Sisal	NEMBA/CARA Category 2	Localised
<i>Arundo donax</i>	Spanish Reed	NEMBA Category 1b/ CARA Category 1	Localised, riparian
<i>Canna indica</i>	Indian Shot	NEMBA Category 1b/ CARA Category 1	Localised, riparian
<i>Casuarina equisetifolia</i>	Beefwood	NEMBA/CARA Category 2	Large individual trees
<i>Cereus jamacaru</i>	Queen of the Night	NEMBA Category 1b/ CARA Category 1	Scattered
<i>Cestrum laevigatum</i>	Ink Berry	NEMBA Category 1b/ CARA Category 1	Scattered
<i>Datura stramonium</i>	Thorn Apple	NEMBA Category 1b/ CARA Category 1	Scattered
<i>Eucalyptus diversicolor</i>	Gum Tree	NEMBA/CARA	Large individual

Botanical Name	Common Name	Category	Extent
		Category 2	trees
<i>Grevillea robusta</i>	Australian Silky Oak	NEMBA/CARA Category 3	Large individual trees
<i>Lantana camara</i>	Lantana	NEMBA Category 1b/ CARA Category 1	Scattered
<i>Nicotiana glauca</i>	Wild Tobacco	NEMBA Category 1b/ CARA Category 1	Scattered
<i>Opuntia aurantiaca</i>	Jointed Cactus	NEMBA Category 1b/ CARA Category 1	Scattered clumps
<i>Opuntia ficus-indica</i>	Prickly Pear	NEMBA Category 1b/ CARA Category 1	Moderate localised
<i>Pennisetum clandestinum</i>	Kikuyu Grass	NEMBA Category 1b (wetlands)/ CARA Weed	Scattered
<i>Pinus sp.</i>	Pine	NEMBA/CARA Category 2	Localised
<i>Ricinus communis</i>	Castor Oil Plant	NEMBA/CARA Category 2	Scattered, localised

### **General Control Methods**

The most effective form of alien and invasive species management is prevention. If prevention is no longer possible, it is best to treat infestations when they are manageable to prevent them from establishing through early detection and rapid response. Controlling the species before it seeds will reduce future problems. Control is generally best applied to the least infested areas before dense infestations are tackled. Consistent follow-up work is required for sustainable management.

### **Clearing Principles**

The following general principles should be taken into consideration when using mechanical control methods:

- Start clearing the less seriously infested area first (the area with young / immature, less dense trees) to prevent the build-up of seed banks. Starting with less dense areas will also require fewer resources and have greater impact in the long term.
- Dense mature stands ideally should be left for last, as they probably won't increase in density or pose a greater threat than they are at the moment.
- Collective management and planning with neighbours allows for more cost effective clearing and maintenance. Consider neighbours upstream and downstream where species may be transported by water.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

### **Handling, Storage and Transportation of Herbicides**

The following should be noted when dealing with herbicides:

- Take extreme care when handling chemicals and concentrates.
- Wear appropriate personal protective equipment such as gloves, aprons and eye protection.
- After contact with herbicides, clean hands thoroughly with soap and water.
- All chemicals, concentrated or diluted, must be stored safely, with access to these storage areas controlled.

- All containers in which herbicides and/or chemicals are stored or decanted must be clearly labelled.
- Herbicides must only be used according to the product recommendations on the label.
- Avoid spraying herbicides or chemicals onto non-target vegetation.

### **Foliar Applications**

For dense stands, suitable fan nozzles for overall application should be fitted. Sprayers should be fitted with pressure or flow regulators. In stands where individual plants are treated, solid cone nozzles should be fitted. Foliar spraying should be restricted to plants waist-height or lower and sufficient foliage (leaves) must be available to carry the applied herbicide to the root system.

### **Basal Stem Treatments**

Suitable herbicides mixed in diesel must be applied to the base (bottom 250 mm) of the stem and to any exposed roots. Stems with a diameter up to 50 mm should be treated to a height of 250 mm; and stems above 50 mm diameter to a height of 500 mm. This method is only suitable for stems up to 100 mm in diameter. Application should be by means of a low pressure, coarse droplet spray from a narrow angle solid cone nozzle.

### **Cut Stump Treatments**

Stems should be cut as low as practical, as stipulated on the herbicide label. Herbicides are then applied in diesel or water as recommended. Applications in diesel should be to the whole stump and exposed roots, and in water to the cut area as instructed on the label.

### **Hand Pulling or Hoeing**

Hand pulling should be carried out in sparse stands under conditions where seedlings are easily removed from the soil. Operators should be supplied with suitable gloves or other hand protection. Seedlings should be severed below the soil surface or removed from the soil. Soil disturbance should be minimised to reduce the potential for re-germination.

### **Ring Barking**

Bark must be removed from the bottom of the stem to a height of 0.75 m to 1.0 m. Bush knives (machetes) or hatchets should be used for de-barking (Figure 5).

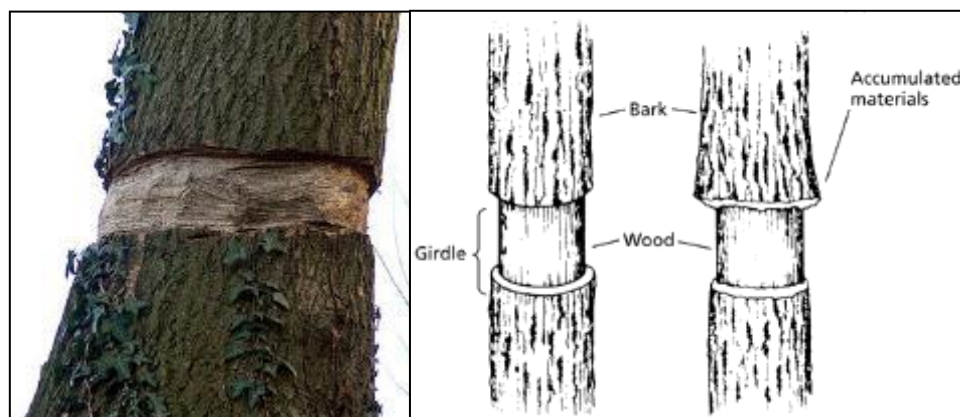


Figure 5: Ring barking (Working for Water, 2011)

### **Disposal of Cleared Material**

Cleared material must be removed from site by a contractor and disposed of at a landfill site, unless there is the potential to use the removed material as firewood.

### **Species Specific Identification and Control Methods**



Figure 6: *Acacia melanoxylon* (Australian Blackwood) (Henderson, 2001; van Wyk and van Wyk, 2013)

#### **Recommended Control Methods:**

- Small plants can be uprooted but it is important to remove the roots completely as it reproduces vegetatively from root suckers.
- Mature trees can be cut and herbicide applied to the stump to limit re-sprouting.
- Basal bark methods (painting herbicide onto the bark) can also be effective.
- Large trees can be killed by ring barking.
- Foliar sprays can be used on young plants.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

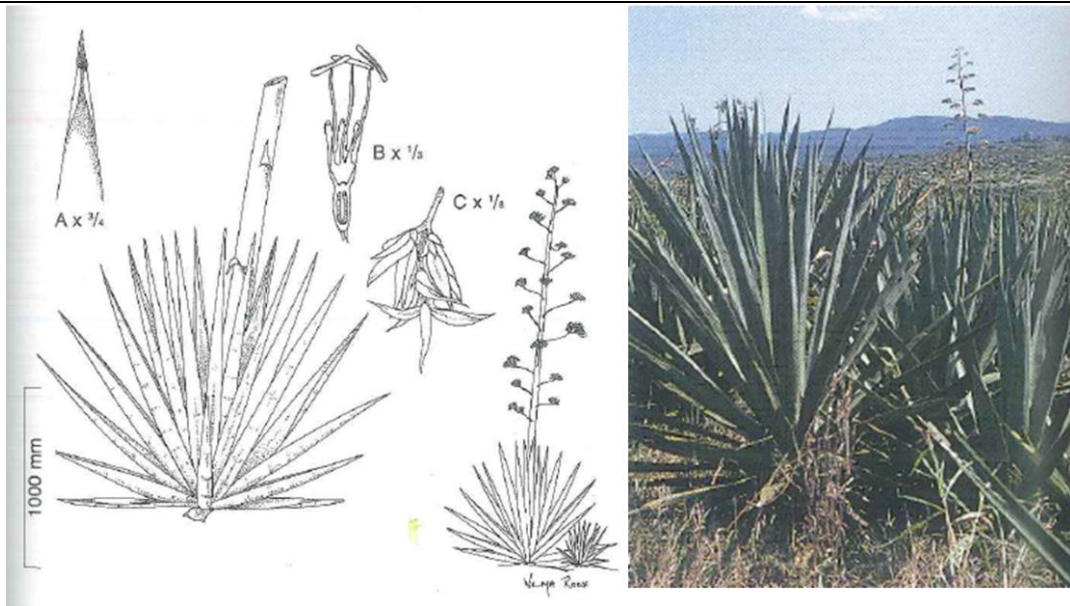


Figure 7: *Agave sisalana* (Sisal) (Henderson, 2001)

Recommended Control Methods:

- Small plants can be uprooted by hand.
- Larger plants can be controlled by prescribed fire treatment.
- Good results can be obtained by breaking the "heart" from the main plant and spraying with a suitable herbicide. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

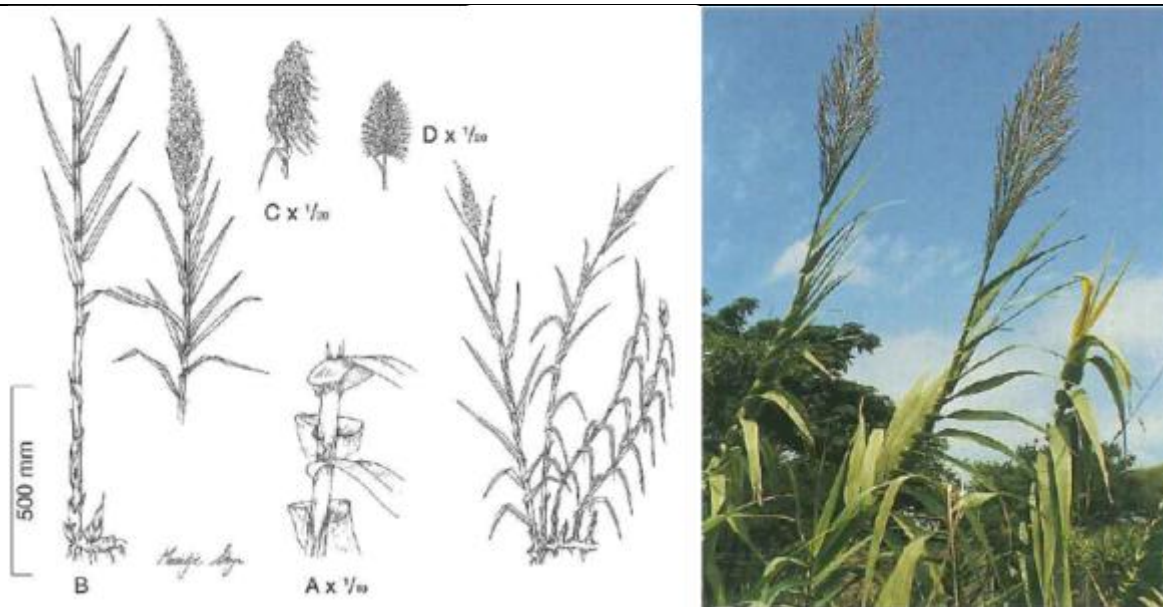


Figure 8: *Arundo donax* (Spanish Reed) (Henderson, 2001)

Recommended Control Methods:

- Dense clumps, predominantly along river banks, but usually outside of the wet zone, should be removed from areas in close proximity to the river banks as a priority during

construction.

- Eradicate weeds when they are small to prevent them from establishing (early detection and rapid response). Control is generally best applied to the least infested areas before dense infestations are tackled. Consistent follow-up work is required for sustainable management.
- Stems can be manually removed using a combination of cutting stems and digging up roots with shovel or pick axe.
- Prescribed burning can also be used as a control method but it does not remove underground stems and roots and may cause damage to native species.
- Suitable herbicides can be applied as a foliar spray (most effective when applied after flowering or as a concentrated solution applied directly to freshly cut stems).
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.
- Care must be taken to not confuse this species with *Phragmites australis*, which is indigenous. *Phragmites* is a smaller reed with narrow leaves. *Arundo* has broad leaves, and is tall and robust.

(BioNET-EAFRINET keys and Fact Sheets)



Figure 9: *Canna indica* (Indian Shot) (Henderson, 2001)

Recommended Control Methods:

- Small plants can be uprooted but it is important to remove the roots completely as *Canna indica* reproduces vegetatively from rhizomes.
- Usually digging or herbicide spraying will be required.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)



Figure 10: *Casuarina equisetifolia* (Beefwood) (Henderson, 2001)

Note:

- *Casuarina equisetifolia* originally planted as windbreaks around the citrus orchards, should be cleared over time and indigenous alternatives for use as windbreaks investigated.

Recommended Control Methods:

General measures for trees will likely be effective in controlling this species:

- If the tree is too large for physical removal, consider ring-barking. This technique involves removing a ring of bark at least 25 cm wide. Peel the bark down to just below ground level, pulling outwards. If you wish to hasten the process, fell the tree to a stump that is 30cm above ground level. Then loosen the bark on the stump by hitting it with a hammer and peel the bark downwards to ground level. Any re-growth that appears must be cut off cleanly at once, to prevent nutrition from new growth reaching the roots.
- Cut-stump treatment:
  - Fell the tree, leaving a stump as flat and as close to the ground as possible, and apply herbicide.
- Basal stem treatment:
  - Paint herbicide onto the base of the tree trunk and any exposed roots, up to a height of 25 cm above ground level. In the case of multi-stemmed trees, each individual stem should be painted.
- Foliar spraying:
  - In the case of re-growth from stumps (coppicing), spray herbicide on the re-growth. Allow the re-growth to reach a height of 50 cm before treatment. Ensure that a full cover spray is achieved.
- Seek professional advice on which herbicides to use.

([www.invasives.org.za](http://www.invasives.org.za))

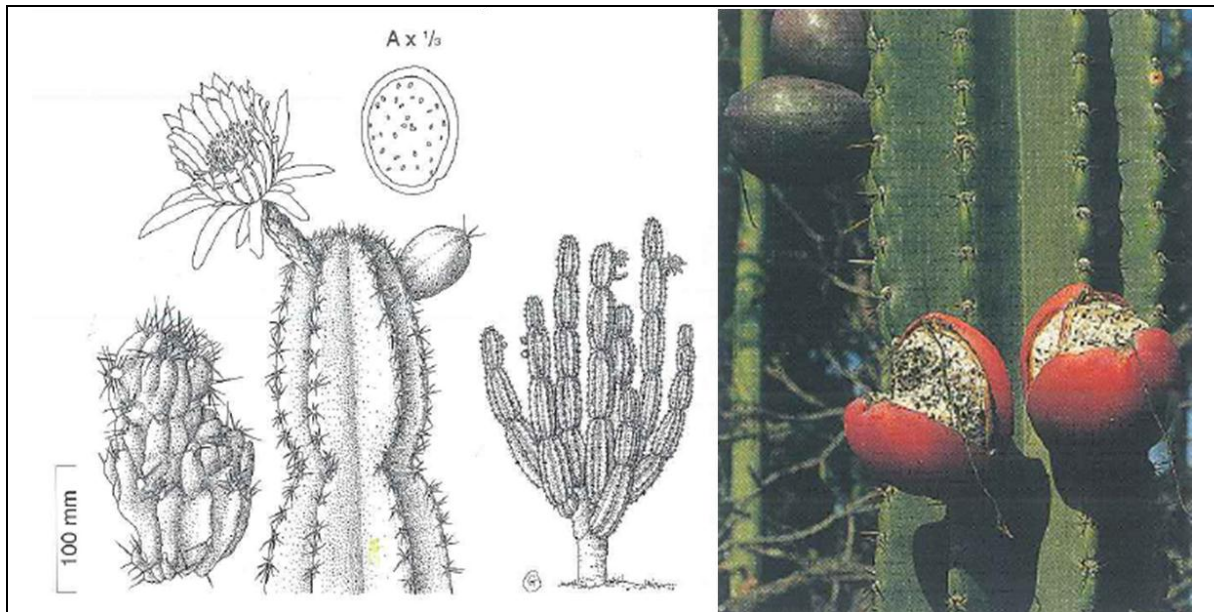


Figure 11: *Cereus jamacara* (Queen of the Night) (Henderson, 2001)

Recommended Control Methods:

- The mealybug, *Hypogeococcus pungens*, and a stem-boring cerambycid beetle, *Alcidion cereicolacan* help control this plant as part of an integrated control programme.
- Manual control can be effective when numbers of plants are very low but must be done carefully otherwise plant fragments will re-sprout into new plants, thus exacerbating the infestation.
- Controlled burns must be well-timed and coordinated to reduce the risk of creating a bushfire, and there must be sufficient material to carry a hot fire. For maximum effect plants must be uprooted before being burned. Fire could be used for small, isolate stands but it will not penetrate large stands.
- Plants can be treated by herbicide stem injections.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)



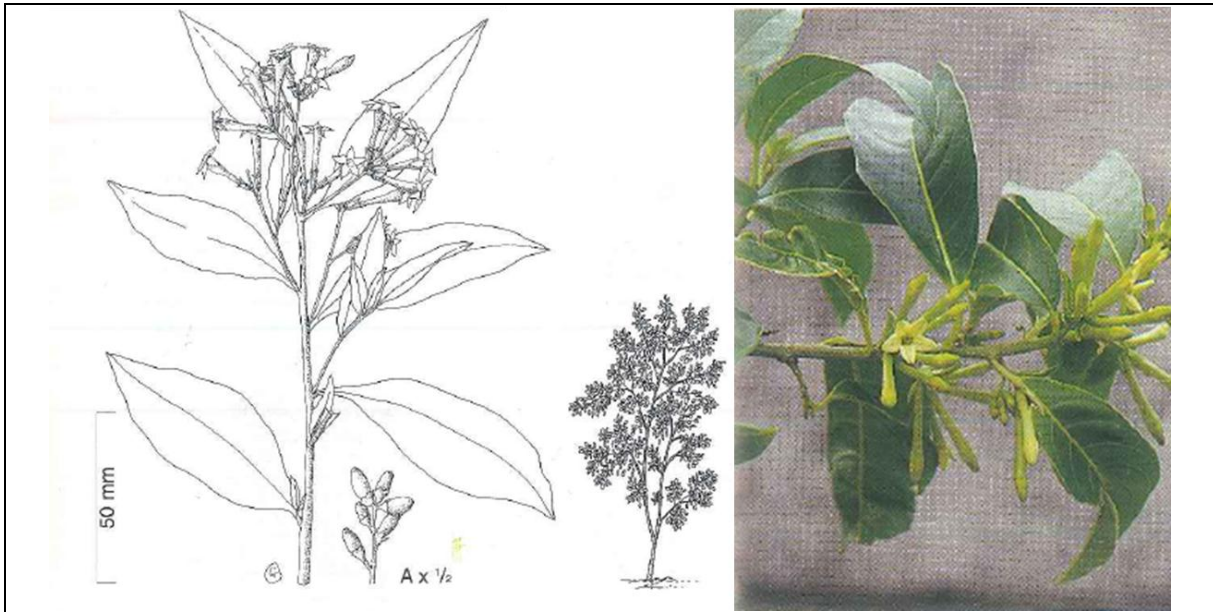


Figure 12: *Cestrum laevigatum* (Ink Berry) (Henderson, 2001)

Recommended Control Methods:

- Mature *Cestrum laevigatum* plants can be killed by applying concentrate suitable herbicide to stumps cut 10 cm above ground level. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

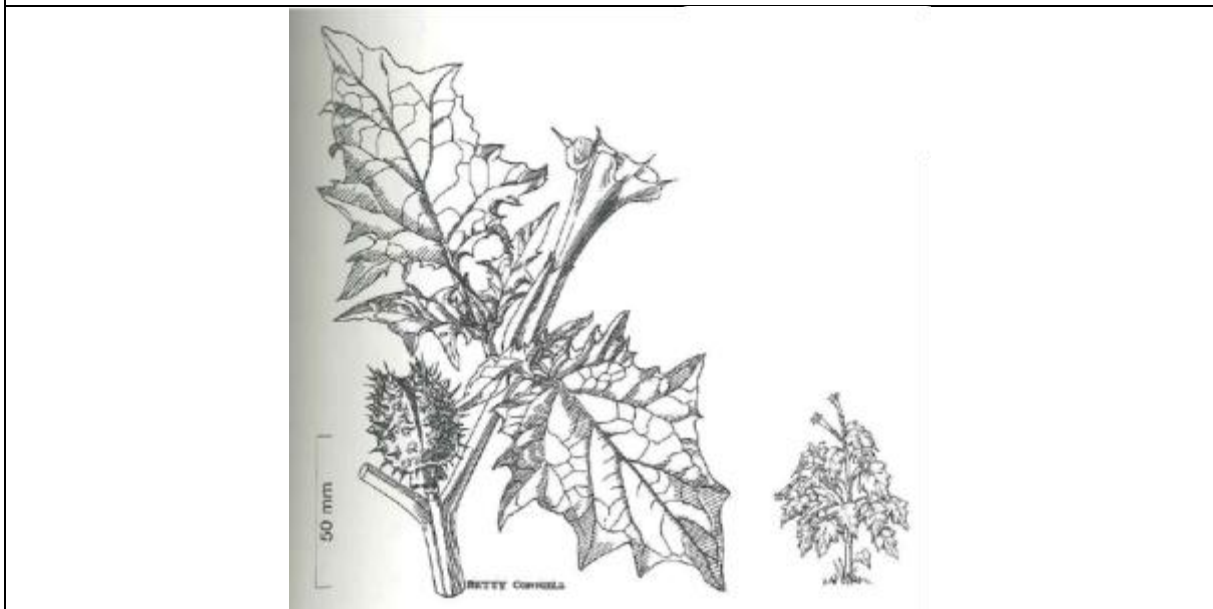


Figure 13: *Datura stramonium* (Common Thorn Apple) (Henderson, 2001)

Recommended Control Methods:

- This plant is declared a weed which is both poisonous to ingest and has an aggressive growth habit.
- As they are deep germinators, the common thorn apple is not adequately controlled by

many pre-emergence herbicides.

- Post-emergence herbicides are the most reliable method of control, and include:
  - 2,4-D/dicamba, MCPA bendioxide, bromoxynil 225, bromoxynil 450, chlorimuron-ethyl, chlorsulfuron, fomesafen MCPA, metribuzin and metsulfuron methyl.
- As it is an annual, it is advisable to delay herbicide application for as long as possible in order to impact on late germinating individuals.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

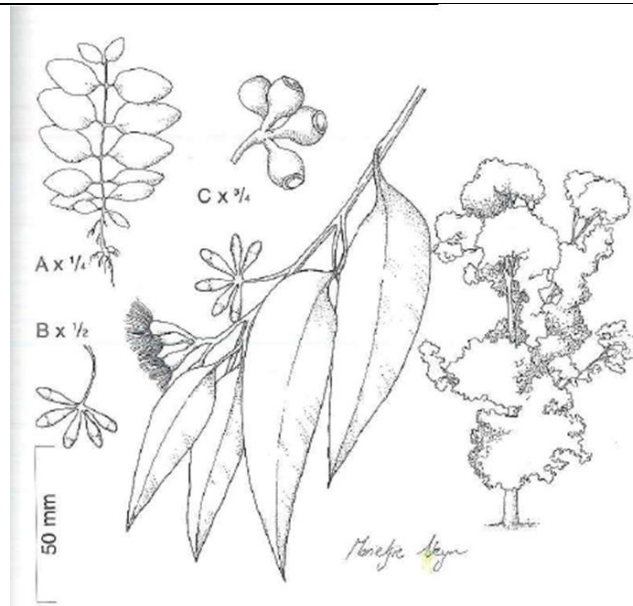


Figure 14: *Eucalyptus diversicolor* (Gum Tree) (Henderson, 2001)

**Note:**

*Eucalyptus diversicolor* along the river banks have reached immense sizes (>20 m) resulting in serious degradation of the riparian zone mostly restricted to the middle reach of the river. Removal along the river should be a priority during construction phases and trees should be removed over a period of time and replaced by indigenous species. A number of these trees are also located in the vicinity of the homestead and may be considered of heritage importance. Additionally they are reported to provide important roosting sites for avifauna. It is recommended that these trees be replaced over a long-term period with more appropriate species, as Eucalyptus trees when growing to a very large size may be prone to falling over and dropping branches and thus pose a health risk. Any trees that would require long term preservation must be located away from rivers and drainage lines.

**Recommended Control Methods:**

- Although it is encouraged, it is not necessary to have these established tree species removed, unless they occur within 30 m of the 1:50 year floodline of watercourses and/or wetlands. The further spreading of these species must however be prohibited.

- Where these trees occur in stands, indigenous tree species should be planted to ultimately replace these exotics. As the replacement trees establish themselves, so the invasive species should be removed.
- As these are tree species, mechanical and chemical control methods such as cut stump treatments, ring barking, frilling or an Eco-plug may be used.
- Hand pulling or hoeing may be used to control saplings.
- Cut stumps must be thoroughly treated with herbicide within 15 minutes of cutting, according to label recommendations, to minimise re-growth.
- Control measures must be undertaken before coppicing plants become too large to be controlled with foliar sprays. Coppicing stumps should be treated before coppices reach head height.
- Recommended herbicides for *Eucalyptus* species:
  - Access, Brush-Off, Chopper, Ecoplug, Garlon 4, Roundup, Timbrel, Tordon 101 and Touchdown.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

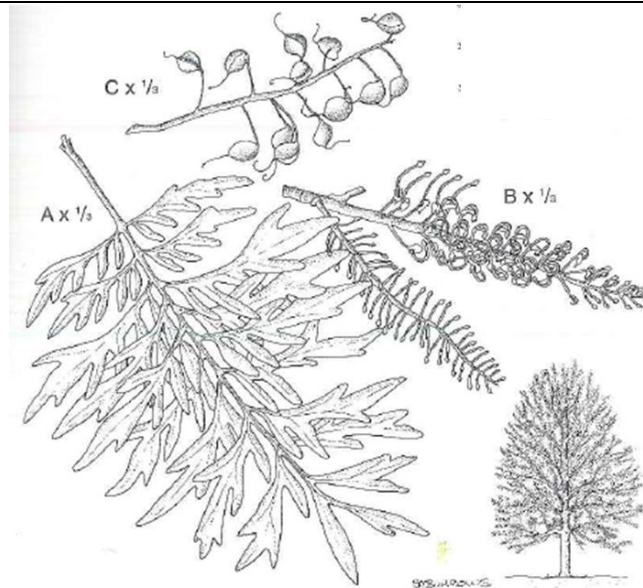


Figure 15: *Grevillea robusta* (Australian Silky Oak) (Henderson, 2001)

Recommended Control Methods:

General measures for trees will likely be effective in controlling this species:

- If the tree is too large for physical removal, consider ring-barking. This technique involves removing a ring of bark at least 25 cm wide. Peel the bark down to just below ground level, pulling outwards. If you wish to hasten the process, fell the tree to a stump that is 30cm above ground level. Then loosen the bark on the stump by hitting it with a hammer and peel the bark downwards to ground level. Any re-growth that appears must be cut off cleanly at once, to prevent nutrition from new growth reaching the roots.

- Cut-stump treatment:
  - Fell the tree, leaving a stump as flat and as close to the ground as possible, and apply herbicide.
- Basal stem treatment:
  - Paint herbicide onto the base of the tree trunk and any exposed roots, up to a height of 25 cm above ground level. In the case of multi-stemmed trees, each individual stem should be painted.
- Foliar spraying:
  - In the case of re-growth from stumps (coppicing), spray herbicide on the re-growth. Allow the re-growth to reach a height of 50 cm before treatment. Ensure that a full cover spray is achieved.
- Seek professional advice on which herbicides to use.

([www.invasives.org.za](http://www.invasives.org.za))



Figure 16: *Lantana camara* (Lantana) (Henderson, 2001)

**Recommended Control Methods:**

- Attempts to control *Lantana camara* using large grazers are detrimental. Few large browsers are entirely freed from the plants ability to cause ulcers and other lesions, especially around and in their mouths.
- Mechanical control can be effective but there must be continuous follow-up as stem and roots freely coppice.
- Burning can encourage lantana regeneration.
- Work carried out in the South African Kruger National Park showed that chemical control was cheaper and caused less disturbance resulting in higher biodiversity than mechanical control. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

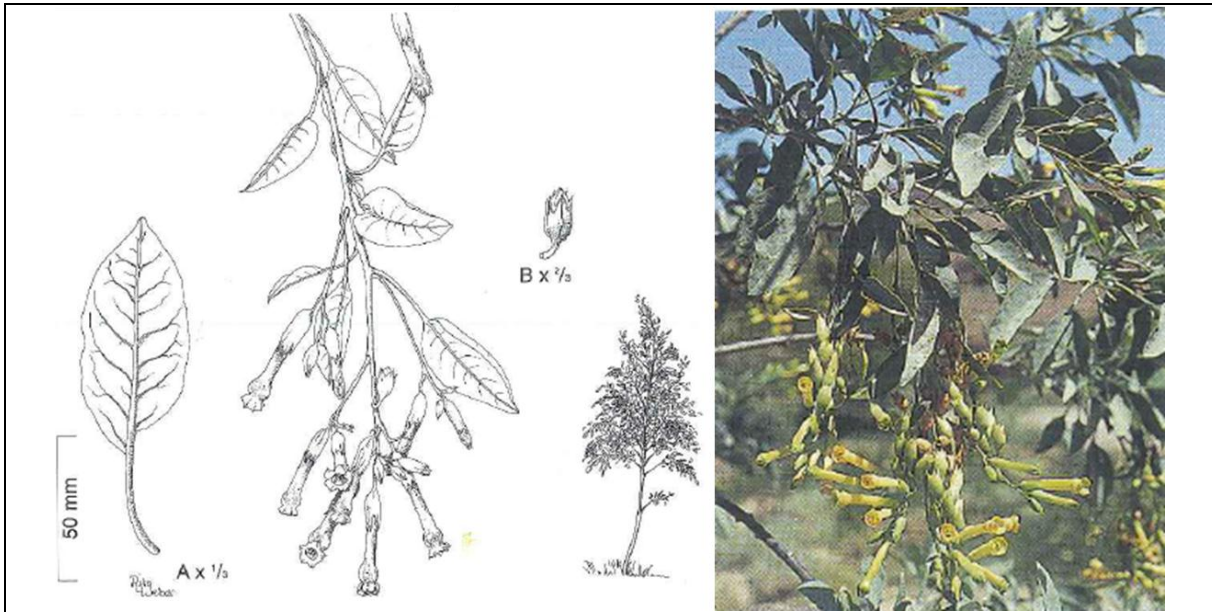


Figure 17: *Nicotiana glauca* (Wild Tobacco) (Henderson, 2001)

Recommended Control Methods:

- Seedlings and young plants can be pulled or dug out.
- Larger plants can be cut and the stumps treated with herbicide. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)



Figure 18: *Opuntia aurantiaca* (Jointed Cactus) (Henderson, 2001)

Note:

*Opuntia aurantiaca* found throughout the site, form dense mats in places making thoroughfare impossible. Eradication of this species should be a priority during construction and operational phases.

Recommended Control Methods:

- Manual control can be effective when numbers of plants are very low but must be done carefully otherwise plant fragments will re-sprout into new plants, thus exacerbating the infestation.
- Controlled burns must be well-timed and coordinated to reduce the risk of creating a bushfire, and there must be sufficient material to carry a hot fire. For maximum effect plants must be uprooted before being burned. Fire could be used for small, isolate stands but it will not penetrate large stands.
- Plants can be treated by herbicide stem injections.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

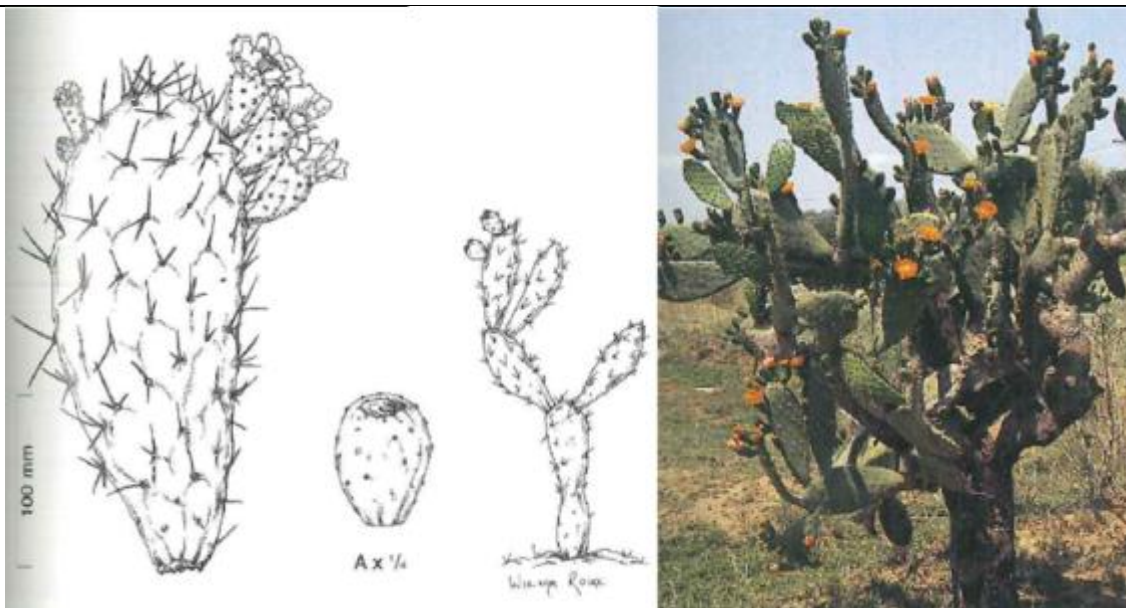


Figure 19: *Opuntia ficus-indica* (Prickly Pear) (Henderson, 2001)

Note:

*Opuntia ficus-indica* (Prickly Pear) is a problem throughout the region and can form dense, usually isolated stands within Sundays Valley Thicket. Stands should be identified and eradicated.

Recommended Control Methods:

- Manual control can be effective when numbers of plants are very low but must be done carefully otherwise plant fragments will re-sprout into new plants, thus exacerbating the infestation.
- Controlled burns must be well-timed and coordinated to reduce the risk of creating a bushfire, and there must be sufficient material to carry a hot fire. For maximum effect plants must be uprooted before being burned. Fire could be used for small, isolate stands but it will not penetrate large stands.
- The moth *Cactoblastis cactorum* can help control this plant as part of an integrated

control programme.

- Plants can be treated by herbicide stem injections.
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

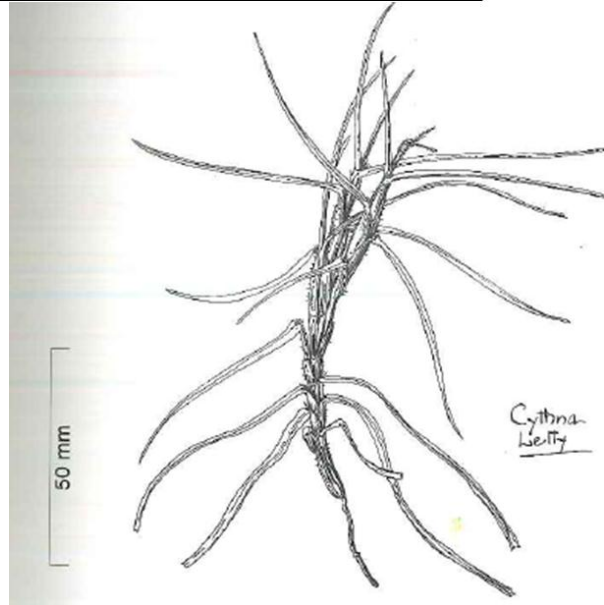


Figure 20: *Pennisetum clandestinum* (Kikuyu Grass) (Henderson, 2001)

Recommended Control Methods:

Species specific control methods could not be confirmed, a botanist should be consulted to identify the best control method for this species on site.

Identification is species specific. A botanist should be consulted to identify the alien and invasive *Pinus sp.* on site.

Recommended Control Methods:

- *Pinus* species will not re-grow if cut low to the ground and all green foliage is removed so physical control can be effective.
- Trees can be killed standing by ring barking, frilling (making deep cuts at regular intervals around the base of the tree and applying herbicide into the cuts) and tree injection. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

(BioNET-EAFRINET keys and Fact Sheets)

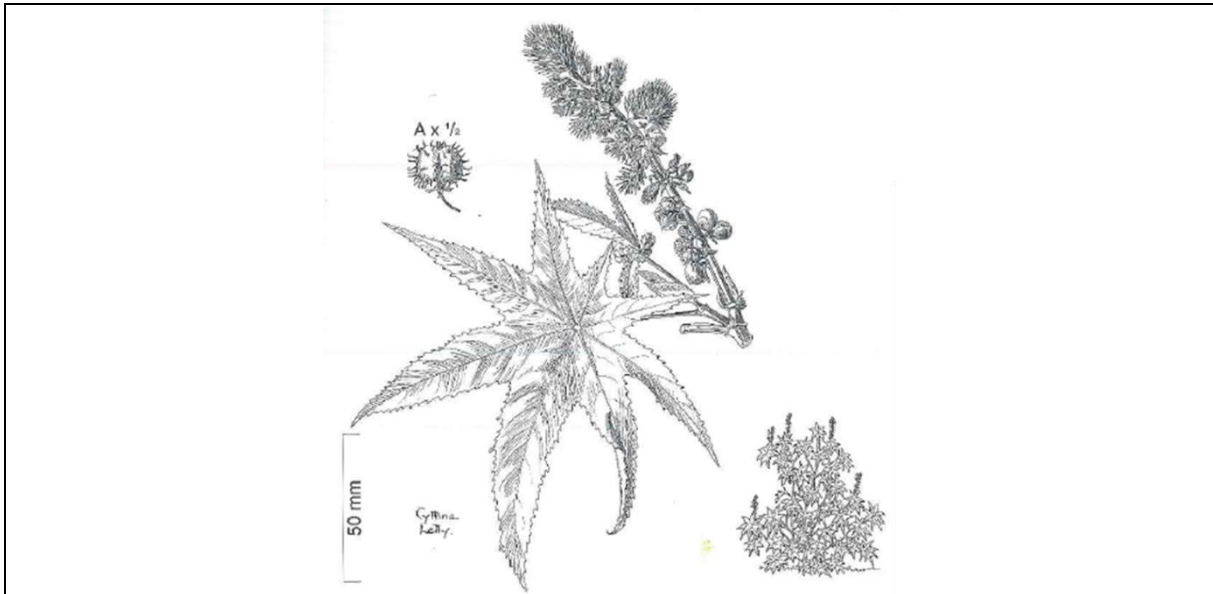


Figure 21: *Ricinus communis* (Castor Oil Plant) (Henderson, 2001)

Recommended Control Methods:

- *Ricinus communis* can be controlled through cultivation and mowing or physical uprooting. Herbicides can be effective as cut stump treatments or basal bark applications (painting herbicide onto the bark).
- When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert. Fire can be used as a management tool, but usually in combination with other methods such as chaining. Fire alone may actually increase *R. communis* densities by plant regrowth and enhanced seed germination.

(BioNET-EAFRINET keys and Fact Sheets)



**Table 12: Dust Management Plan**

<b>Aspect</b>	<b>Management Action</b>	<b>Time Period for Implementation</b>
Dust	Should nuisance dust be generated from denuded areas under windy conditions, dust suppression in the form of watering must be conducted across the denuded areas until windy conditions subside.	During construction (i.e. site preparation and planting)

## **5. MONITORING OF MANAGEMENT ACTION IMPLEMENTATION**

### **5.1 Monitoring Method**

A copy of the management actions and conditions of Environmental Authorisation will be kept on site for reference and will be used to compile a checklist to monitor compliance.

### **5.2 Responsibility**

The farm manager will be the responsible person for ensuring that the management actions detailed in Section 4 above as well as the conditions of the Environmental Authorisation are being adhered to.

### **5.3 Monitoring Frequency**

The farm manager oversees all the activities on the farm and will familiarize themselves with the management actions and conditions of Environmental Authorisation to be able to identify any potential risks to compliance during day-to-day overseeing of the activities and will put measures in place to rectify the situation to ensure compliance.

Formal internal compliance monitoring using the checklist to be compiled will also be undertaken on a monthly basis during construction and regularly during operation. The checklist must be completed during monitoring and any risks to compliance- and actions to rectify the situation noted. Actions to rectify a situation which is a risk to compliance must be implemented timeously to ensure ongoing compliance. The internal monitoring checklists and notes must be kept on file.

### **5.4 Mechanism for Monitoring Compliance**

In terms of the NEMA EIA Regulations (GNR982 of 2014), external environmental audits of the EMPr and Environmental Authorisation must be conducted, by an independent person with the relevant environmental auditing expertise, to monitor compliance with the conditions of the Environmental Authorisation and commitments in the EMPr. The frequency of these audits is to be indicated by the Competent Authority in the Environmental Authorisation.

### **5.5 Reporting**

An environmental audit report must be compiled after each environmental audit is conducted. The report must comply with the requirements laid out in Regulation 35(2) and Appendix 7 of the NEMA EIA Regulations (GNR982 of 2014), and is to be submitted to the Competent Authority.

The report is to be prepared by an independent person with the relevant environmental auditing expertise and must provide verifiable findings on the:

- Level of performance against and compliance of the project with the provisions of the Environmental Authorisation and EMPr; and
- Ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

If any shortcomings are identified during the audit, recommendations on addressing these shortcomings must be included in the environmental audit report and the EMPr amended accordingly.

When submitting an amended EMPr to the Competent Authority with the environmental audit report, the amendments (i.e. recommendations) thereto must have been subjected to a public participation process, as agreed to by the Competent Authority.

Within 7 days of the date of submission of an environmental audit report to the Competent Authority, the holder of an Environmental Authorisation must notify all potential and registered interested and affected parties of the submission of that report, and make the report available to anyone who requests the report and on a publicly accessible website, where the holder has such a website.

## **6. ENVIRONMENTAL AWARENESS PLAN**

Sustainability Initiative of South Africa (SIZA) training of all employees is conducted annually. The SIZA programme promotes sound and ongoing improvement of ethical labour practices on South African fruit farms. SIZA is a holistic programme that identifies problems that may exist, usually by way of an independent third party audit and responds with appropriate support and interventions, including awareness-raising and relevant capacity-building programmes. The SIZA programme is underpinned by a number of principles including: adoption of a single South African standard and audit process and methodology that is aligned to local law and international standards; non-duplication of audits and support for ongoing improvement of labour practices on farms.

In addition to the above the farm manager will ensure that the all employees, whether contract or permanent, are aware of the commitments of the EMPr and conditions of the Environmental Authorisation through overseeing activities and providing continuous guidance to correct any actions which may result in non-compliance in this regard.

## **APPENDIX 1**

### **ROMY ANTROBUS-WUTH CV**



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## Romy Antrobus-Wuth – Environmental Scientist

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<b>Present Appointment</b>	Environmental Scientist, Prime Resources (Pty) Ltd
<b>Date of Birth</b>	27 <sup>th</sup> February 1987
<b>Nationality</b>	South African (English Speaking)
<b>Education</b>	MSc, Conservation Biogeography, University of the Witwatersrand BSc (Hons.), Environment Ecology and Conservation, University of the Witwatersrand (2008) BSc, Zoology and Geography, University of the Witwatersrand (2007)

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<b>Synopsis</b>	Through my work as an environmental consultant I have gained valuable experience in scoping and environmental impact assessments, financial closure costing and public consultation engagement within the mining sector. I also have experience in environmental compliance auditing, as well as GIS mapping and database skills.
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### **Project History:**

#### **Environmental (Environmental Impact Assessments and Environmental Management Programmes)**

- Koorfontein Mines coal mining operations, Mpumalanga, South Africa
- Main Street 800, KaNgwane Anthracite Mine, Mpumalanga Province, South Africa
- HolGoun Energy, Canyon Springs Coal Mine, Mpumalanga Province, South Africa
- ZYL, KaNgwane South Anthracite Mine, Mpumalanga Province South Africa
- Mbila Resources, Mbila Anthracite Mine, KwaZulu-Natal Province, South Africa
- Mbila Resources, Msebe Block, KwaZulu-Natal Province, South Africa

#### **High Level Environmental Risk Assessments (GIS)**

- Ferrex Plc, Malelane Iron Ore, Mpumalanga Province, South Africa
- ZYL, KaNgwane North and South Anthracite Mines, Mpumalanga Province South Africa
- Environmental Assessment, Horizonte Minerals, Araguaia Nickel Project, Brazil

### **Mine Closure Planning**

- Interim Closure Report for the Bafokeng Rasimone Platinum Mine, North West Province

### **Environmental Audits/ Environmental Control Officer**

- Quarterly environmental compliance audits for landfill waste sites, Ekurhuleni Metropolitan Municipality, Gauteng, SA
- Monthly ECO audits for Elsmore Investments, during the construction of Elsmore Luvuvhu Camp, Makuleke Contractual Park, Kruger National Park.
- Environmental Authorisation amendment Pafuri Camp, Makuleke Contractual Park, Kruger National Park.

### **Due Diligence**

- Review of North River Resources, Lead and Zinc Project, Namibia

### **GIS**

- GIS is used as a tool to plot project developments and sensitive environments in the majority of the projects listed above.
- A good working knowledge of the SANBI BGIS database and associated documentation including among others National Freshwater Ecosystem Priority Areas (NFEPAS), Threatened Ecosystems, SANBI Mining and Biodiversity Guidelines and provincial conservation plans.

## **APPENDIX 1**

### **AMANDA MOONEY CV**





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## **Amanda Mooney – Environmental Scientist, Pr. Sci. Nat. (Env Science)**

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<b>Present Appointment</b>	Environmental Scientist, Prime Resources (Pty) Ltd
<b>Period</b>	May 2012 - Present
<b>Professional Registration</b>	South African Council for Natural Scientific Professions (SACNASP) Professional Natural Scientist Registration No. 115171
<b>Education</b>	BSc. Zoology and Biochemistry, University of Johannesburg BSc Hons. Zoology (Aquatic Health) <i>cum laude</i> , University of Johannesburg MSc. Zoology, University of Johannesburg MSc. Environmental Management, University of Johannesburg

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### **Synopsis:**

Working as an environmental scientist in the field of environmental consulting I have obtained a sound working knowledge of environmental legislation. I have also gained experience in a variety of aspects including: Environmental Authorisation processes, i.e. Basic Assessments, Environmental Impact Assessments, public participation processes and environmental management planning; rehabilitation planning; liability and closure assessments; Equator Principles and IFC Performance Standards reviews; environmental compliance auditing; water monitoring and reporting; air quality impact assessments including atmospheric dispersion modelling; as well as visual impact assessments.

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### **Project History:**

#### **Environmental Authorisation Processes (Basic Assessments, Environmental Impact Assessments, Stakeholder Engagement and Environmental Management Programmes)**

- Gold One International, Modder East Operations, New Return Water Dam, Gauteng Province, South Africa
- Altius Trading 404, KaNgwane South Anthracite Mine, Mpumalanga Province, South Africa
- Anglo American Platinum, EMP Consolidation and MPRDA alignment, Amandelbult Section, Limpopo Province, South Africa

- Main Street 800, KaNgwane Anthracite Mine, Mpumalanga Province, South Africa
- HolGoun Energy, Canyon Springs Coal Mine, Mpumalanga Province, South Africa
- Gold One International, Randfontein Surface Operations, Reclamation of Material at the Lindum Tailings Storage Facility, Gauteng Province, South Africa
- Anglo American Platinum, Amandelbult Chrome Recovery Plant, Limpopo Province, South Africa
- Koorfontein Mines, Wilmansrust Section, Mpumalanga Province, South Africa
- Samancor Chrome, Scheiding Chrome Mine, Limpopo Province, South Africa
- Southern Shaft Expansion Project at T-Project Colliery, Kinross, Mpumalanga Province, South Africa
- Mbila Resources, Msebe Opencast Anthracite Mine, KwaZulu-Natal Province, South Africa
- Mbila Resources, Mbila Anthracite Mine, KwaZulu-Natal Province, South Africa
- Gold One International, Holfontein Project, Gauteng Province, South Africa
- CHF Woolley Trust, Boschkraal Citrus Farm, Eastern Cape Province, South Africa
- Vale Fertil, Lucunga Phosphate Project, Angola

### **Stand-Alone Plans**

- Emergency Preparedness and Response Plan for Gold One International, Modder East Operations, Gauteng Province, South Africa
- Emergency Preparedness and Response Plan for T-Project Colliery, Kinross, Mpumalanga Province, South Africa
- Alien Invasive Vegetation Eradication Plan for T-Project Colliery, Kinross, Mpumalanga Province, South Africa
- Stakeholder Engagement Plan and Grievance Mechanism for T-Project Colliery, Kinross, Mpumalanga Province, South Africa
- Wetland Rehabilitation Plan for T-Project Colliery, Kinross, Mpumalanga Province, South Africa

### **Mine Closure Planning**

- Preliminary Closure Plan for the KaNgwane Anthracite Mine, Mpumalanga Province, South Africa
- Prospecting Rehabilitation Plan for the Cabinda Phosphate Project, Cabinda, Angola
- Interim Closure Plan for the Gold One International, Holfontein Project, Gauteng Province, South Africa
- Performance Assessment and Evaluation of the Quantum for Closure-Related Financial Provision for the Samancor Chrome Maresburg Prospecting Right, Limpopo Province, South Africa
- Care and Maintenance Plan for the Samancor Chrome, Western Chrome Mines, Buffelsfontein East Mine, North West Province, South Africa
- Final Rehabilitation, Decommissioning and Closure Plan for the Modikwa Platinum Mine, Limpopo Province, South Africa

### **Waste Management and Compliance Auditing**

- Waste Impact Report for the Ekurhuleni Metropolitan Municipality Weltevreden Landfill Site, Gauteng Province, South Africa
- Environmental compliance auditing of operational landfill sites, Ekurhuleni Metropolitan Municipality, Gauteng Province, South Africa
- Environmental compliance auditing of the Interwaste George and Mossel Bay depots, Western Cape Province, South Africa

### **Environmental Authorisation and Environmental Management Programme Compliance Auditing**

- Environmental Control Officer and environmental compliance auditing for the Bio2Watt Biogas Plant, Bronkhorstspuit, Gauteng Province, South Africa
- Environmental Control Officer and environmental compliance auditing for the Interwaste Klinkerstene Landfill Site, Delmas, Mpumalanga Province, South Africa

### **Water Management and Compliance Auditing**

- Water Use License Application and Integrated Waste and Water Management Plan for the Samancor Chrome, Scheiding Chrome Mine, Limpopo Province, South Africa
- Integrated Water Use Licence and GN704 compliance audit for the Modikwa Platinum Mine, Limpopo Province, South Africa
- Integrated Waste and Water Management Plan for the Gold One International, Holfontein Project, Gauteng Province, South Africa

### **Water Quality Monitoring**

- Groundwater quality monitoring and reporting for operational landfill sites, Ekurhuleni Metropolitan Municipality, Gauteng Province, South Africa
- Groundwater quality monitoring and reporting for Interwaste FG Waste Disposal Site, Olifantsfontein, Gauteng Province, South Africa
- Leachate sampling and analysis for the Weltevreden Landfill Site, Gauteng Province, South Africa

### **Environmental Review (Compliance with National Legislation)**

- Review and report on the environmental requirements associated with the activities being undertaken by Shiva Uranium, North West Province, South Africa

### **Equator Principles (EPII) / IFC / World Bank Environmental and Social Assessments**

- Environmental and social baseline report (pre-feasibility) for the Horizonte Minerals, Araguaia Nickel Project, Brazil
- Review and gap analysis preparation for T-Project Colliery, Kinross, Mpumalanga Province, South Africa

### **Due Diligence (Compliance with Equator Principles)**

- Review of Tharisa Platinum Mine on behalf of HSBC, North West Province, South Africa
- Review of Maamba Colliery's existing and proposed expansion project, Zambia
- Review of North River Resources, Lead and Zinc Project, Namibia

### **Air Quality Impact Assessments**

- Gold One International, Holfontein Project, Gauteng Province, South Africa
- Vale Fertil, Lucunga Phosphate Project, Angola

### **Visual Impact Assessments**

- Gold One International, Holfontein Project, Gauteng Province, South Africa

**APPENDIX G**

**OTHER INFORMATION**

**PROOF OF ENTITLEMENT FROM LSRWUA**



**Lower Sundays River**  
Water User Association

**Laer Sondagsrivier**  
Watergebruikersvereniging

PO Box / Posbus 10, Belmont Road, Sunland, 6115  
Tel: 042 234 0038 Fax / Faks: 042 234 0022 • E-mail / E-pos: info@sundaysriverwater.co.za  
VAT No. 4630120287

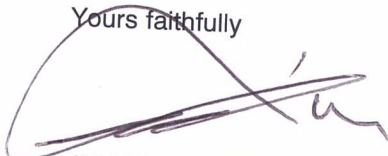
TO WHOM IT MAY CONCERN

29<sup>th</sup> January 2016

This is to certify that Woolley Trust / MSRS has the following properties with scheduled water entitlements:

PTN 5 of the Farm Landdrost Veeplaats 84	91,0 ha
PTN 3 of the Farm Landdrost Veeplaats 84	51,3 ha
	-----
	142,3 ha

Yours faithfully



JHH DU PLESSIS  
CHIEF EXECUTIVE OFFICER

