

CHAPTER 4: BIOPHYSICAL ENVIRONMENT

4.1 INTRODUCTION

This Chapter of the report presents the findings of the ecological specialist assessment conducted by Marisa Jacoby. This Chapter provides an outline of the biophysical and ecological characteristics of the study area, the vegetation condition, as well as providing an assessment of the impacts that the bush clearing has had on the biophysical environment and the potential impacts that may still be experienced.

4.2 METHODOLOGY AND APPROACH

A site visit was conducted on 24 July 2012 and 28 September 2012 to evaluate the present ecological state of the entire study area. This evaluation included the distribution, extent and condition of vegetation at the study site (i.e. plant species composition, extent of alien plant invasion, extent and nature of habitat transformation).

The impacts of the bush clearing on the ecological and biodiversity resources (ecological functioning, species diversity, biodiversity patterns, biodiversity processes) at the site have been assessed. Recommendations are made with regards to the mitigation and management of negative impacts and the enhancement of positive impacts that have been experienced, and that may potentially still occur as a result of the bush clearing and proposed agricultural development.

4.2.1 Terms of Reference

The vegetation assessment for the proposed development included the following:

- Conduct a desktop assessment of available literature in order to identify and describe the status of the vegetation in terms of applicable local and regional conservation planning frameworks (NSBA, ECBCP, STEP)
 - Include the identification and evaluation of critical biodiversity areas and corridors
- Conduct field research in order to identify, map and describe the vegetation that would have been present within the area that has been cleared; as well as providing supporting photographs
- Identify and assess impacts on conservation areas, Addo Elephant National Park
- Identify and assess current, and potential future project related impacts (both positive and negative) for the site preparation and operational phases of the project using the prescribed methodology. Where feasible include the assessment of cumulative impacts.
- Outline mitigatory measures for the management of current, as well as potential project related impacts and include, where feasible, the individuals/organizations responsible for implementation
- Outline management recommendations for the rest of the site preparation and operational phases of the project

4.2.2 Assumptions and Limitations

The vegetation type that would have occurred in the portion that has been cleared has been inferred from the vegetation currently found on the rest of the site; and through consultation of historical aerial imagery for that portion of the site.

- A plant species list was compiled for the Basic Assessment Report and thus includes the plant species found on the affected properties. While the plant species list is considered

representative of the plant diversity for the area that was cleared, it is possible that certain plant species may have been dormant at the time of the site visit and would therefore not be reflected in this list. Conversely, it is possible that not all of these species would have occurred in the area that has been cleared. However this is not expected to significantly affect the findings of this report.

- Due to the scale of mapping of the Biodiversity Planning maps consulted in this assessment, these resources are not considered to be an accurate reflection of the vegetation types and conditions at the site. While these planning resources were considered, the findings of the on-site assessment by the botanical specialist, and the detailed mapping undertaken as part of this report give a more accurate reflection of conditions at the site.
- Vegetation at the site as well as the extent of the cleared area was mapped using aerial imagery and GPS data, and the mapping was verified during site visits to the study area. While the mapping represents a good reflection of the position and extent of biophysical features at the site, discrepancies may arise due to differences in projection and GPS inaccuracies.

4.2.3 Information Sources

The ecological assessment is based on information from the following sources:

- Site visits and data collection to the affected property on 24 July 2012 and 28 September 2012.
- Plant species list for the site based on plant collections and identification conducted during the above site visits.
- A review of the Biodiversity Planning Frameworks applicable to the area:
 - STEP - Subtropical Thicket Ecosystem Planning Project,
 - NSBA - National Spatial Biodiversity Assessment,
 - ECBCP - Eastern Cape Biodiversity Conservation Plan
 - SAVeg - Vegetation of South Africa, Lesotho and Swaziland.
- Published lists of Species of Special Concern:
 - NEMA: Biodiversity Act List of Critically Endangered, Endangered, Vulnerable or Protected Species
 - National Red List for South African Plants (2009),
 - Cape Nature and Environmental Conservation Ordinance (No 19 of 1974)
 - List of Protected Tree Species under the National Forest Act (No 84 of 1998) (Government Gazette No.35648, Notice 716, 7 September 2012)
- A review of the relevant literature regarding the ecological/biodiversity features in the study area.

4.3 DESCRIPTION OF THE ECOLOGICAL FEATURES OF THE SITE

4.3.1 Physical Environment

The area that has been cleared is located on Portion 23 of Farm 104 Swanepoels Kraal and the Remainder of Farm No 650, Division Uitenhage, Sundays River Valley Municipality. The two farms measure approximately 230 hectares in combined total extent. The total area that has been cleared for proposed additional citrus production measures approximately 20.2 hectares. It is important to note that an additional 74 hectares is proposed for clearing on the affected properties. This is being addressed through a separate Basic Assessment Process.

The properties on which the clearing has taken place (Portion 23 of Farm 104 Swanepoels Kraal, and the Remainder of Farm 650, Kirkwood) form part of an existing citrus farm known as Miskruier

Citrus Farm; near the town of Kirkwood, in the Sundays River Valley Municipality. The farm is situated adjacent to the gravel road that extends between the town of Kirkwood and the R335 regional road (Zuurberg Road). The entrance to the affected properties is located directly off the gravel road, approximately 2.8 kilometres west of the intersection of the Kirkwood Road and the Zuurberg Road (R335)

The affected properties are zoned for agricultural use, and have historically been used for the stocking of game, to provide game-viewing for guests at Dung Beetle Lodge. However, due to the expansion of agricultural activities surrounding the site, socio-economic considerations have made the stocking of game on the affected properties unsustainable. That is, the illegal poaching of game has increased on the property and despite efforts to curb this, the game stock numbers on the property have systematically declined.

The two properties are currently surrounded by agricultural activities (see map 4.1 below) and are largely isolated from the ecological process and faunal movement corridors in the surrounding areas. Current land uses include commercial agriculture – predominantly orchards on the southern, western and eastern boundary of the properties, and pasture on the northern boundary. A farm dam is located on the north western boundary of the farm. The Dung Beetle Lodge is located on the eastern boundary of the affected properties. The site is located immediately south of the Kirkwood Road and the Zuurberg Road (R335).

The area beyond the immediate boundary of the properties is used for commercial farming (poultry west of the site); orchards further east of the site and intact vegetation (approximately 500 meters south east of the site). The Addo Elephant National Park is located, east of the Addo road, approximately 3km from the properties.



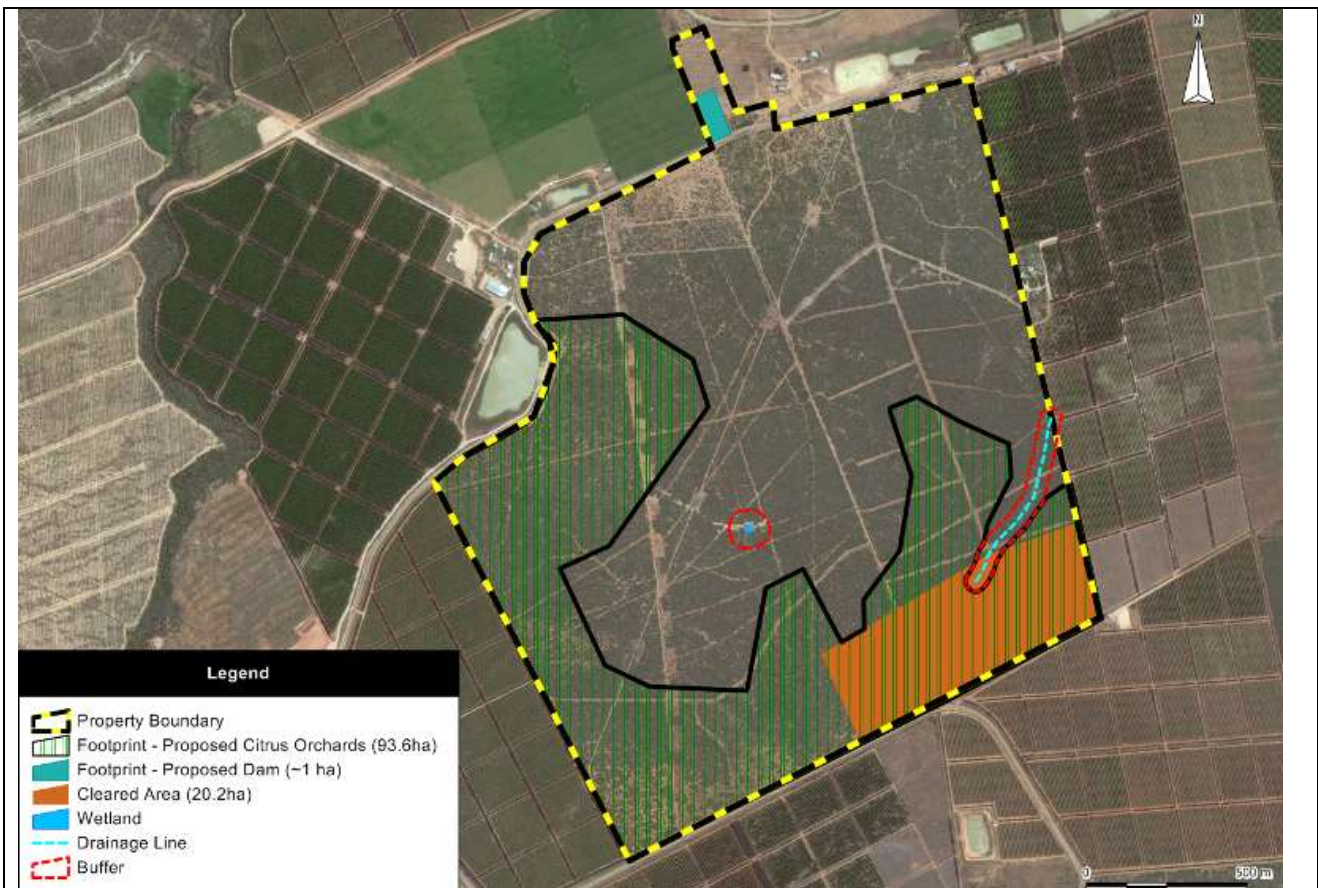
Map 4.1 Current land use practices on the properties surrounding the affected site.

While the affected properties are covered predominantly with indigenous thicket vegetation, which is largely intact, there are varying levels of degradation evident on various portions of the site, with certain portions completely transformed. The thicket is traversed by a variety of vehicle tracks, footpaths, cut-lines and clearings, as well as an Eskom Powerline servitude. Some degradation of the vegetation is evident in the southern portion of the site and along the northern boundary.

It is assumed that the portion of the properties that has been cleared would have previously been covered by Sundays Thicket. Consultation of aerial imagery of the site has revealed that portions thereof were similarly degraded and traversed by vehicle tracks, footpaths, cutlines and clearings.

The section above focuses on the entire 230 hectares which form the properties of the Miskruier farm. Subject to the receipt of a positive environmental authorisation it is important, in the context of the Section 24G application, to note the intended future use of the portions of the property surrounding the 20.2 ha cleared area.

The applicant, through a separate Basic Assessment Process, is proposing the clearing of an additional 74 ha of vegetation on the property. Of the 230 ha, 136 ha will remain zoned as agriculture and is not proposed for future expansion of citrus (approximately 60% of the properties under assessment). Should a positive environmental authorisation be received for the additional 74 ha proposed for citrus production, the 20.2ha cleared area would be surrounded by citrus production on the northern, eastern, southern and western boundary. The cleared 20.2 ha area would be isolated from the proposed 136 ha which is not proposed for additional citrus production. The two properties are largely isolated from the ecological process and faunal movement corridors in the surrounding areas, and the 20.2 ha cleared area would become even further isolated. Map 4.2 below indicates the proposed future use of the property, including the 20.2 ha cleared area.



Map 4.2 Green hatched area showing the intended areas for citrus cultivation, orange area showing the 20.2 ha cleared portion of the properties

The site is stocked with a few species of buck as well as giraffe; and a variety of avifauna frequents the site. The fauna present on the site currently form part of the Dung Beetle Lodge's facilities; offering guests walks in the natural vegetation.

4.3.2 Topography

The affected properties slope gently from a high point in the north eastern corner (167 masl) to the west, south west and south with the lowest point being at 100masl on the southern and northern boundaries. The portion that has been cleared slopes gently towards the south west. The contours for the area (see map 4.3 below) indicate a small valley, which seems to be associated with a drainage line, running from the eastern boundary towards the centre of the cleared area.



Map 4.3 Contour map showing topography of the affected properties (cleared area indicated in red).

4.3.3 Geohydrology and surface water

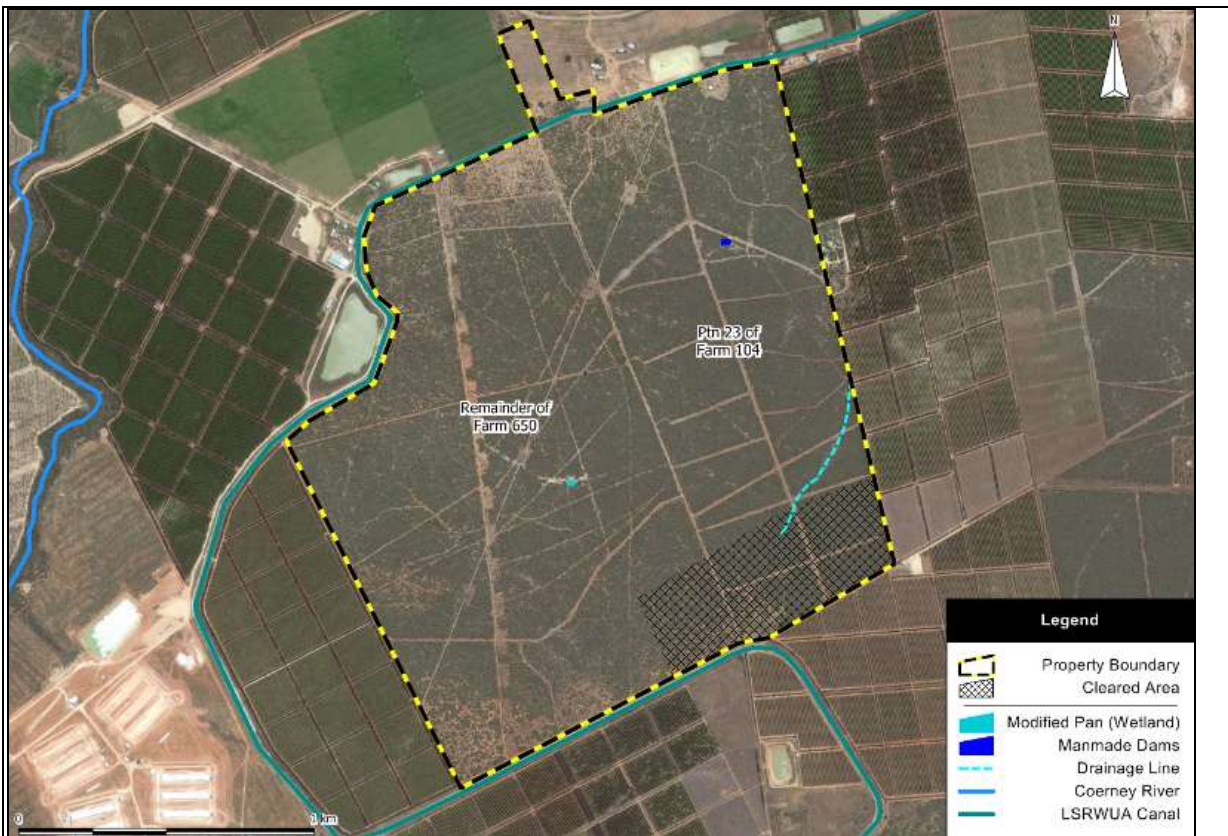
Surface runoff from the site will be dictated by the topography of the site. Runoff from the high point on the north eastern boundary is expected to drain northwards and southwards towards the lowest points at the boundaries. As the Lower Sundays River Water Users Association (LSRWUA) canal flows along the northern and southern boundaries of the site it is anticipated that this runoff will have to be diverted so as to not eventuate into the canal. Map 4.4 indicates the water resources found on the affected properties and their proximity to the cleared area in the south eastern corner.

Dams and Wetlands

Two manmade dams and one natural wetland have been located on site. The wetland is however highly modified, and at the time of the site visit, did not contain any standing water. It does however still provide habitat for wetland flora and fauna. Neither the wetland nor the manmade dams occur within the area that has been cleared. However, the wetland does occur within 500 metres of the cleared area. Any activity which occurs within 500m of a wetland triggers the need for a Water Use Licence in terms of Section 21 (c) and (i) of the National Water Act (Act 36 of 1998).

Drainage Line

A drainage line was encountered on the properties during the site visit. It flows from the eastern boundary towards the southern boundary extending into the area that has recently been cleared, where it dissipates. No riparian vegetation was encountered in this drainage line, although pug marks and desiccation cracks were evident which suggests the occasional presence of water. It is anticipated that water only flows in the drainage line after heavy rainfall events. From aerial imagery of the site it is not clear where the drainage line would have eventuated historically. It is possible that the water seeps underground or is dissipated over the flat low-lying area in the southern portion of the site.



Map 4.4 Water resources located in and around the affected properties (the cleared area is indicated by the crosshatching).

4.3.4 Vegetation

Perceived Reference State

The vegetation expected to occur on the affected properties is noted in a number of conservation planning framework documents relevant to the general area. The resolution of the planning framework mapping is limited to a landscape level, and the vegetation types and distribution on individual farms is subject to confirmation by a botanical specialist. The section below outlines the findings of the relevant conservation planning frameworks.

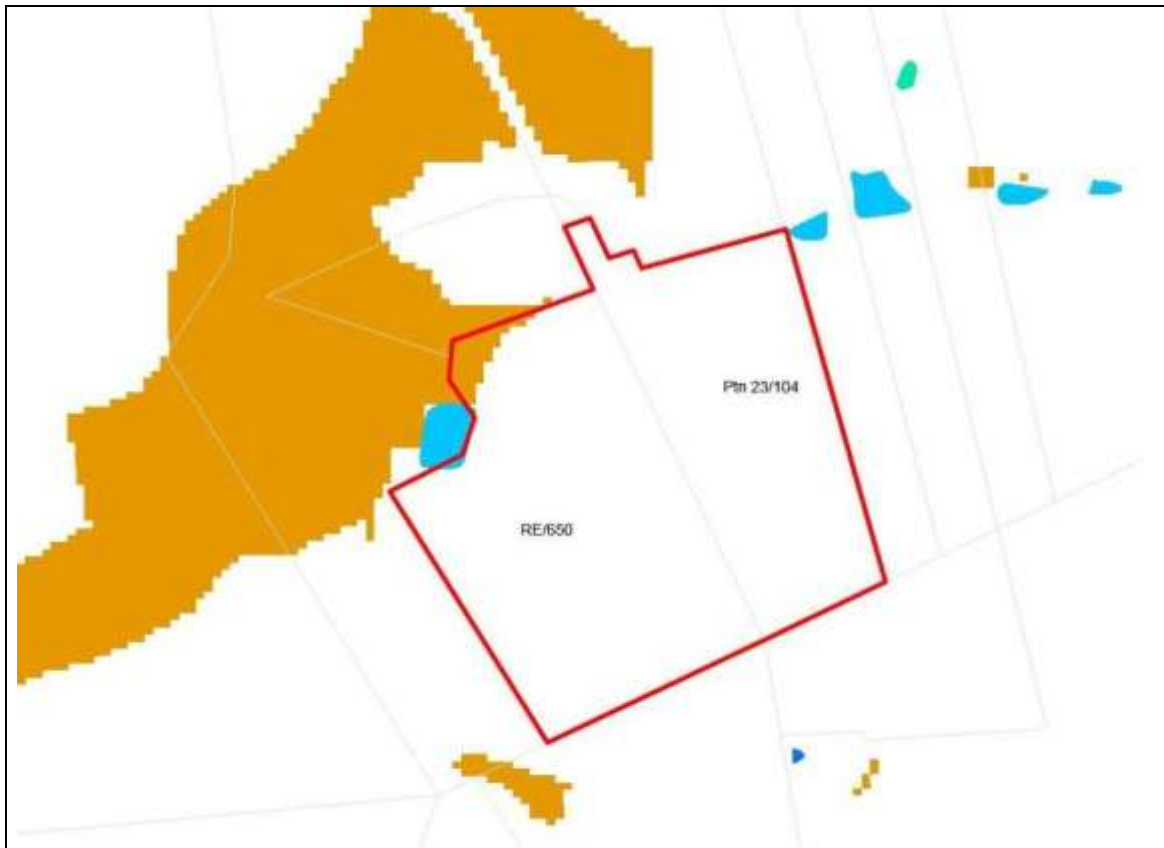
The Biodiversity Planning mapping resources for the affected properties indicate that most of the site is covered by Thicket Vegetation with two small portions along the north western and south western boundaries being classified as Alluvial Vegetation.

The site visits to the area have revealed that most of the affected properties is still dominated by near natural vegetation although a level of degradation is evident throughout most of the site, with certain portions being more heavily degraded than others.

According to the NSBA and VegMap the cleared 20.2 ha area of vegetation on the affected properties has been mapped as Sundays Thicket which is *Least Threatened* and Poorly Protected. In the STEP mapping however, this vegetation type is classified as Sundays Spekboom Thicket which is considered *Vulnerable* in the STEP report.

Two small portions in the south western and the north western corners of the site are indicated as Albany Alluvial Vegetation (NSBA and VegMap: *Endangered*), and Sundays Doringveld (STEP: *Vulnerable*) respectively. They however do not form part of this Section 24G application. The SANBI BGIS mapping resources were used to identify the remaining extent of the Albany Alluvial

Vegetation as it was delineated in 2011, with the publishing of the NEM:BA List of Threatened Ecosystems. This mapping resource is therefore considered to be more accurate as it is based on a more recent assessment. It indicates a small portion along the north western boundary as Albany Alluvial Vegetation, but nothing in the southern portion of the properties (See map 4.5 below).



Map 4.5 Remaining extent of the Albany Alluvial Vegetation (orange) on and surrounding the affected properties (indicated by the red line) (taken from SANBI BGIS mapping resources - <http://bgis.sanbi.org>, accessed on 6 November 2012).

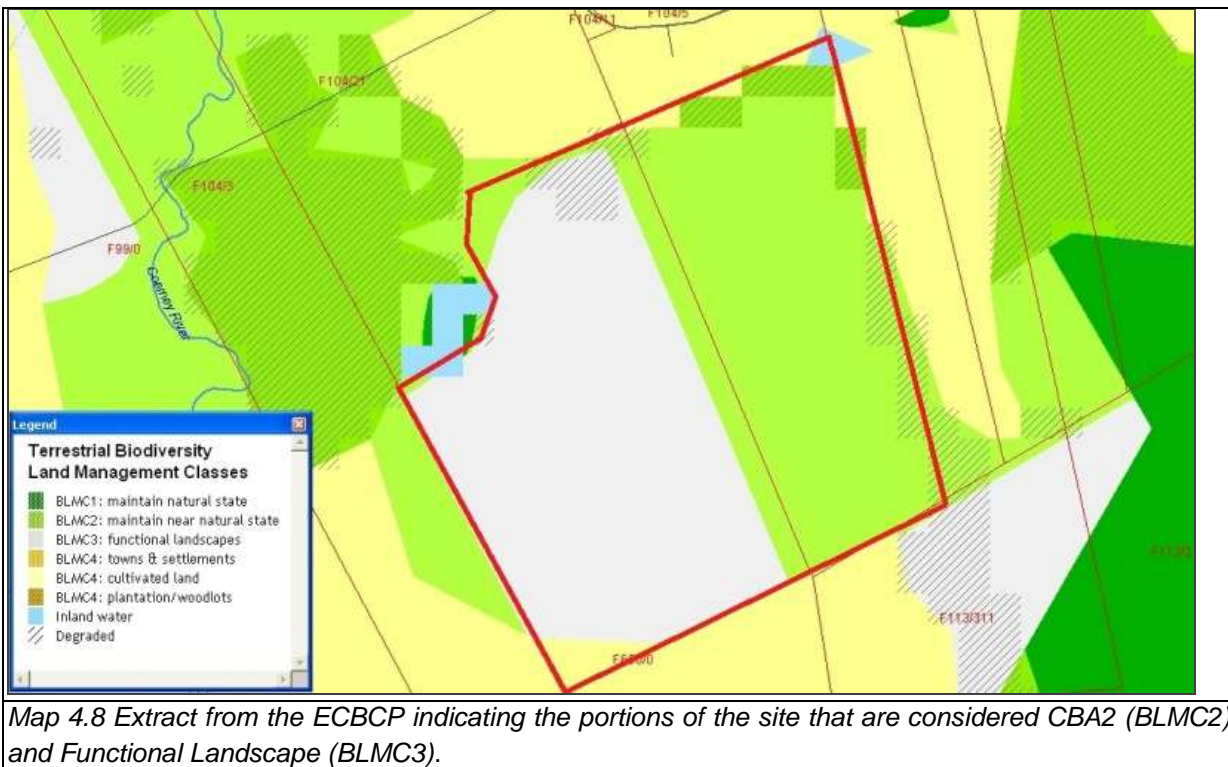


Map 4.6 Vegetation mapping of the site under assessment according to the VegMap and NSBA mapping resources.



Map 4.7 Vegetation mapping of the site under assessment according to the STEP mapping resources.

According to the ECBCP (Eastern Cape Biodiversity Conservation Plan) the majority of the Remainder of Farm 650 is classed as “*Functional Landscape*” and has been assigned the Biodiversity Land Management Class of *BLMC3*. A triangular portion in the south western corner is designated as “*Cultivated Land*” (*BLMC 4*). A small strip along the eastern boundary of the Remainder of Farm 650 as well the whole of Portion 23 of Farm 104 have been classed as *BLMC2* (CBA 2: corridor). The northern and eastern boundary of this portion is shown to be degraded, a portion of which falls within the cleared 20.2 ha area.



Vegetation on the affected properties (Present Ecological State)

One of the key limitations of this assessment is to accurately identify the vegetation that has been affected by the clearing of the 20.2 ha area. The area has been cleared and the vegetation has been stockpiled in rows.

In order to overcome this limitation in the assessment process, the vegetation type that would have occurred in the portion that has been cleared has been inferred from what is currently found on the rest of the site as well as through consultation of historical aerial imagery (See map 4.9). Thus, the section below describes what occurs over the entire site and summarises what is anticipated to have occurred on the cleared 20.2 ha area.

Sundays Spekboom Thicket

The overall vegetation type present on the properties was Sundays Spekboom Thicket. Species diversity within the Thicket vegetation is not exceptionally high. In addition, portions of the vegetation has been degraded and transformed (by cutlines, vehicle tracks and footpaths) and, to a small degree, invaded by weed species; however, overall it is still relatively intact. There is also a lack of connectivity between the Thicket vegetation on site and the nearest indigenous vegetation due to the established agricultural lands that surround the properties.

Typical Sundays Spekboom Thicket species were identified within this vegetation including *Schotia afra* var. *afra*, *Euclea undulata* and *Pappea capensis* as well as a number of small succulent species for example *Euphorbia ledienii* and a few *Crassula* and *Mesembryanthemaceae* species. *Portulacaria afra* was ubiquitous throughout the entire site.

Degraded Area

The vegetation encountered on portions of the affected properties which have been mapped in the relevant planning frameworks as Albany Alluvial Vegetation (VegMap) and Sundays Doringveld (STEP) does not fit the description given in those frameworks.

The northern portion is clearly degraded with a high presence of grasses and a few low shrubs. This portion of the site is located close to an old kraal. Thus it is likely that this area was transformed by historical land use practices (grazing/firewood collection).

The southern portion has a higher species diversity than the northern portion, however, the number of species present in this portion is relatively low when compared to the rest of the site. A slight change in species composition is also evident. Species such as *Cynodon dactylon*, *Acacia karoo* and *Azima tetraantha* which are indicators of disturbance and bush encroachment were found in abundance in this portion of the site. The high presence of succulents, in particular rare endemics like *Haworthia sordida*, which is reportedly associated with this vegetation type, is not evident in these portions. This loss of species may indicate that the changes evident in this portion of the site are as a result of disturbance or degradation, which could have been caused by overgrazing or some other historical land-use practice. This conclusion is supported by the fact that the ECBCP indicates this southern portion as cultivated land (*BLMC4*) and functional landscape (*BLMC3*). A portion of which falls within the cleared 20.2 ha area. Based on aerial imagery there was a portion, approximately 2 hectares in extent, that fell within the cleared area that may have been similar in composition and condition to this southern degraded area.

Transformed Areas

Portions of the affected properties have been cleared historically for agricultural landuse activities (grazing, cutlines, vehicle tracks etc) as well as for the erection of the Eskom powerline. These areas have reverted to grass and weedy vegetation.

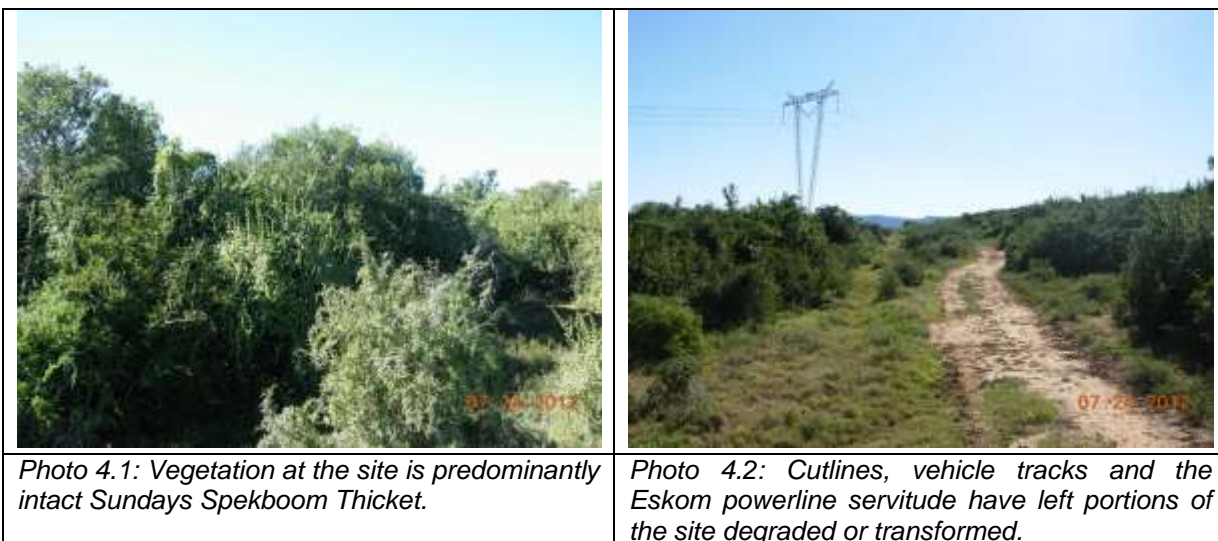




Photo 4.3: The vegetation in the southern degraded portion is species poor and has a high presence of *Acacia karoo*.

Photo 4.4: The vegetation in the northern degraded portion is mostly grassy with a few low growing shrubs.

Modified Pan and Drainage Line

A natural wetland feature was encountered on the affected properties during the initial site visit. It had no standing water at the time of the site visit and only two plant species (*Schoenoplectus decipiens* and *Marsilea* sp.) were identified in the pan that would suggest the occasional presence of standing water. It is anticipated that this feature would contain water only after heavy rainfall events. It would seem that the pan has been highly modified and its function is thus likely to have been compromised to some extent. It would however still provide habitat for wetland faunal and floral species which improves its conservation value. In line with the guidelines as stated in the Eastern Cape Biodiversity Conservation Plan (ECBCP) it is recommended that a buffer of 50 metres be applied from the boundary of this feature so as to maintain the ecological functioning of the pan. Any activity which occurs within 500m of a wetland triggers the need for a Water Use Licence in terms of Section 21 (c) and (i) of the National Water Act (Act 36 of 1998). As the cleared area is within 500 meters of this wetland, an application to this effect will most likely have to be submitted to the Department of Water Affairs if the proposed development receives Environmental Authorisation.

A drainage line was also encountered on the affected properties. It flows from the eastern boundary towards the southern boundary and dissipates in the area that has recently been cleared. No riparian vegetation was encountered in this drainage line, although pug marks and cracking of the surface was evident which suggests the occasional presence of water. It is anticipated that water only flows in the drainage line after heavy rainfall events. From aerial imagery of the site it is not clear where the drainage line would have eventuated historically. It is possible that the water seeps underground or is dissipated over the flat low-lying area in the southern portion of the site. In line with the guidelines as stated in the Eastern Cape Biodiversity Conservation Plan (ECBCP) it is recommended that a 32 metre buffer be applied around this drainage line so as to maintain the ecological functioning of the drainage line. Because the vegetation surrounding the southernmost extent of the drainage line has already been cleared it is recommended that which has been allowed to remain be excluded from any further development and efforts be made to rehabilitate the thicket vegetation within the 32 metre buffer area.

RECOMMENDATIONS

Modified Pan

It has been proposed that the wetland be retained and that a 50 metre no development buffer be applied so as to preserve ecological functioning, in line with the recommendations of the Eastern Cape Biodiversity Conservation Plan (ECBCP). The modified pan does not fall within the area that

has been cleared and therefore is not directly impacted upon by the clearing of the intact vegetation. However, any activity that is undertaken within 500m of a wetland requires a Water Use Licence in terms of Section 21 (c) and (i) of the National Water Act. Since a portion of the cleared area falls within this 500m radius application for a Water Use Licence will have to be made retrospectively.

Drainage Line

In line with the guidelines as stated in the Eastern Cape Biodiversity Conservation Plan (ECBCP) it is recommended that a 32 metre no development buffer be applied around the drainage line so as to maintain the ecological functioning thereof. Because the vegetation surrounding the southernmost extent of the drainage line has already been cleared it is recommended that an area of 32 metres either side of the drainage line be rehabilitated using Thicket vegetation removed from other parts of the site.



Photo 4.5: Modified pan (wetland) encountered in the central portion of the site.



Photo 4.6: The drainage line encountered at the site where it enters the cleared portion of the site.



Map 4.9 Vegetation on the affected properties indicating what the vegetation is most likely to have been on the area that has been cleared (shown by crosshatching).

Cleared Area

It would seem from aerial imagery of the site, as well as inspection of the piles of cleared vegetation that have been left on site, that the cleared portion of the site would have been covered by Sundays Spekboom Thicket (approximately 18 hectares) prior to being cleared. One can infer from examining aerial imagery of the site that the vegetation in this portion would have been relatively intact. However, based on the imagery there was a portion approximately 2 hectares in extent which seems to have been degraded, perhaps due to historical agricultural activities, as well as a few vehicle tracks and cutlines which ran through this portion of the site (see Map 4.10 below). Unfortunately the level of invasion of alien vegetation is not discernible through aerial imagery; therefore a more accurate description of the condition of the vegetation in this regard, in this portion prior to being cleared, is not possible. It is assumed that the condition of the vegetation in the cleared area would have been similar to that found on the rest of the site. Therefore the description given above for the affected properties should sufficiently describe the vegetation that is expected to have occurred on the cleared area, prior to it being cleared.



Photo 4.7: View of the cleared area from the eastern corner thereof facing west.



Photo 4.8: View of the cleared area from the western corner thereof facing east.



Map 4.10 Aerial image of the area that has been cleared indicated by the orange line. The area measures approximately 20.2 ha, most of which seems to have been Sundays Spekboom Thicket.

Plant Species Check List

Table 4.1 below represents the plant species recorded on the affected properties during the site visits and collection. It is possible that certain species may have been overlooked due to their irregular distribution or seasonal dormancy, however this is not considered to significantly impact on the findings of this report.

It is assumed that many of these species would have occurred within the cleared area prior to it being cleared.

Table 4.1: Plant Species Check List for the study area.

<u>Family Name</u>	<u>Scientific Name</u>	<u>Status</u>	<u>Legislation</u>
Malvaceae	<i>Abutilon sonneratianum</i>		
Fabaceae	<i>Acacia karoo</i>	Bush Encroacher	CARA
Asphodelaceae	<i>Aloe africana</i>	Protected Genus	CNECO
Asphodelaceae	<i>Aloe ferox</i>		
Asteraceae	<i>Arctotheca calendula</i>		
Asparagaceae	<i>Asparagus africanus</i>		
Asparagaceae	<i>Asparagus asparagoides</i>		
Asparagaceae	<i>Asparagus burchelli</i>		

Asparagaceae	<i>Asparagus racemosus</i>		
Asparagaceae	<i>Asparagus sp.</i>		
Asparagaceae	<i>Asparagus striatus</i>		
Chenopodiaceae	<i>Atriplex semibaccata</i>		
Salvadoraceae	<i>Azima tetracantha</i>	Bush Encroacher	CARA
Acanthaceae	<i>Barleria irritans</i>		
Acanthaceae	<i>Blepharis capensis</i>		
Amaryllidaceae	<i>Brunsvigia gregaria</i>	Protected Family	CNECO
Asphodelaceae	<i>Bulbine frutescens</i>		
Asphodelaceae	<i>Bulbine narcissifolia</i>		
Capparaceae	<i>Capparis sepiaria</i>		
Apocynaceae	<i>Carissa bispinosa</i>		
Scrophulariaceae	<i>Chaenostoma polyanthum</i>		
Chenopodiaceae	<i>Chenopodium sp.</i>		
Asteraceae	<i>Cineraria lobata</i>	Near Threatened	Red List
Commelinaceae	<i>Commelina sp.</i>		
Crassulaceae	<i>Cotyledon velutina</i>		
Crassulaceae	<i>Crassula cultrata</i>		
Crassulaceae	<i>Crassula expansa</i>		
Crassulaceae	<i>Crassula glomerata</i>		
Crassulaceae	<i>Crassula muscosa</i>		
Crassulaceae	<i>Crassula ovata</i>		
Crassulaceae	<i>Crassula pellucida</i>		
Crassulaceae	<i>Crassula perforata</i>		
Crassulaceae	<i>Crassula spathulata</i>		
Asteraceae	<i>Curio radicans</i>		
Hyacinthaceae	<i>Cyanella lutea</i>		
Poaceae	<i>Cynodon dactylon</i>		
Cyperaceae	<i>Cyperus rubicundus</i>		
Lobeliaceae	<i>Cyphia sylvatica</i>		
Mesembryanthemaceae	<i>Delosperma echinatum</i>	Protected Family	CNECO
Hyacinthaceae	<i>Drimia capensis</i>		
Mesembryanthemaceae	<i>Drosantheum hispidum</i>	Protected Family	CNECO
Apocynaceae	<i>Duvalia sp.</i>	Possibly Rare / Protected Former Family	Red List / CNECO
Poaceae	<i>Eragrostis curvula</i>		
Poaceae	<i>Eragrostis obtusa</i>		
Ebenaceae	<i>Euclea undulata</i>	Bush Encroacher	CARA
Euphorbiaceae	<i>Euphorbia ledieni</i>		
Euphorbiaceae	<i>Euphorbia mauritanica</i>		

Asteraceae	<i>Felicia filifolia</i>		
Asteraceae	<i>Felicia sp.</i>		
Aizoaceae	<i>Galenia secunda</i>		
Orchidaceae	Geophyte	Protected Family	CNECO
Malvaceae	<i>Grewia robusta</i>		
Celastraceae	<i>Gymnosporia polycantha</i>		
Malvaceae	<i>Hermannia althaeifolia</i>		
Malvaceae	<i>Hermannia althaeoides</i>		
Convolvulaceae	<i>Ipomoea sp.</i>		
Scrophulariaceae	<i>Jamesbrittenia microphylla</i>		
Cucurbitaceae	<i>Kedrostis nana</i>		
Hyacinthaceae	<i>Lachenalia ensifolia</i>		
Hyacinthaceae	<i>Ledebouria ensifolia</i>		
Brassicaceae	<i>Lepidium africanum</i>		
Lamiaceae	<i>Leucas capensis</i>		
Lobeliaceae	<i>Lobelia sp.</i>		
Solanaceae	<i>Lycium cinereum</i>		
Solanaceae	<i>Lycium ferocissimum</i>		
Mesembryanthemaceae	<i>Malephora sp.</i>	Protected Family	CNECO
Marsileaceae	<i>Marsilea sp.</i>		
Mesembryanthemaceae	<i>Mesembryanthemum aitonis</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Mestoklema tuberosum</i>	Protected Family	CNECO
Scrophulariaceae	<i>Nemesia fruticans</i>		
Oleaceae	<i>Olea europea subsp. africana</i>		
Cactaceae	<i>Opuntia ficus-indica</i>	Category 1	CARA
Poaceae	<i>Panicum deustem</i>		
Poaceae	<i>Panicum maximum</i>		
Sapindaceae	<i>Pappea capensis</i>		
Geraniaceae	<i>Pelargonium odoratissimum</i>		
Geraniaceae	<i>Pelargonium peltatum</i>		
Asteraceae	<i>Pentzia incana</i>		
Plumbaginaceae	<i>Plumbago auriculata</i>		
Portulacaceae	<i>Portulacaria afra</i>		
Ptaeroxylaceae	<i>Ptaeroxylon obliquum</i>		
Pteridaceae	<i>Pteris sp.</i>		
Celastraceae	<i>Putterlickia pyracantha</i>		
Bignoniaceae	<i>Rhigozum obovatum</i>		
Vitaceae	<i>Rhoicissus digitata</i>		
Mesembryanthemaceae	<i>Ruschia rigens</i>	Protected Family	CNECO
Dracaenaceae	<i>Sansevieria hyacinthoides</i>		
Apocynaceae	<i>Sarcostemma viminale</i>	Protected Former Family	CNECO

Cyperaceae	<i>Schoenoplectus decipiens</i>		
Fabaceae	<i>Schotia afra</i>		
Rhamnaceae	<i>Scutia myrtina</i>		
Anacardiaceae	<i>Searsia laevigata</i>		
Anacardiaceae	<i>Searsia longispina</i>		
Anacardiaceae	<i>Searsia pterota</i>		
Scrophulariaceae	<i>Selago cinerea</i>		
Solanaceae	<i>Solanum tomentosum</i>		
Lamiaceae	<i>Stachys aethiopica</i>		
Iridaceae	<i>Tritonia dubia</i>	Protected Family	CNECO
Rutaceae	<i>Vepris lanceolata</i>		
Viscaceae	<i>Viscum obscurum</i>		
Zygophyllaceae	<i>Zygophyllum morgsana</i>		

Plant Species of Special Concern

A number of plant species of special concern were found to occur on the affected properties during the site visit. It has been recommended that, if Environmental Authorisation is granted for the clearing of the 74 hectares, which forms part of a separate assessment process, a floral and faunal search and rescue operation be conducted prior to commencement of vegetation clearing and that all species of special concern be translocated into the intact thicket vegetation which will not be cleared from the site. The removal of species listed as Protected in terms of the Cape Nature and Environment Conservation Ordinance (19 of 1974) require a permit be obtained from DEDEAT prior to the removal, transportation or destruction thereof. The plant species of special concern identified on the affected properties during the site visit are listed in table 4.2 below. No species contained in the NEM: BA List of Protected Species were found on the site.

It is assumed that some of these species of special concern had occurred within the vegetation prior to it being cleared. No permits for their removal would have been obtained from DEDEAT prior to the area being cleared.

Table 4.2 Species of Special Concern recorded at the site during the site visit.

<u>Family Name</u>	<u>Scientific Name</u>	<u>Status</u>	<u>Legislation</u>
Amaryllidaceae	<i>Brunsvigia gregaria</i>	Protected Family	CNECO
Apocynaceae	<i>Sarcostemma viminale</i>	Protected Former Family	CNECO
Apocynaceae	<i>Duvalia</i> sp.	Possibly Rare / Protected Former Family	Red List / CNECO
Asphodelaceae	<i>Aloe africana</i>	Protected Genus	CNECO
Asteraceae	<i>Cineraria lobata</i>	Near Threatened	Red List
Iridaceae	<i>Tritonia dubia</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Malephora</i> sp.	Protected Family	CNECO
Mesembryanthemaceae	<i>Mesembryanthemum aitonis</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Drosantherum hispidum</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Delosperma echinatum</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Mestoklema tuberosum</i>	Protected Family	CNECO
Mesembryanthemaceae	<i>Ruschia rigens</i>	Protected Family	CNECO

Orchidaceae	Geophyte	Protected Family	CNECO
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Only one Declared Weed (in terms of the Conservation of Agricultural Resources Act 43 of 1983) was found on the affected properties during the site visits. Category 1 invaders must be removed from the site and follow-up clearing in intact vegetation should be conducted. A few species found at the site are declared indicators of Bush Encroachment in terms of CARA. See table 4.3 below for the list of CARA listed species recorded at the site.

It is assumed that some of these CARA listed species had occurred within the vegetation prior to it being cleared. By removing Category 1 plants from the portion of the farm that has already been cleared the applicant has complied with the requirements of CARA.

Table 4.3 CARA listed species recorded at the site during the site visit.

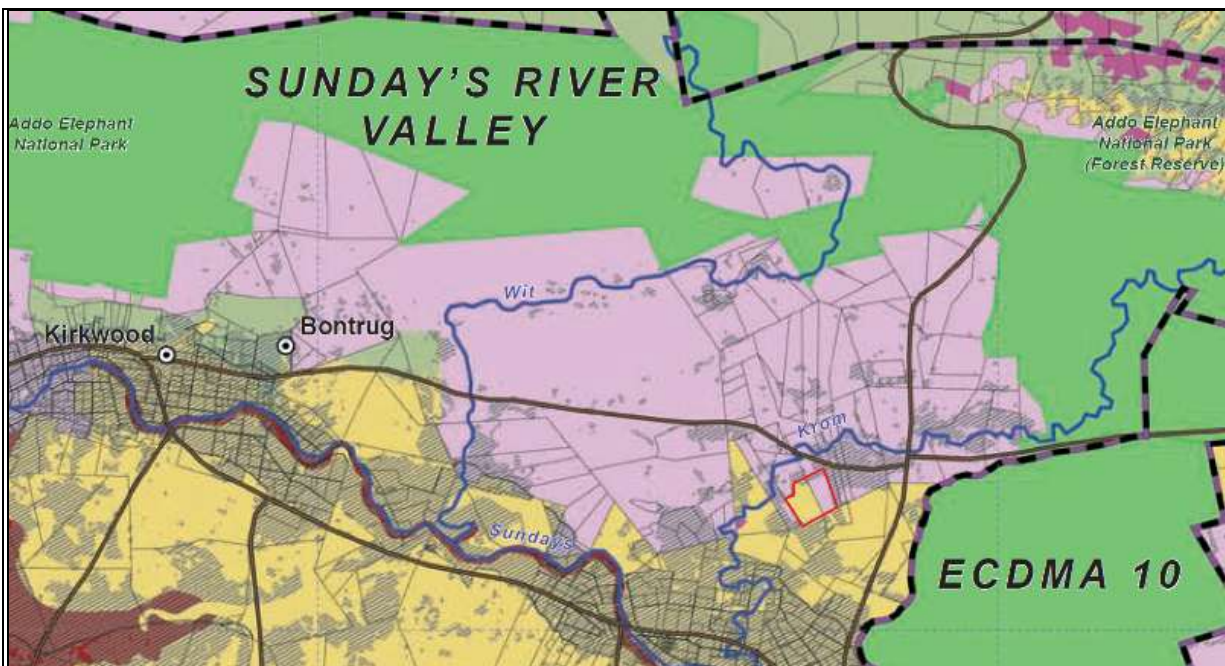
<u>Family Name</u>	<u>Scientific Name</u>	<u>Status</u>	<u>Legislation</u>
Cactaceae	<i>Opuntia ficus-indica</i>	Category 1	CARA
Ebenaceae	<i>Euclea undulata</i>	Bush Encroacher	CARA
Fabaceae	<i>Acacia karoo</i>	Bush Encroacher	CARA
Salvadoraceae	<i>Azima tetraantha</i>	Bush Encroacher	CARA

4.3.5 Biodiversity Patterns & Processes (Ecological Corridors & Critical Biodiversity Areas)

Natural ecological corridors such as rivers and mountains sustain the natural landscape by providing pathways for faunal and floral movement and by protecting water catchments (ECBCP, 2007).

The Biodiversity Planning Resources for the area show that the site under assessment falls within an Ecological Corridor (STEP) as well as a Critical Biodiversity Area (ECBCP).

The Ecological Corridor described in STEP extends from Bontrug (near Kirkwood) in the west to the Addo Elephant National Park in the east (See map 4.11). Portion 23 of Farm 104 falls within this corridor. However the farms adjacent to this portion have, subsequent to the publishing of the STEP mapping resources, been transformed into agricultural lands. Therefore the vegetation on the affected properties has been isolated from the rest of the STEP corridor.



Map 4.11 A portion of the affected properties (indicated in Red) falls within a STEP Corridor (indicated in Purple).

The portions to the east and northwest of the affected properties that are indicated as CBA 2 (BLMC2) in the ECBCP mapping resources (see Map 4.8) have been transformed into orchards. Thus the area designated as CBA2 on the affected properties, and more specifically on the cleared area, has been completely isolated from the surrounding indigenous vegetation. As such the cleared area would have been unable to function as it is intended to – as an ecological process corridor. The affected properties do however still provide important faunal and floral habitat for indigenous species. The applicant has indicated that approximately 50% of the area that has been designated as a CBA 2 on the affected properties will not be developed / transformed for agriculture.

4.3.6 Conservation Targets

The Subtropical Thicket Ecosystem Programme (STEP) has set conservation targets for all of the vegetation types assessed in the programme. The conservation target for Sundays Spekboom Thicket was set at 18 % of the original extent of the vegetation type.

In order for this target to be met on the affected properties approximately 40 ha of intact Sundays Spekboom Thicket would have to be conserved. It is proposed that approximately 136ha (60%) be conserved on the affected properties. Therefore, while the conservation target was not directly achieved on the portion that was cleared (ie. 100% of 20 hectares was cleared), it is anticipated that it will be met through the conservation of the Sundays Spekboom Thicket on the rest of the site.

4.3.7 Conservation Value

Conservation Value in the context of this Chapter, integrates the biodiversity and ecosystems services benefits that a particular vegetation type or community could have. i.e. the greater the benefits that a particular vegetation type could provide, the higher the Conservation Value. These benefits may include the following: serving as biodiversity (species) reservoirs, providing habitat for indigenous species, providing habitat for species of special concern, or providing ecosystems services (e.g. carbon sequestration).

The protection of vegetation communities which are representative of natural vegetation assemblages that have a very limited remaining extent is another important potential benefit provided by certain intact vegetation stands. This benefit is integrated into the Conservation Value term by giving due consideration to the *Ecosystem Status* designations outlined in the *STEP* documentation.

Conservation value is diminished by factors that reduce the potential benefits that vegetation may provide e.g. loss of species / diversity, invasion by exotics, loss of connectivity, habitat transformation or degradation. Table 4.4 on the following page provides a summary of the Conservation Value categories employed in this report.

Table 4.4 Conservation Value categories used in this report.

Conservation Value	Benefits
Very High	Irreplaceable natural area.
High	Retention / conservation will provide many benefits.
Medium	Retention / conservation will provide some benefits.
Low	Retention / conservation will provide minor benefits.
Very Low	Retention / conservation will provide negligible benefits.
None	Retention / conservation will provide no benefits.

Sundays Spekboom Thicket

The **intact Sundays Spekboom Thicket** is considered of Medium Conservation Value due to the fact that it provides habitat for indigenous species and species of special concern; as well as for its role in providing ecosystem services (eg. carbon sequestration). The conservation value of this vegetation on the affected properties is somewhat diminished by the fact that the vegetation on the surrounding properties has been transformed, thus isolating the indigenous vegetation on the affected properties.

The conservation of this intact vegetation patch will provide some benefits, and is therefore considered to have a Medium Conservation Value.

Degraded Area

The **degraded Sundays Spekboom Thicket** is considered of Low Conservation Value as it may provide some habitat for indigenous species and species of special concern. However, due to its degraded nature it has low species diversity and has lost some of its ability to support ecosystem functioning. In addition the vegetation on surrounding properties has been transformed, thus isolating the indigenous vegetation on the affected properties.

The conservation of this vegetation will provide minor benefits, and is therefore considered to have a Low Conservation Value.

Transformed Areas

Transformed areas at the site are of Very Low Conservation Value. They represent areas that have few or no indigenous plant species. Some of these areas are characterised by the presence of structures such as kraals, as well as areas that have been cleared of natural vegetation for the grazing of livestock.

The conservation of these areas would provide negligible benefits and is thus considered to have a Very Low Conservation Value.

Modified Pan and Drainage Line

The **Wetland Habitat** associated with the water bodies (modified pan and drainage line) on the site is considered of Low Conservation Value. Due to the current disturbances within the study area, and the lack of any important riparian vegetation or sensitive plant species associated with the drainage line, the conservation value for the drainage line would be rated as *Low*.

With regards to the modified pan, this provides unique habitat within the landscape, however, due to the degraded nature of the wetland this is also considered to be of Low Conservation value.

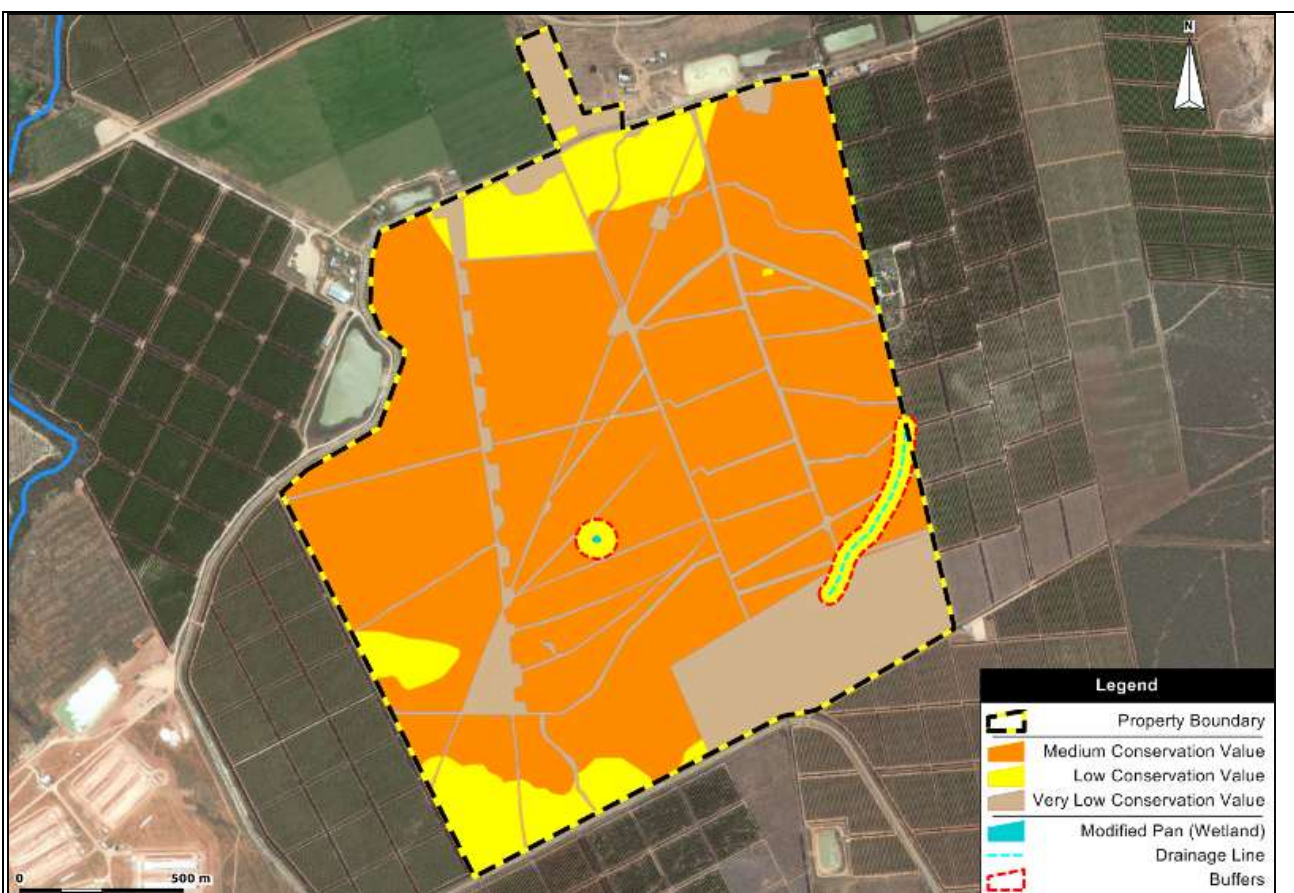
The conservation of the wetland and drainage line will provide some benefits and is therefore considered to have Low Conservation Value.

Cleared Area

It is assumed that, **prior to being cleared**, most of this portion of the site would have had intact Sundays Spekboom Thicket. Therefore, it would have had a Medium Conservation Value.

However, in its **current state** the cleared area provides little or no benefits and therefore is considered to be of Very Low Conservation Value.

The conservation value assigned to the vegetation on the affected properties is indicated on map 4.12 below.



Map 4.12 Conservation value of the vegetation on the affected properties.

4.4 ASSESSMENT OF ALTERNATIVES

There are two alternative ways to proceed with the area that has been cleared. The No-Go alternative would entail the restoration of the 20 hectares that have been cleared to Sundays Spekboom Thicket. The preferred alternative would involve continuing with the expansion of the citrus farming operation as described in Chapter 2 of this Report, including the establishment of infrastructure and citrus orchards on the cleared area.

4.4.1 No – Go Alternative (Thicket Restoration)

The no-go option would entail the restoration of the thicket that would have occurred on the cleared portion of the properties. If this were to be the case, the applicant would have to restore the Thicket to what it would have originally been, or as close to it as is possible. Restoration implies the return of ecological integrity and the full pattern of biological complexity and diversity, together with the ecosystem processes that maintain this pattern (Mills et al, 2007).

Thicket restoration is notoriously difficult to do successfully due to the fact that many thicket plant species are relatively slow growing and there is also very little evidence of natural recovery of degraded thicket (Powell et al, 2006). Restoration, therefore, requires active intervention to establish shrubs (Mills et al, 2007).

In most instances where rehabilitation of thicket has been attempted the Thicket had been degraded due to poor farming techniques (ie. Overgrazing etc.), however remnant species are usually still present in these instances and can act as refuges for seedling recruitment. In addition *Portulacaria afra* has been used to create the microclimate necessary for plant growth and provides cover for seed dispersing animals and birds, thereby facilitating natural ecosystem recovery (Mills et al, 2007). However, this often leads to the formation of spekboom-dominated vegetation, with few other Thicket species present (Powell et al, 2006).

It has been suggested that by employing a combined approach of rehabilitating with *P. afra* truncheons (some infected with *Viscum crassulae*), and large specimens of *Aloe*, *Euphorbia*, *Crassula* and other succulent spp., thereby effectively creating instant bush structure, the catalyst will be created for an accelerated increase in biodiversity (via zoochorous seed dispersal) (Powell et al, 2006).

Limitations of the Site

There are no indigenous Thicket species remaining on the portion of the site that has been cleared. This increases the difficulty of restoration as there are no shrubs to provide the microclimates necessary for plant growth or refuge for seed dispersing animals and birds. Restoration of the Thicket vegetation on the site will thus require using a variety of Thicket species, not just *P. afra*. In 2007 it was estimated that it would cost approximately \$862/ha to restore Thicket that had less than 25% of the original biomass remaining using a variety of species (Mills et al, 2007). Taking inflation over the past 5 years into account this amount is currently likely to be over \$960/ha. This would translate into over R 8 200/ha at the current exchange rate. Therefore to restore the 20ha of Thicket vegetation that was cleared from the affected properties will cost over an estimated R164 000, with little or no returns anticipated.

The fact that the site is isolated from other intact Thicket vegetation means there is limited faunal movement on the site. Should this portion of the site be restored, it would also be isolated from the intact portions of the properties by proposed citrus production, should authorisation for the

remaining 74 ha be received. As zoochory is said to be an important driver of enhancing biodiversity in the restoration of degraded vegetation, it is anticipated that the effectiveness of restoration efforts on the site will be hampered by the limited faunal movement experienced on the site relative to areas where ecological process corridors are still intact.

If environmental authorisation is received from DEDEAT to clear the additional 74 hectares of intact Thicket vegetation from the site then the 20 hectare cleared area will be surrounded by citrus orchards. In which case, it would not be sustainable, from an ecological perspective, to rehabilitate the cleared portion of the site.

4.4.2 Go Alternative (Preferred Alternative)

It is the intention of the applicant to proceed with the proposed establishment of citrus orchards on the 20 hectare cleared area. The initial capital investment to develop this portion of the site is anticipated to be approximately R2.25 Million. However the anticipated yearly income after the orchards become productive is approximately R15 000 000 per annum.

The preferred alternative will however include the rehabilitation of the drainage line and a 32 metre buffer area surrounding it so as to ensure the ecological functioning thereof.

4.5 RETROSPECTIVE IDENTIFICATION AND ASSESSMENT OF IMPACTS

The section below outlines the impacts that the clearing of 20 hectares of indigenous vegetation has already had on the biophysical environment. Appropriate mitigation measures have been suggested for those impacts that may still be mitigated. The impacts have been rated with and without mitigation.

Destruction of habitat for plant species of special concern (SSC)

Nature of the Impact	The clearing of 20 hectares of indigenous Thicket vegetation has resulted in the loss of habitat for plant SSC.
Extent	Site specific (footprint) - The impact is limited to the actual cleared area.
Duration	Permanent - The 20 hectares of vegetation that has been cleared is permanent.
Intensity	High - The cleared area has been completely altered from its original state.
Probability	Definite – The vegetation has already been cleared.
Reversibility	Partially reversible – The rehabilitation of the indigenous vegetation is possible at great expense and over a long period of time. However, it is unlikely that the rehabilitated vegetation will be the same in every respect (biodiversity, ecological processes, etc.) as that which has been cleared.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-) No critically endangered, endangered or species otherwise having a severely limited distribution occur within the proposed footprint. However, regionally protected species most likely would have occurred in this portion of the site.
Mitigation	<ul style="list-style-type: none"> • Conserve intact indigenous vegetation outside the cleared area as habitat for SSC.
Significance and Status (with mitigation)	Medium Negative (-)

Destruction of habitat for faunal species of special concern (SSC).

Nature of the Impact	The clearing of 20 hectares of indigenous Thicket vegetation has resulted in the loss of habitat for faunal SSC. It is assumed that faunal SSC would have moved off the site as soon as clearing commenced.
Extent	Site specific - The impact is limited to the actual cleared area.
Duration	Permanent – The 20 hectares of vegetation that has been cleared is permanent.
Intensity	High - The cleared area has been completely altered from its original state.
Probability	Definite - The vegetation and associated faunal habitat has already been cleared.
Reversibility	Partially reversible – The rehabilitation of the indigenous vegetation is possible at great expense and over a long period of time. However, it is unlikely that the rehabilitated vegetation will be the same in every respect (biodiversity, ecological processes, etc.) as that which has been cleared.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Low Negative (-) – It is assumed that the fauna that would have occurred in this portion would have moved off the site when clearing commenced.
Mitigation	<ul style="list-style-type: none"> • Conserve intact indigenous vegetation outside the cleared area as habitat for SSC.

Significance and Status (with mitigation)	Low Negative (-)
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Loss of plant SSC due to vegetation clearing and disturbance

Nature of the Impact	The clearing of 20 hectares of indigenous Thicket vegetation may have resulted in the loss of plant SSCs.
Extent	Site specific - The impact is limited to the actual cleared area.
Duration	Permanent - The 20 hectares of vegetation that has been cleared is permanent.
Intensity	High - The cleared area has been completely altered from its original state and all plant SSCs removed.
Probability	Definite - The vegetation has already been cleared and the plant SSCs removed.
Reversibility	Irreversible – The loss of plant SSCs is irreversible.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-) It is unlikely that any critically endangered, endangered or species otherwise having a severely limited distribution would have occurred within the proposed footprint.
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Medium Negative (-)

Loss of faunal SSC due to vegetation clearing and disturbance

Nature of the Impact	The clearing of 20 hectares of indigenous Thicket vegetation may have resulted in the mortality or injury of some faunal SSCs.
Extent	Site specific - The impact is limited to the actual cleared area.
Duration	Temporary – Any faunal species that were lost during the clearing of the 20 hectares of vegetation are lost permanently.
Intensity	Moderate - The faunal SSC that may have occurred on the site are mostly highly mobile species (excluding tortoises) and are likely to have moved off the site as soon as vegetation clearing commenced.
Probability	Improbable - The faunal SSC that may have occurred on the site are mostly highly mobile species (excluding tortoises) and are likely to have moved off the site as soon as vegetation clearing commenced.
	Irreversible – The loss of faunal SSC is irreversible.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Negative (-) - The loss of faunal SSC, is considered negative. While unlikely, there is the possibility that faunal SSC may have been injured or killed by activities associated with the bush clearing. It is anticipated that increased noise and activities on site would have temporarily displaced faunal species from the site.
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Low Negative (-)

Disruption of ecological corridors, patterns and processes

Nature of the Impact	The clearing of 20 hectares of indigenous Thicket vegetation may have caused a disruption of the Critical Ecological Process Areas, Ecological Corridors and Critical Biodiversity Areas occurring thereon.
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Extent	Site specific - The impact would be experienced over the whole extent of the affected properties.
Duration	Permanent – Disturbance to the ecological connectivity is permanent.
Intensity	Moderate – The cleared area is the closest portion of the site to intact indigenous vegetation.
Probability	Probable
Reversibility	Irreversible – Loss of connectivity of ecological corridors and process areas is irreversible.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Negative (-) Due to the fact that the entire site is surrounded by agricultural land (orchards, pastures etc.) it is unlikely that the intact vegetation on the site would have contributed much to the ecological corridors in the area. Thus, the clearing of 20 hectares of vegetation from the site is unlikely to have had any significant impact on the ecosystem functioning or ecological patterns and processes at the site.
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Low Negative (-)

Increased exotic plant invasion due to disturbance of soils and vegetation

Nature of the Impact	Vegetation disturbance and vegetation clearing may have created opportunities for weeds and exotic plants to invade the site.
Extent	Site specific - The impact will be limited to the affected properties.
Duration	Long Term - If not mitigated the impact will spread from the cleared area into the rest of the site. This impact may continue to be experienced in perpetuity if no mitigatory action is taken.
Intensity	Medium - Exotic plant invasion will lead to a notable alteration of natural patterns and processes at the site.
Probability	Highly Probable
Reversibility	Reversible – If attended to early enough the invasion by exotic plants can easily be reversed.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-)
Mitigation	<ul style="list-style-type: none"> • Eradicate weeds and invasive vegetation on the cleared portion, as well as the rest of the affected properties. • Control their spread from the cleared portion of the site. • Destroy weeds and invasive plants before they reach seed formation stage. • Limit disturbance to intact indigenous vegetation on site.
Significance and Status (with mitigation)	Low Positive (+)

Destruction of exotic plants (weeds and invaders) during vegetation clearing.

Nature of the Impact	During the clearing of the 20 hectares of Thicket vegetation it is likely that exotic vegetation was also removed.
Extent	Site Specific – The destruction of exotic plants would have occurred within the 20 hectares that has been cleared.
Duration	Permanent – Exotic vegetation removed from the site has been permanently cleared.
Intensity	Low
Probability	Probable - At least some of the vegetation removed would have included exotic weeds and invaders.
Reversibility	Reversible – If no mitigatory action is taken it is likely that weeds and exotics will return and invade the portion of the site that

	has been cleared, spreading into intact vegetation on the affected properties.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Positive (+)
Mitigation	<ul style="list-style-type: none"> • Exotic plant material removed must be removed from the site and destroyed so that seeds and propagating material does not remain at the site. • Follow-up clearing for weeds and exotics should take place.
Significance and Status (with mitigation)	Medium Positive (+)

Destruction of riparian vegetation and associated habitat

Nature of the Impact	The clearing of the 20 hectares of vegetation has resulted in the clearing of some vegetation associated with the drainage line on the site. This vegetation consisted mainly of Thicket species and no typical hydrophytic plants were encountered.
Extent	Site specific – The impact is limited to the portion of the drainage line that falls within the cleared area.
Duration	Permanent – The riparian vegetation which has been removed will not be replaced.
Intensity	Medium – Removal of riparian vegetation may result in damage to the functioning of the drainage line.
Probability	Definite - Some of the vegetation associated with the drainage line has been removed, however it would seem that this would have been thicket vegetation and not typical riparian vegetation.
Reversibility	Partially reversible – Once riparian vegetation has been cleared it may be rehabilitated, however it is unlikely that the rehabilitated vegetation will be the same in every respect (biodiversity, ecological processes etc) as that which has been cleared.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-) – The drainage line does not represent any important natural habitat for riparian species.
Mitigation	<ul style="list-style-type: none"> • Applying a 32 metre buffer around the drainage line and rehabilitating the portion thereof that has been cleared will likely improve the functioning thereof and will re-establish the habitat that has been lost.
Significance and Status (with mitigation)	Low Negative (-)

4.6 IDENTIFICATION AND ASSESSMENT OF POTENTIAL FUTURE IMPACTS

The section below outlines the potential impacts that the proposed development may still have on the biophysical environment, if allowed to proceed as described in Chapter 2 of this report. Appropriate mitigation measures for each impact are suggested, and the impacts are rated with and without mitigation.

Impacts are identified and assessed for the No-Go Alternative and the Preferred Alternative. Impacts are separated into direct and indirect impacts, as well as those associated with the construction and operational phase of the project.

4.6.1 Preferred Alternative

4.6.1.1 Construction Phase Direct Impacts

The following section of the report identifies direct impacts that may be associated with the site preparation phase of the development. The mitigatory measures proposed apply to the upgrading of roads, installation of agricultural infrastructure, as well as the establishment of the orchards.

Increased erosion risk and topsoil loss due to vegetation clearing and disturbance

Nature of the Impact	The clearing of the vegetation topsoil stripping and cultivation may lead to increased soil erosion risk and increased runoff velocities that may result from the vegetation that has been cleared may exacerbate existing erosion features on site. In particular in areas of runoff concentration and increased flow velocities (e.g. vehicle tracks, roads and pathways).
Extent	Site specific - The impact will be limited to the property.
Duration	Temporary - The impact will only take place during the construction phase.
Intensity	Medium - Without mitigation extensive soil erosion could cause an alteration of natural processes at the site.
Probability	Highly Probable - Without mitigation there is a high likelihood that soil erosion will occur during the site preparation phase.
Reversibility	Partially reversible – Erosion scars can be remediated by the reinstatement of soil and vegetation, however it might not be possible to replace the topsoil that is lost.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-) Erosion and topsoil loss can have an impact on the local environment.
Mitigation	<ul style="list-style-type: none"> • Design and implement a stormwater management system for the area, especially along access roads and internal vehicle tracks. • Initiate erosion countermeasures on the site in parallel with the site preparation phase. • Judicious use should be made of appropriate runoff control measures (e.g. cut-off berms, contour ploughing, shaping) to reduce sheet-flow and concomitant soil erosion.
Significance and Status (with mitigation)	Low Negative (-)

Damage to the drainage line due to upgrading of roads and the installation of infrastructure.

Nature of the Impact	If the existing gravel road that runs through the drainage line were to be upgraded and infrastructure installed it would likely further compromise the ecological functioning thereof.
Extent	Site specific – The impact is limited to the portion of the drainage line that falls within the cleared area and that would be affected by upgrading of the road and the installation of infrastructure.
Duration	Permanent – The upgrading of roads and installation of infrastructure through the drainage line would have a permanent effect on the ecological functioning thereof.
Intensity	Medium – The upgrading of roads and installation of infrastructure through the drainage line is likely to impede the ecological functioning thereof.
Probability	Definite - The upgrading of roads and installation of infrastructure through the drainage will definitely impede the ecological functioning thereof.

Reversibility	Partially reversible – Once riparian vegetation has been cleared it may be rehabilitated, however it is unlikely that the rehabilitated vegetation will be the same in every respect (biodiversity, ecological processes etc) as that which has been cleared. It would also require that the roads and infrastructure be removed from this portion of the drainage line.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-) – The drainage line does not represent any important natural habitat for riparian species.
Mitigation	<ul style="list-style-type: none"> • No roads should be established and no infrastructure installed through the drainage line. • Applying a 32 metre buffer around the drainage line and rehabilitating the portion thereof that has been cleared will likely improve the functioning thereof and will re-establish the habitat that has been lost.
Significance and Status (with mitigation)	Low Positive (+) The ecological functioning of the currently compromised drainage line will be improved by the above mitigatory actions.

4.6.1.2 Cumulative Construction Phase Impacts

It is understood that the Basic Assessment Process being conducted for the clearing of an additional 74 hectares of vegetation for the purpose of establishing citrus orchards, is not guaranteed to receive environmental authorisation and that the applicant may be required to rehabilitate the cleared area. However, should authorisation be granted for both of these applications, the cumulative impacts of the clearing of the total 94 hectares would need to have been assessed. Thus, below, please find the anticipated cumulative positive and negative impacts that are anticipated to occur for the clearing of 94ha in total in the construction (site preparation) and operational phases.

Loss of a total of 94 hectares of Sundays Spekboom Thicket

Nature of the Impact	The loss of a total of 94 hectares of Sundays Spekboom Thicket would represent a loss of approximately 0.18% of the remaining regional extent(as of 2003), as opposed to the loss of approximately 0.14% for the 74 hectares.
Extent	Site specific - The impact will be limited to property.
Duration	Permanent - During lifetime of the development.
Intensity	Medium
Probability	Definite
Reversibility	Partially reversible – The rehabilitation of the indigenous vegetation is possible at great expense and over a long period of time. However, it is unlikely that the rehabilitated vegetation will be the same in every respect (biodiversity, ecological processes, etc.) as that which has been cleared.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • Thicket vegetation and associated topsoil which needs to be cleared from the site should be used to rehabilitate degraded portions of the site that are not proposed for development. • Species of special concern that are removed from the vegetation prior to vegetation clearing must be transplanted into the portions of the site where thicket vegetation is to remain.

	<ul style="list-style-type: none"> The retained and rehabilitated vegetation must be cleared of invasive alien species and kept clear of these by conducting regular follow-up clearing operations.
Significance and Status (with mitigation)	Low Negative (-)

Loss of additional Species of Special Concern

Nature of the Impact	A total of 13 protected species were recorded on site. The species of special concern that may have occurred within the cleared area would have been destroyed during vegetation clearing.
Extent	Site specific - The impact will be limited to property.
Duration	Permanent - During lifetime of the development.
Intensity	Medium
Probability	Definite
Reversibility	Irreversible
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> Before site clearing commences on the rest of the site, it must be surveyed for plant SSC by a suitably qualified botanist. It is recommended that these plants are transplanted prior to the commencement of site clearing, under the supervision of a qualified botanical / horticultural specialist to the portion of the properties that will remain intact. Permits for the removal of these plants need to be obtained from the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), or in the case of Protected Tree species, from the Department of Agriculture, Forestry and Fisheries (DAFF)
Significance and Status (with mitigation)	Low Negative (-)

Dust generation during the vegetation clearing and site preparation phase.

Nature of the Impact	Areas of unconsolidated soil will be present during the vegetation clearing. These soils will be prone to wind erosion with associated generation of dust and windblown sand during high wind velocities. The area that has already been cleared is likely currently prone to wind erosion and dust generation
Extent	Site specific /Local- The impact should be limited to property, however, some windblown dust may reach adjacent properties.
Duration	Temporary – this impact will only occur during the site preparation phase
Intensity	Medium
Probability	Probable
Reversibility	Irreversible – once the dust has been eroded /blown away it cannot be recovered.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-)

Mitigation	<ul style="list-style-type: none"> • Vegetation on the rest of the site should be cleared in a phased manner to avoid large areas of unconsolidated soils. • Topsoil and soil stockpiles should be covered, wetted or otherwise stabilised to prevent wind erosion and dust generation. • A water cart or sufficient watering equipment should be available to wet soils during windy days if wind-blown sand and dust becomes a problem.
Significance and Status (with mitigation)	Very Low Negative (-)

Noise and disturbance during the vegetation clearing and site preparation phase.

Nature of the Impact	The use of machinery and the presence of additional labourers on site will result in greater than normal levels of noise for the area, although, given the agricultural nature of the area, it is unlikely that this impact will be significant. In addition, because the 20.2 hectares has already been cleared of vegetation it is anticipated that the noise and disturbance created with the continued development of this portion will not contribute significantly to the overall impact.
Extent	Site specific- The impact should be limited to property.
Duration	Temporary – this impact will only occur during the site preparation phase
Intensity	Medium
Probability	Probable
Reversibility	Reversible
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Negative (-)
Mitigation	<ul style="list-style-type: none"> • Limit activities, as far as possible, to working hours (ie. 7am-6pm weekdays). • Encourage labourers to not make unnecessary noise. • Should after hours work take place nearby residents should be notified. • Signage with the contact details of the responsible person should be provided at the site for residents with complaints in this regard. • A complaints register should be kept to document complaints and the corrective action taken. • No loud music to be allowed on site.
Significance and Status (with mitigation)	Very Low Negative (-)

Increased stormwater runoff due to the removal of the vegetation.

Nature of the Impact	The clearing of vegetation from an additional 20.2 hectares will result in increased stormwater runoff. However, if managed effectively the cumulative impact of stormwater runoff should not be significant.
Extent	Site specific- The impact should be limited to property.
Duration	Temporary – this impact will only occur during the site preparation phase
Intensity	Medium
Probability	Improbable
Reversibility	Reversible

Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • Limit vegetation disturbance outside the portions to be cleared. • Stormwater on the site must be controlled for the duration of the site preparation phase by employing appropriate temporary stormwater control structures e.g. cut-off berms. • Cleared areas must be re-vegetated (cultivated) as soon as possible after the initial vegetation clearing.
Significance and Status (with mitigation)	Low Negative (-)

Destruction and removal of exotic plants.

Nature of the Impact	From the condition of the rest of the site it is inferred that there would have been some Category 1 weeds in terms of CARA (Conservation of Agricultural Resources Act 43 of 1983) within the cleared area. The additional removal of CARA listed species is a positive impact.
Extent	Site specific- The impact should be limited to property.
Duration	Permanent
Intensity	Medium
Probability	Definite
Reversibility	Reversible – If no mitigatory action is taken it is likely that weeds and exotics will return and invade the portion of the site that has been cleared, spreading into intact vegetation on the affected properties.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Positive (+)
Mitigation	<ul style="list-style-type: none"> • The retained and rehabilitated vegetation must be cleared of invasive alien species and kept clear of these by conducting regular follow-up clearing operations.
Significance and Status (with mitigation)	High Positive (+)

Disturbance and injury to fauna during construction and the associated loss of habitat.

Nature of the Impact	It is anticipated that much of the game that currently inhabits the site will be transported to another site prior to site preparation commencing. Those smaller faunal species that may remain behind within the vegetation may suffer injury during the site preparation and vegetation clearing phase. The loss of 94 hectares would mean an additional habitat loss for those species and it is possible that some faunal species may suffer injury during clearing.
Extent	Site specific- The impact should be limited to property.
Duration	Permanent – the loss of faunal habitat will be permanent
Intensity	Medium
Probability	Probable
Reversibility	Reversible

Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • A faunal search and rescue operation should be undertaken prior to commencement of vegetation clearing on site. • Site clearing must be done in a phased manner to allow fauna the chance to move off the site. • No fauna encountered at the site may intentionally be harmed or killed. • All personnel should be made aware of the need to prevent harm to fauna on site. • All open excavations must be securely fenced or barricaded. • Speeds travelled by vehicles must be kept to a minimum. • Excavations must be checked daily for trapped fauna; and trapped animals rescued and released. • Injured fauna should be referred to an appropriate faunal rehabilitation or care centre (e.g. SPCA, African Dawn Wildlife Sanctuary).
Significance and Status (with mitigation)	Low Negative (-)

4.6.1.3 Operational Phase Direct Impacts

The following activities on site during the operational phase of the project may result in direct impacts to the environment.

Erosion risk and topsoil loss due to stormwater runoff and wind.

Nature of the Impact	Unvegetated areas such as vehicle tracks will be susceptible to soil erosion due to stormwater runoff and strong winds during the operational phase of the development.
Extent	Site specific - The impact will be limited to the property.
Duration	Long Term - The impact will be present during the project lifetime.
Intensity	Medium - Without mitigation extensive soil erosion could cause an alteration of natural processes at the site.
Probability	Probable - Without mitigation there is a likelihood that soil erosion will occur.
Reversibility	Partially reversible – Erosion scars can be remediated by the reinstatement of soil and vegetation, however it might not be possible to replace the topsoil that is lost.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-) Erosion and topsoil loss can have an impact on the local environment.
Mitigation	<ul style="list-style-type: none"> • Design and implement a stormwater management system for the site to be implemented for the operational lifespan thereof, especially along access roads and internal vehicle tracks. • Make judicious use of appropriate runoff control measures (e.g. cut-off berms, contour ploughing, shaping) to reduce sheet-flow and concomitant soil erosion. • Monitor the site for erosion on a regular basis and take corrective action immediately if detected.
Significance and Status (with mitigation)	Low Negative (-).

Pollution of surface and groundwater by herbicides, pesticides and fertiliser.

Nature of the Impact	Agricultural runoff may cause pollution of surface and groundwater sources on or near the site.
Extent	Site Specific – It is unlikely that pollution of the water resources on the site will spread to water resources on adjacent properties.
Duration	Long Term
Intensity	Medium
Probability	Improbable - The applicant will use micro-irrigation to apply minimal amounts of water and agricultural chemicals. It is unlikely that excess chemicals will eventuate in the water resources on or near the site.
Reversibility	Partially reversible – Once the water resources are polluted there are remedial measures that can be applied to reverse potential impacts. However, if the impacts have been severe enough, it might not be possible to restore polluted areas to their original condition prior to degradation.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • Minimise the use and application of agricultural chemicals. • Apply chemicals as per the product instructions, in line with the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947 (As amended). • Employ appropriate runoff control measures on site to avoid runoff from the orchards onto neighbouring areas or into the watercourses on site. • Employ vegetated buffer strips along the edges of the orchards and along fences in order to trap and filter potential runoff from the orchard area. • Employ appropriate diversion measures to ensure that runoff does not eventuate into the LSRWUA canal.
Significance and Status (with mitigation)	Low Negative (-)

4.6.1.4 Indirect Operational Phase Impacts

The following activities associated with the operational phase of the development may result in indirect impacts on the environment.

Loss of faunal species of special concern (poaching, domestic dogs & cats).

Nature of the Impact	Poaching and hunting could result in high faunal mortalities including the loss of faunal species of special concern.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium - Loss of fauna that frequent the intact indigenous vegetation on the affected properties will result in an alteration of natural processes at the site. These could include SSC.
Probability	Improbable
Reversibility	Irreversible – The loss of faunal SSC will be irreversible.
Degree of Confidence	Medium
Status and Significance	Medium Negative (-)

of Impact (no mitigation)	
Mitigation	<ul style="list-style-type: none"> • Domestic animals must be controlled. • The owners or managers of the area should conduct routine monitoring for snares and feral pets.
Significance and Status (with mitigation)	Low Negative (-)

Introduction of exotic flora and risk of alien plant invasion

Nature of the Impact	Increased traffic associated with the development may result in exotic invasive species becoming established along road reserves, eventuating into the intact vegetation on the affected properties.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium - Exotic plant invasion could cause a notable alteration on ecosystem functioning
Probability	Probable
Reversibility	Reversible – If attended to early enough the invasion by exotic plants can easily be reversed.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • The site should be monitored routinely for alien plant invasion. • Regular clearing of weeds and invasive plants should be implemented, preferably before the plants have reached seed formation stage, especially along access road verges.
Significance and Status (with mitigation)	Neutral – A weed eradication program will ensure that exotic flora and alien vegetation does not become established.

Potential Visual Impacts on the Addo Elephant National Park.

Nature of the Impact	The clearing of 20 hectares of indigenous vegetation and associated establishment of a citrus orchard has the potential of impacting visually on the Addo Elephant National Park. However, due to the fact that the site is surrounded by existing orchards and other cultivated areas the additional orchards are unlikely to negatively impact on the sense of place associated with the area. The applicant does not intend to construct any large warehouses or industrial infrastructure not in keeping with the surrounding landscape.
Extent	Local - The impact will be experienced by the AENP.
Duration	Long Term
Intensity	Low
Probability	Improbable – The site is approximately 3km from the AENP. Due to the fact that the site is surrounded by existing orchards and other cultivated areas the additional orchards are unlikely to negatively impact on the sense of place associated with the area. The applicant does not intend to construct any large warehouses or industrial infrastructure not in keeping with the surrounding landscape.
Reversibility	Irreversible – Once the orchards are established any potential visual impact experienced by the park would not be reversible.
Degree of Confidence	Medium
Status and Significance	Very Low Negative (-) to Neutral (0)

of Impact (no mitigation)	
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Very Low Negative (-) to Neutral (0)

Disruption of ecological corridors, patterns and processes associated with the Addo Elephant National Park.

Nature of the Impact	The clearing of 20 hectares of indigenous vegetation and associated establishment of a citrus orchard has the potential of disrupting ecological patterns and processes within the ecological corridor within which the AENP is situated.
Extent	Local - The impact will be experienced by the AENP.
Duration	Long Term
Intensity	Low
Probability	Improbable – Due to the fact that the affected properties are surrounded by existing orchards and cultivated lands and therefore are ecologically isolated from any intact Thicket vegetation it is highly unlikely that the clearing of 20 hectares of indigenous vegetation thereon or the subsequent establishment of orchards for citrus production will have any effect on the ecological corridor within which the AENP is situated.
Reversibility	Irreversible – Once the orchards are established any potential impacts associated with the development would not be reversible.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Very Low Negative (-) to Neutral (0)
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Very Low Negative (-) to Neutral (0)

4.6.1.5 Cumulative Operational Phase Impacts

Increased stormwater runoff due to the removal of the vegetation.

Nature of the Impact	The removal of vegetative cover and litter, as well as the alteration of the topography, may reduce rainwater infiltration and result in increased runoff volumes and velocities. These volumes and velocities would be greater for the whole 94 hectares as opposed to the 20 hectares or the 74 hectares on their own.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium
Probability	Probable
Reversibility	Reversible – The use of appropriate stormwater control measures and establishment of vegetation can reduce the amount of stormwater runoff.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)

Mitigation	<ul style="list-style-type: none"> • Implement suitable storm-water management measures within the orchards (E.g.: cut-off berms, diversion canals and appropriate planting configurations). • Retain as much vegetation cover within the planted areas as possible (e.g. grass and small shrubs).
Significance and Status (with mitigation)	Very Low Negative (-)

Increased soil erosion by wind and water due to the removal of the vegetation.

Nature of the Impact	The erosion anticipated would be greater for the whole 94 hectares than for the 74 hectares or the 20 hectares on their own.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium
Probability	Probable
Reversibility	Partially reversible – Erosion scars can be remediated by the reinstatement of soil and vegetation, however it might not be possible to replace the topsoil that is lost.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • Retain vegetative cover of the soil surface for as long as possible between tilling / planting operations. • Should erosion scars begin to form on the landscape, erosion counter measures should be implemented immediately. • Landscaping and erosion control measures should be implemented on steep portions of the site that may be sensitive to erosion.
Significance and Status (with mitigation)	Very Low Negative (-)

4.6.2 No-Go Alternative (Rehabilitation)

Restored habitat for plant Species of Special Concern (SSCs)

Nature of the Impact	If the 20 hectares portion of cleared area were to be rehabilitated the habitat for plant SSCs would be restored. However, restoration of this area to the point where ecosystem function is fully restored will take decades.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term – Rehabilitation would restore habitat in perpetuity.
Intensity	Medium
Probability	Probable - The rehabilitation is likely to be effective if enough resources (money, labour etc. is available)
Reversibility	Reversible – Rehabilitation of habitat can be reversed.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Positive (-) While rehabilitation on this site may be possible it will take many years. Given that the site is already isolated from intact Thicket vegetation there is not much value in rehabilitation of the cleared area.
Mitigation	<ul style="list-style-type: none"> • None proposed

Significance and Status (with mitigation)	Low Positive (-)
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Restored habitat for faunal Species of Special Concern (SSCs)

Nature of the Impact	If the 20 hectares portion of cleared area were to be rehabilitated the habitat for faunal SSCs would be restored. However, restoration of this area to the point where ecosystem function is fully restored will take decades.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term – Rehabilitation would restore habitat in perpetuity.
Intensity	Medium
Probability	Probable - The rehabilitation is likely to be effective if enough resources (money, labour etc.) is available.
Reversibility	Reversible – Rehabilitation of habitat can be reversed.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Positive (+) While rehabilitation on this site may be possible it will take many years. Given that the site is already isolated from intact Thicket vegetation there is not much value in rehabilitation of the cleared area.
Mitigation	<ul style="list-style-type: none"> • None proposed
Significance and Status (with mitigation)	Low Positive (+)

Restored ecological functioning of the drainage line.

Nature of the Impact	As part of the rehabilitation of the 20 hectares of vegetation that has been cleared, the drainage line will also be rehabilitated. Because only a small portion of the drainage line actually falls within the cleared area this impact is not anticipated to be significant. In addition, it seems likely that the drainage line was already degraded prior to the clearing of the vegetation (possibly due to a change in the flow regime resulting from the transformation of adjacent properties).
Extent	Site specific - The impact will be limited to the drainage line on the affected properties.
Duration	Permanent – Ecological function of the drainage line will be restored permanently.
Intensity	Medium
Probability	Probable – It is probable that ecological function of the drainage line can be restored.
Reversibility	Reversible – The rehabilitated drainage line can become degraded.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Positive (+) Rehabilitation efforts might be hampered by the fact that the drainage line seems to have already been degraded prior to the clearing of vegetation from the site.
Mitigation	<ul style="list-style-type: none"> • None proposed.
Significance and Status (with mitigation)	Low Positive (+)

4.7 GENERAL CONCLUSIONS AND RECOMMENDATIONS

The clearing of indigenous vegetation from Portion 23 a portion of 5 of 104 and the Remainder of Farm No 650 Swanepoels Kraal has resulted in the loss of approximately 18 hectares of intact Sundays Spekboom Thicket, and approximately 2 hectares of degraded Thicket and weedy vegetation. In addition, some vegetation associated with the drainage line that runs across the south eastern corner of the site has also been lost.

The rehabilitation of this cleared area is no doubt an option, however, it is not recommended for the following reasons. Firstly the cleared area has no remnant species to act as refuges for seedling recruitment. This will increase the cost of rehabilitation as it will require the use of a variety of species in rehabilitation. It will also increase the time it will take before the area will be rehabilitated. Secondly, it is unlikely that the cleared area will be restored to its original condition. It is possible that the changed ecosystem function and species diversity might impact negatively on the intact vegetation on the rest of the site. Lastly, there is not much ecological value in rehabilitating the 20 hectares of cleared vegetation. This is due to the fact that the adjacent properties have all been transformed into citrus orchards, as well as the possibility that approximately 74 hectares to the east and north of the cleared portion on the affected properties may be granted environmental authorisation to be cleared for the establishment of citrus orchards.

The key impacts that the clearing of vegetation has had on the environment are shown below. Only impacts that had a Medium or higher significance are shown.

- Destruction of habitat for plant species of special concern (SSC) (*Medium Negative*)
- Loss of plant SSC due to vegetation clearing and disturbance (*Medium Negative*)
- Destruction of exotic plants (weeds and invaders) during vegetation clearing (*Medium Positive*)
- Destruction of riparian vegetation and associated habitat (*Medium Negative*)

If the cleared portion were to be developed according to the project description provided in chapter 2 of this report the following additional site preparation phase impacts could be experienced:

- Increased erosion risk and topsoil loss due to vegetation clearing and disturbance which can be mitigated to *Low Negative*.
- Damage to the drainage line due to upgrading of roads and the installation of infrastructure which could be mitigated to a *Low Positive* impact.

The following Cumulative Impacts are anticipated during the site preparation phase should authorisation be granted for the clearing and development of the entire 94 hectares on the affected properties. Only impacts that had a Medium or higher significance are shown.

- Loss of a total of 94 hectares of Sundays Spekboom Thicket
- Loss of additional Species of Special Concern
- Dust generation during the vegetation clearing and site preparation phase.
- Increased stormwater runoff due to the removal of the vegetation.
- Destruction and removal of exotic plants.
- Disturbance and injury to fauna during construction and the associated loss of habitat.

All of the above impacts can be mitigated to *Low or Very Low Negative* except for the destruction of exotic plants which can be enhanced to be a *High Positive* impact.

The following impacts may be associated with the operational phase of the proposed development, if it receives authorisation:

- Erosion risk and topsoil loss due to stormwater runoff and wind.
- Pollution of surface and groundwater by herbicides, pesticides and fertiliser.
- Loss of faunal species of special concern (poaching, domestic dogs & cats).
- Introduction of exotic flora and risk of alien plant invasion
- Potential visual impacts on the Addo Elephant National Park.
- Disruption of ecological corridors, patterns and processes associated with the Addo Elephant National Park.

All of the above can be mitigated to a *Low Negative*, *Very Low Negative* or *Neutral* impact.

The following Cumulative Impacts are anticipated during the operational phase should authorisation be granted for the clearing and development of the entire 94 hectares on the affected properties. Only impacts that had a Medium or higher significance are shown.

- Increased soil erosion by wind and water due to the removal of the vegetation which could be mitigated to *Very Low Negative*.
- Increased stormwater runoff due to the removal of the vegetation which could also be mitigated to *Very Low Negative*.

If the cleared area is to be restored, the following impacts are likely to result:

- Restored habitat for plant Species of Special Concern (SSCs)
- Restored habitat for faunal Species of Special Concern (SSCs)
- Restored ecological functioning of the drainage line.

The above would all be of a *Low Positive* impact.

It is recommended therefore that the cleared portion be allowed to be developed according to the description provided in Chapter 2 of this report. This will ensure that exotic vegetation does not occupy the site and invade the intact portions of the site. Should the development be allowed to proceed it is recommended that a 32 metre buffer area be applied around the drainage line and any portion of this which is degraded or transformed should be rehabilitated. In addition the gravel road that runs through the drainage line should not be used for the lifetime of the project and this area should be rehabilitated, neither should infrastructure be installed through the drainage line. In addition it is recommended that any lay-down areas required during the site preparation phase be contained within the cleared area and may not encroach on any of the intact vegetation on the affected properties.

4.8 REFERENCES

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