



**CEN INTEGRATED ENVIRONMENTAL
MANAGEMENT UNIT**

Environmental and Rural Development Specialist

**Results of a forest survey on sections of Erven 590,
10/28, 238 and 240 in the Seaview area, Nelson Mandela
Bay Municipality**

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Project Title:

Results of a forest survey on sections of Erven 590, 10/28, 238 and 240 in the Seaview area, Nelson Mandela Bay Municipality

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Introduction

CEN IEM Unit was appointed by SRK Consulting (SRK) to do a forest survey on sections of Erven 590, 10/28, 238 and 240 in the Seaview area in the Nelson Mandela Bay Municipality. The erven have been identified as possible alternative sites for planned municipal housing developments, and are under assessment in a current Environmental Impact Assessment (EIA) process being done by SRK.

The forest survey is required as part of layout and project feasibility planning, and will inform the EIA process; specifically with regards to meeting the prescriptions of Section 3(3) of the National Forest Act (NFA) which sets out principles to guide sustainable forest management. The Department of Agriculture, Forestry and Fisheries (DAFF) are mandatory commenting authorities on applications for developments planned in forest areas, and it is their mandate is to implement the provisions of the NFA. Section 3(3)(a) states that 'natural forests'¹ must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits. By inference, areas that are classified as forest on the site would be protected in terms of the NFA since residential development is not considered 'exceptional circumstances' in terms of current policy.

A plan indicating the extent of forest on the selected areas, as well as a report that describes the status and nature of the forest in the area is therefore required.

¹ The definition of forest in the NFA was used as a guiding principle in demarcating forest areas on the site:

The National Forest Act gives the following definition for forest: 'forest' includes-

- (a) A natural forest, a woodland and a plantation;
- (b) The forest produce in it, and
- (c) The ecosystem which makes it up

And 'natural forest' means a group of indigenous trees –

- (a) Whose crowns are largely contiguous; or
- (b) Which have been declared by the Minister to be a natural forest under section 7(2); (xxviii)

A map was provided by SRK indicating areas on the erven regarded as possibly 'transformed' based on aerial imagery, with preliminary layout plans superimposed on the aerial images (Figure 1). The purpose of the forest survey was to ground-truth the extent and status of the areas deemed to be 'transformed' and delineate the edge of forest on the erven. The forest survey therefore focused on the area outlined in red in Figure 2. The information would be used to determine whether the preliminary layout plans need to be amended and/or if development on the erven would be feasible based on available space, amongst others.

The terms of reference for the survey were as follows:

- ❖ Review aerial imagery and contour maps to predict where forest vegetation may occur
- ❖ Do a site survey to map the edge of forest vegetation occurring in potentially transformed areas.
- ❖ Compile a list of forest floral species, and describe the structure of forest on site and compare this with published information for forest types in the area (i.e. the National Forest Classification (Environmentek CSIR 2003², National Vegetation Description, Mucina and Rutherford, 2012).
- ❖ Produce a map showing forest vegetation

Note that while the original terms of reference noted that the GPS location of species protected in terms of the NFA will be provided, this could not be done exhaustively owing to the dense nature of the vegetation in several areas of the site and the topography which made demarcating individual trees problematic. *Sideroxylon inerme* (white milkwood) trees in particular occurred in vast numbers and it is advised that once the layout plan is finalised, that planned erven and infrastructure be pegged on site and a survey of individual protected trees be done as part of possible future licence applications.

² Environmentek CSIR (April 2003). Classification System for South African Indigenous Forests. An objective classification system for the Department of Water Affairs and Forestry. ENV-P-C 2003-017.

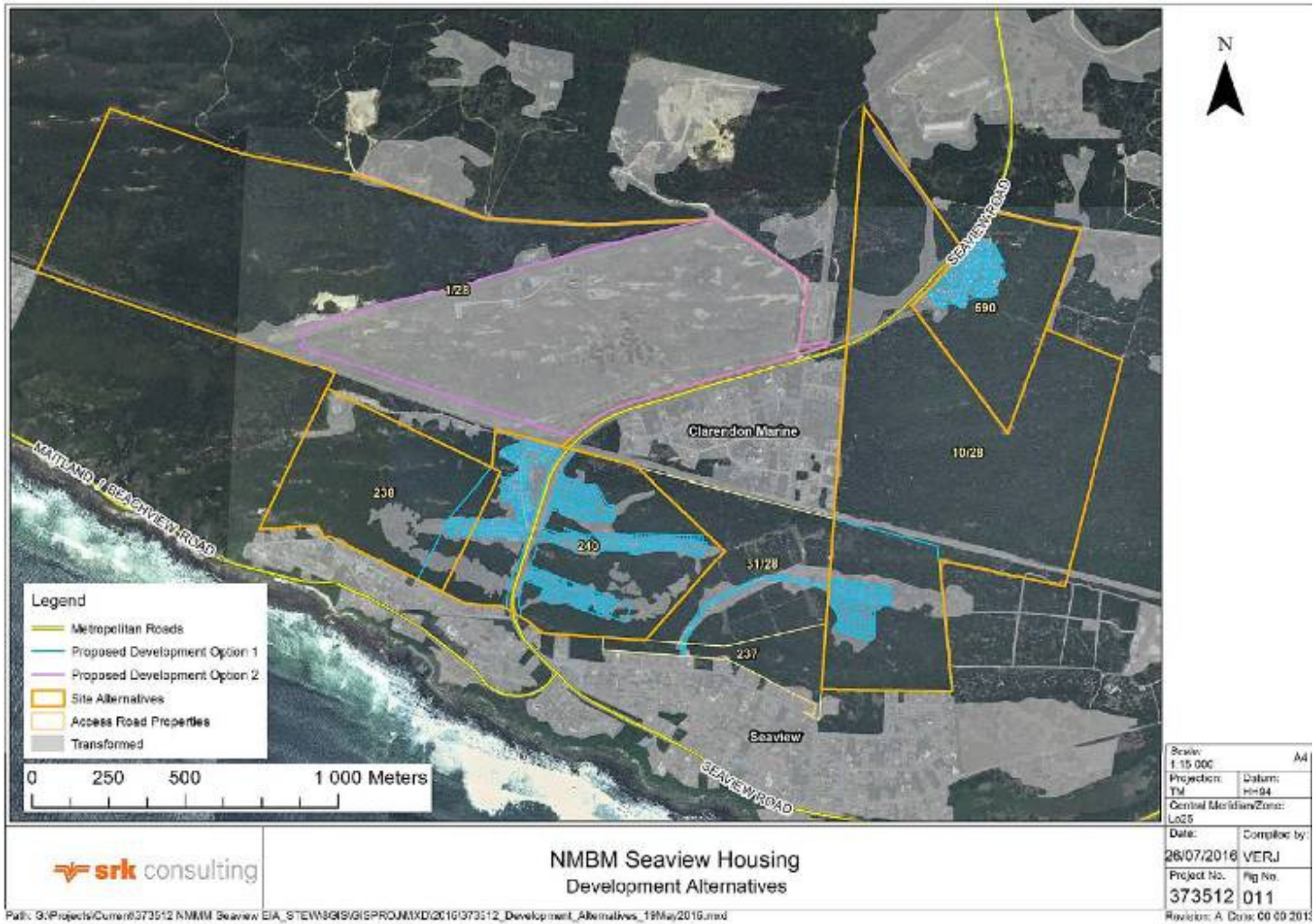


Figure 1: Map showing the location of Erven 590, 10/28, 238 and 240 in Seaview with an indication of potentially transformed areas and preliminary layout proposals (Source: SRK Consulting).



Figure 2: Google Earth image showing the boundary of the area included in the forest survey in relation to the ‘transformed’ layer and preliminary layout proposal provided by SRK Consulting.

Methodology

As a start, the following documents were consulted to determine what constitutes forest in terms of the National Forest Act, and what the forest type is for the area based on available vegetation descriptions and maps:

- ❖ National Forest Act 84 of 1998 – definition of natural forest
- ❖ Policy Principles and Guidelines for Control of Development Affecting Natural Forests (DAFF, September 2009)³
- ❖ Classification System for South African Indigenous Forests: An objective classification for the Department of Water Affairs and Forestry (Environmentek CSIR, April 2003)

Members of CEN IEM Unit visited the site on 18 and 29 August 2016. The extent of the study area was defined by the preliminary layout plan and map provided by SRK Consulting indicating areas that are potentially transformed (refer to Figure 2). The area was further divided into 8 portions (A to H), for ease of description (Figure 3).

The site was traversed on foot using a hand-held GPS and a series of aerial images. As many areas as could be accessed on foot were surveyed, where species lists were compiled and vegetation was described to determine if it is forest. In areas that could not be accessed, vegetation structure and general floral species composition were viewed from vantage points. In these areas, site observations together with 1 m contours and aerial image interpretation were used to demarcate forest vegetation. Current high resolution aerial images of the area compiled from drone surveys were provided by Robertson Baker Lochner Architects. These were used to fine-tune the forest edge in inaccessible areas.

Vegetation cover across the sites is predominantly forest, but the status and cover varies in accordance with slope and aspect, proximity to the coast, and previous disturbance (with resultant varying degrees of succession). In accordance, vegetation was categorized as follows:

- ❖ Forest which occurs mostly on dune ridges and slopes

³ Department of Agriculture, Forestry and Fisheries (2009). Policy Principles and Guidelines for Control of Development Affecting Natural Forests.

- ❖ A forest/thicket mosaic vegetation type that occurs in inter-dune valleys/troughs
- ❖ Forest in early stages of succession and/or where forest remnants are found. Low level alien vegetation invasion occurs in these areas
- ❖ Disturbed forest with more than 50% alien vegetation invasion

The distinction between forest and forest/thicket mosaic vegetation was not always clear, particularly on the southern-most dune ridge in the south-eastern and western extremities of the study site, as the distance to the coast decreased and topographical variation became less pronounced. In the latter areas, the vegetation height decreased and thicket elements became more prominent, with an increased occurrence of *Aloe* species. In general, the following criteria were used to distinguish between forest and forest/thicket mosaic vegetation:

- ❖ Forest/Thicket mosaic:
 - Presence of succulent vegetation such as *Aloe* spp., *Cotyledon* spp., *Crassula* spp. etc.
 - No distinct layering in vegetation structure
 - Woody vegetation dominated by stunted tree layer and large shrub component
- ❖ Forest:
 - Succulent vegetation absent or confined to low growing *Crassula* species in understory
 - Vegetation layering more distinct
 - Presence of tall woody trees with a crown cover of at least 75%

1.1 Deliverables

Deliverables include a map depicting the above-mentioned vegetation descriptions, with a shape file for land use planning. A description of the various sections of the site is given, with supporting photographs and reference to waypoints recorded during the survey. The vegetation description is compared with published vegetation profiles and species lists for forest in

the Seaview area. Lastly an annotated floral species list is given, with an indication of the threatened/protected status of each species, as well as a comparison with floral species listed as typical for Albany and East Cape Dune forests.



Figure 3: The survey area was divided into 8 portions (A to H) for ease of description.

Results of the survey

1.2 Map depicting forest

Vegetation cover across the sites is predominantly forest, but the status and cover varies in accordance with slope and aspect, proximity to the coast, and previous disturbance (with resultant varying degrees of succession). Dune ridges are well vegetated with forest, while inter-dune valleys / troughs comprise a mosaic of shrubs, trees and grasses. It is likely that some form of disturbance occurred in the inter-dune valleys / troughs in the past, and this disturbance is more evident in some areas than others. However, the change in vegetation between the ridges and inter-dune valleys / troughs is also likely a result of natural changes in topography, soil moisture and depth. Trough areas provide an important ecological function, and are considered part of the general forest ecosystem.

Vegetation in the survey area has been described and delineated as follows:

- ❖ Forest which occurs mostly on dune ridges and slopes
- ❖ A forest/thicket mosaic vegetation type that occurs in inter-dune valleys/troughs
- ❖ Forest in early stages of succession and/or where remnants of forest that was disturbed occurs. Low level alien vegetation invasion occurs in these areas
- ❖ Disturbed forest with more than 50% alien vegetation invasion

Figure 4 shows the location of forest in the survey area.

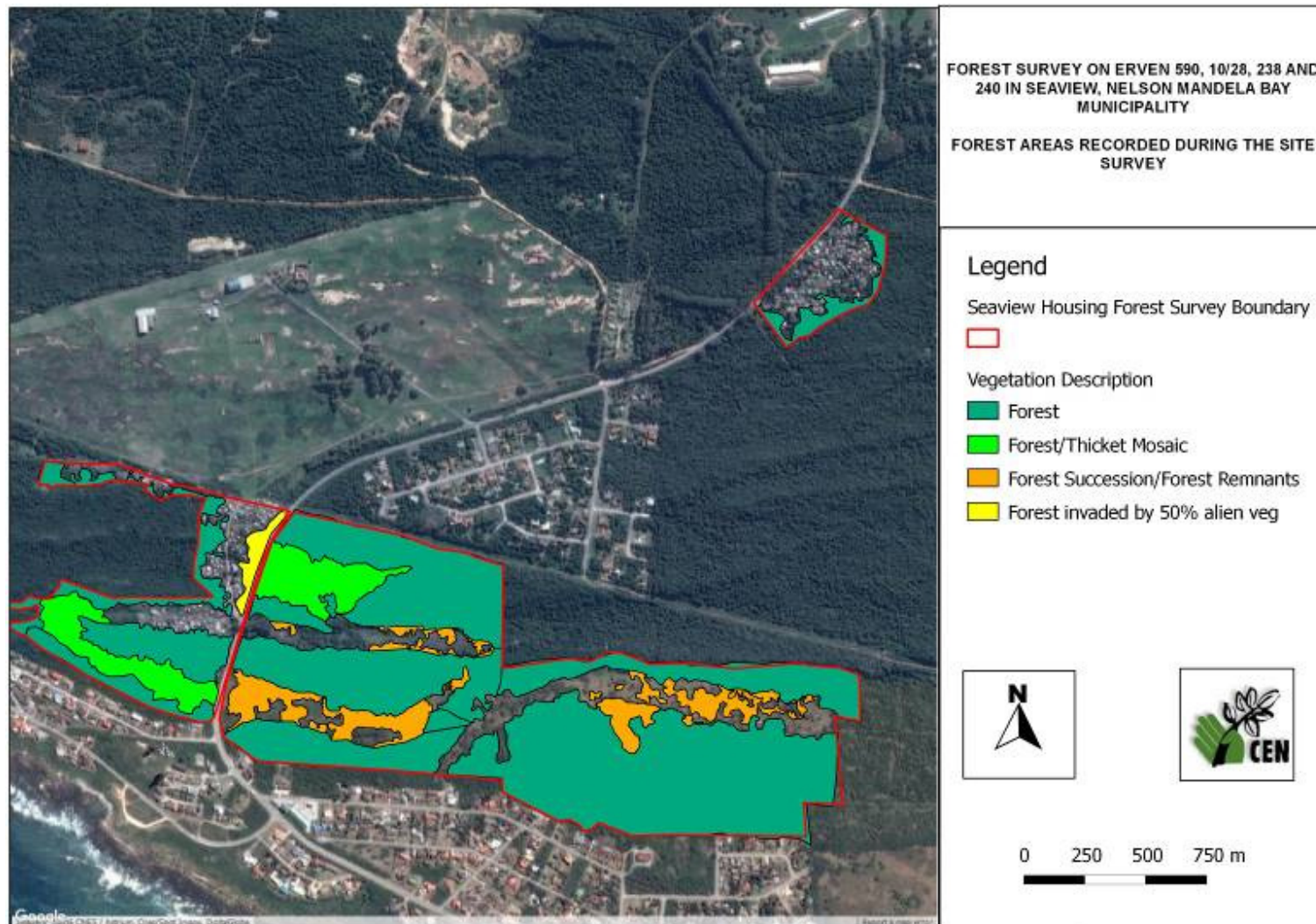


Figure 4: Map showing the location of forest in the survey area, and the classification of vegetation across the site.

1.3 Survey notes and general description of different portions of the site, with relevance to forest mapping

Figure 3 is an overview map of the areas described below. The section that follows gives a general description of each portion of the survey area, including a current high aerial resolution aerial image with 1 m contours and a summary vegetation description map.

1.3.1 Areas A and G on Erf 240 (Figure 5 and Figure 6)

Area A comprises a relatively wide valley between forested ridges to the north and south, which converge in an easterly direction forming a closed and sheltered valley. The ridges and slopes (particularly the south-facing slopes) are covered in dense forest, with characteristic floral species listed for Albany Forest and East Cape Dune Forest. The valley is a mix of thicket species and forest clumps, with some open areas covered in a grassy/fynbos mosaic. A large number of *Vachellia karroo* trees occur in the valley, and some of the forest clumps have tall forest trees (e.g. ~7 m high milkwood trees). Tree felling has taken place in some sections. Where disturbance has taken place, alien trees have established, most notably *Acacia cyclops*.

Area G is an informal settlement situated along either side of a track between relatively intact forest on a ridge to the west, and forest that has been disturbed and is now heavily invaded by alien vegetation to the east. Dumping of rubble and garden refuse occurs on the edge of the track, especially in the vicinity of waypoints 288 and 289 (refer to Figure 6). Several of the houses in the settlement have retained forest trees in their gardens, many of which include protected species (e.g. milkwoods – refer to waypoint numbers 293 to 299).



Figure 5: Current and high resolution aerial image of Areas A and G (images provided by Robertson Baker Lochner Architects, 2016).

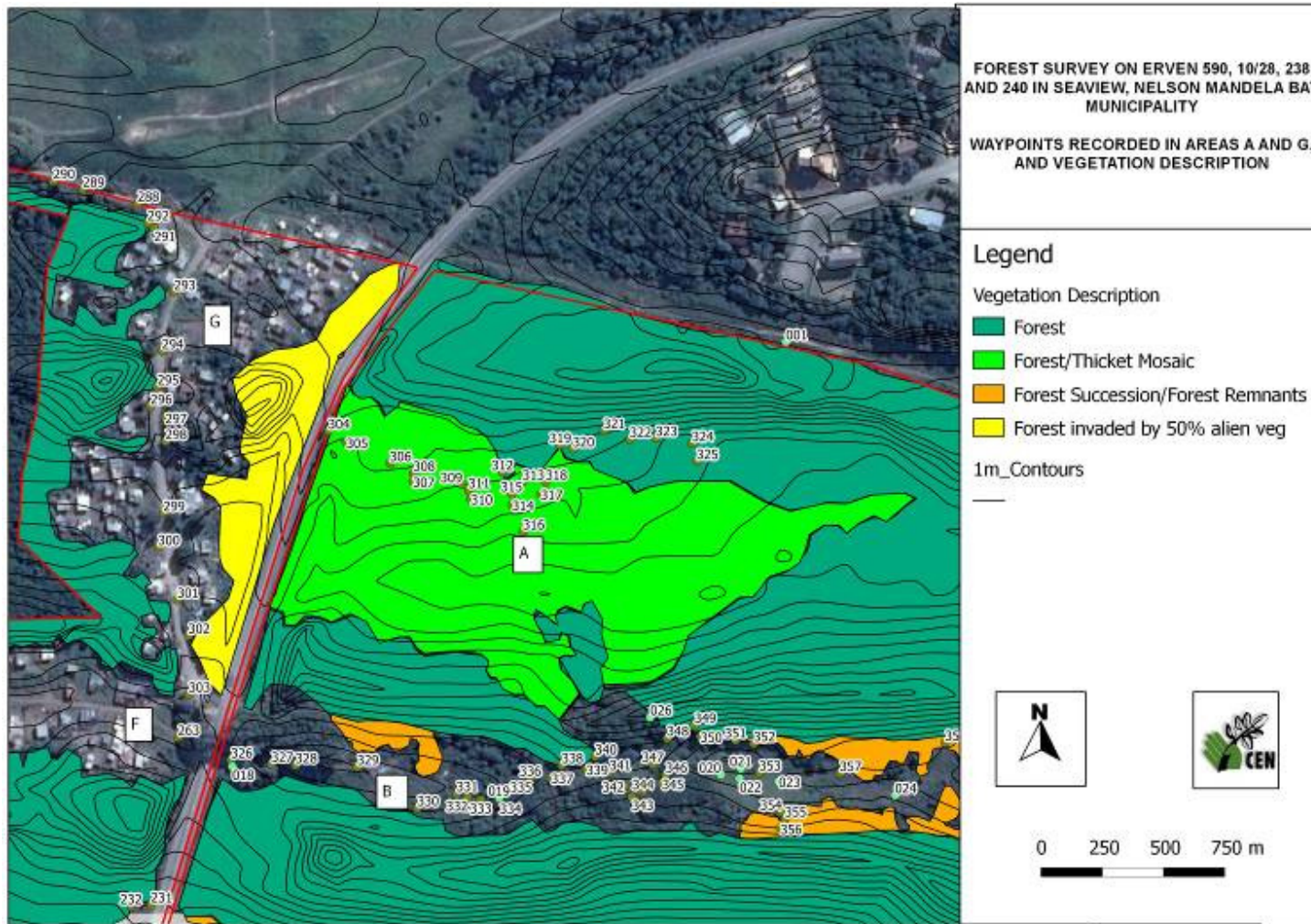


Figure 6: Map of Areas A and G, with waypoints where vegetation was described in the survey.

1.3.2 Areas E and F on Erf 240 and Erf 238 (Figure 7 and Figure 8)

A ridge occurs in the south-eastern section of Area E, with a reservoir at the top. The ridge has forest species, but some alien trees are found in disturbed sections (e.g. near the reservoir). The valley is a mosaic of forest and thicket species, with a typical gradient of pioneer species on the lower slopes of ridges (e.g. *Searsia crenata*, *S. glauca*, *Osteospermum moniliferum*, *Zanthoxylum capense*, *Scutia myrtina*) becoming more mature forest higher up the slope. In some areas of the valley, fynbos shrubs also occur amongst thicket species. The northern ridge has more mature and well developed forest, especially in areas north of Waypoints 238 to 256. Dune ridges to the north and south merge in a westerly direction, with vegetation becoming progressively more thicket in nature (refer to photo taken from Waypoint 258 with a view in a westerly direction - Plate 1). Aloe species were recorded from waypoint 254 and increased in number in a westerly direction.



Plate 1: Photo taken from Waypoint 258 in a westerly direction (Area E). The area where the two ridges merge in the west, and vegetation becomes more thicket dominated can be viewed in the distance. The typical mosaic vegetation in the valley can be seen in the foreground.

An informal settlement has developed in a low lying area between two ridges to the north and south in Area F. As in Area G, several of the homes in Area F have retained forest species around their structures. A narrow valley occurs in the vicinity of Waypoint 277. The valley and the steep slopes leading up the ridge have mature forest, however signs of tree felling were noted and alien trees are encroaching in disturbed areas (refer to Waypoints 279 to 281).



Plate 2: Establishment of an informal settlement in the lower lying areas between forested dune ridges in Area F.



Plate 3: Tree felling in forested areas on the northern ridge and inter-dune valley in Area F.



Figure 7: Current and high resolution aerial image of Areas E and F (images provided by Robertson Baker Lochner Architects, 2016).

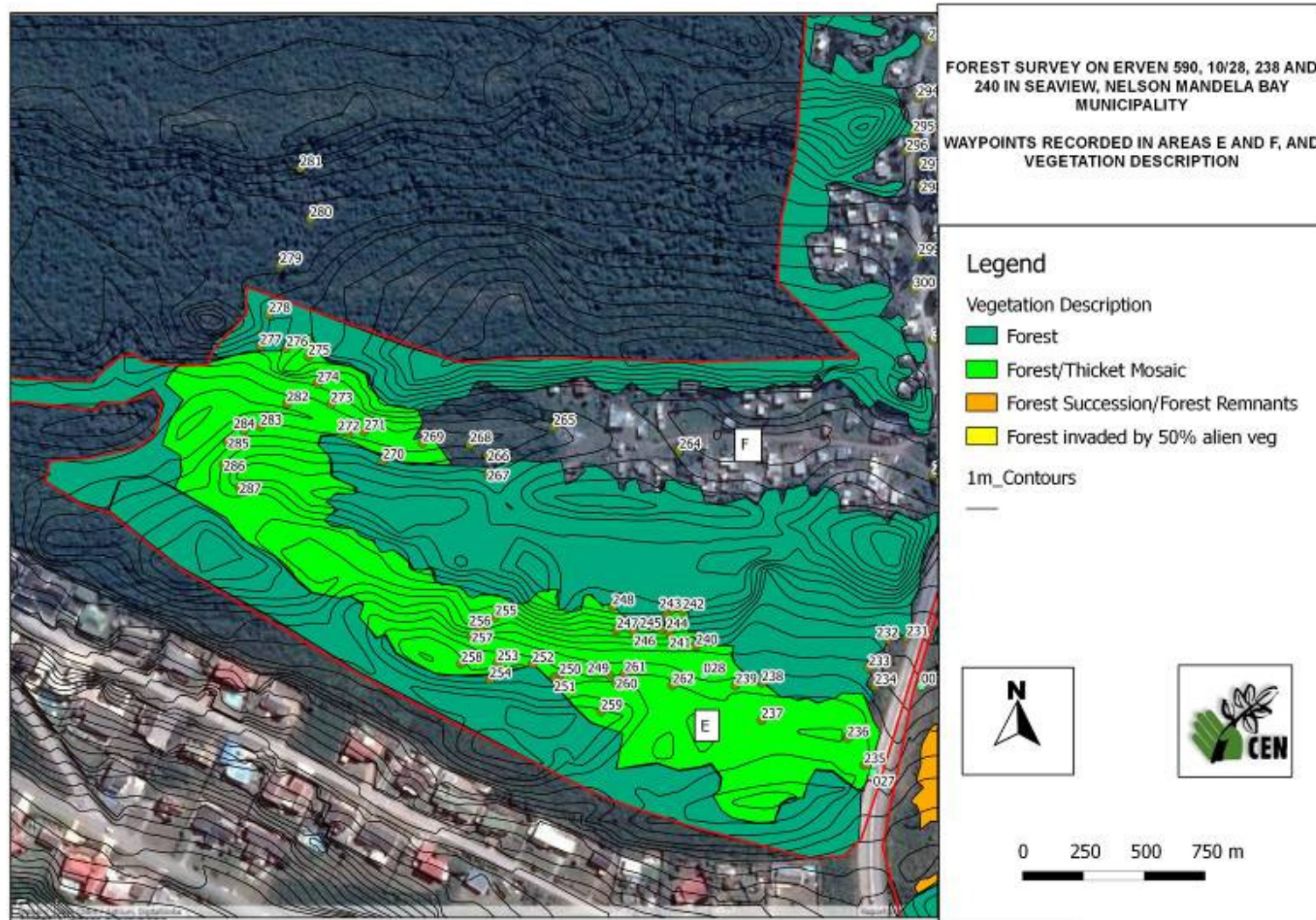


Figure 8: Map of Areas E and F, with waypoints where vegetation was described in the survey.

1.3.3 Areas B and C on Erf 240

Area B is a relatively narrow east-west valley between two forested dune ridges to the north and south. The western extent of the valley has been disturbed, and has large stands of alien trees (*Eucalyptus* sp. and *Acacia cyclops*). Dumping of rubble and household waste also takes place (Plate 4). The valley comprises a mix of open grassy areas with alien trees and some ruderals⁴, with remnant clumps of forest trees and forest in early stages of succession, especially further to the east (Plate 5).

The valley in Area C is relatively wide and connects in an easterly direction with Area G. The north-facing slope of the southern-most ridge has a gentle gradient with forest on the ridge top. The valley has several open areas with a grassy/fynbos mix, and large swathes of *Osteospermum moniliferum*. A large stand of *Eucalyptus* trees occurs between waypoints 7 and 9 (Plate 6). Clearing of *Acacia* trees appears to be taking place (observed at waypoint 5 and 8). The south facing slopes of the northern ridge in Area C are dominated by forest vegetation (Plate 7).

⁴ A ruderal species is one that colonises disturbed areas (natural or artificial disturbances)



Figure 9: Current and high resolution aerial image of Areas E and F (images provided by Robertson Baker Lochner Architects, 2016).

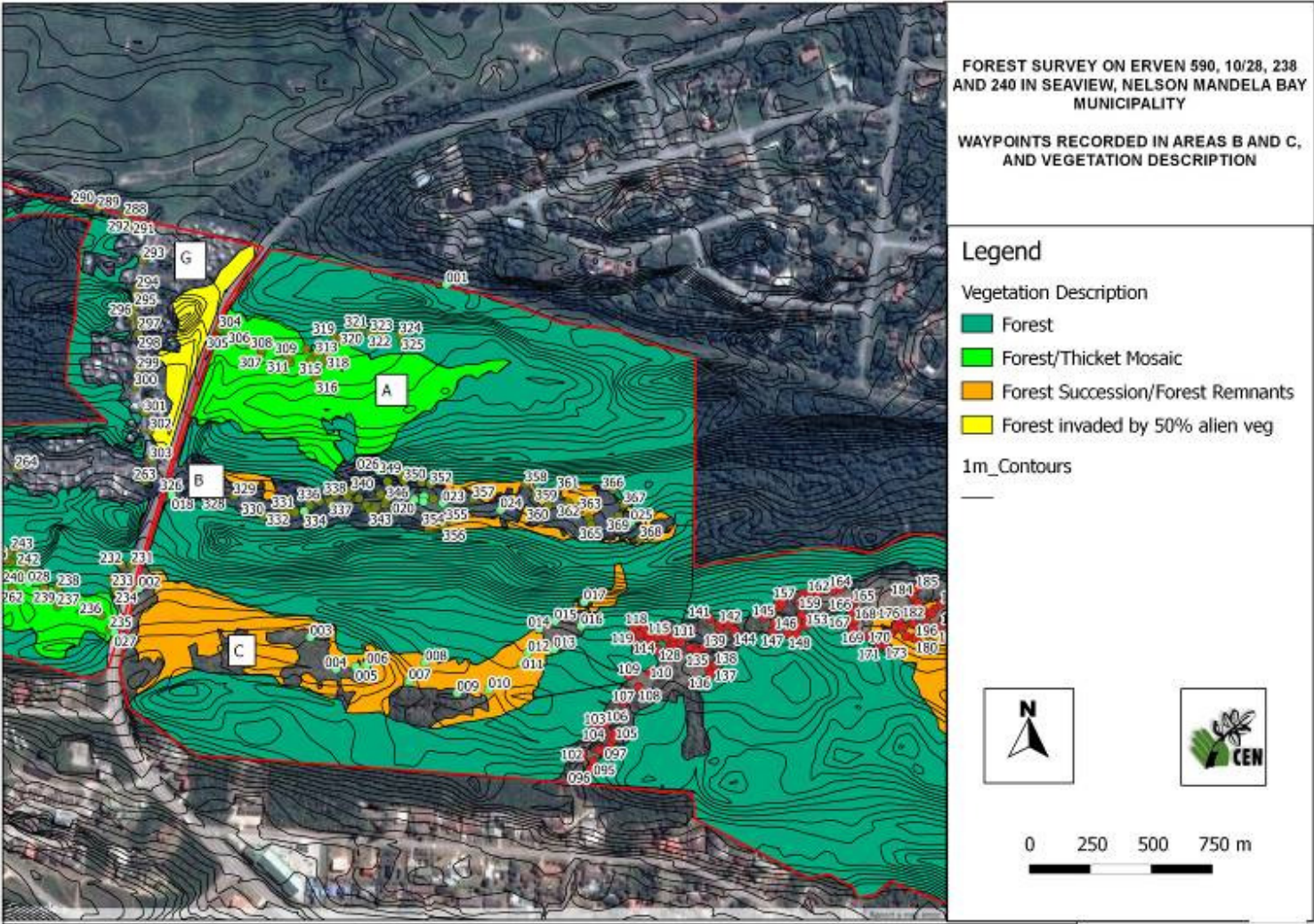


Figure 10: Map of Areas B and C, with waypoints where vegetation was described in the survey.



Plate 4: View from waypoint 329 towards to the east. Alien vegetation on the edges of the lower slopes can be seen in the background, with obvious signs of dumping in the foreground.



Plate 5: A view from waypoint 348 in an easterly direction of the valley flanked by forest in early stages of succession. As the slope increases to the north and south, forest becomes more prominent.



Plate 6: A view of the valley in Area C from Waypoint 3 in a westerly direction. The tall stand of *Eucalyptus* trees can be seen in the background. Note the dense swathes of *Osteospermum moniliferum* in the foreground, and forest restricted to ridge tops to the north and south.



Plate 7: A view from Waypoint 13 in a northerly direction at forest on the northern ridge in Area C.

1.3.4 Area D on Erf 31/28 and Erf 10/28

An access track runs north and north-east from Van Renen Road on the western side of Area D. Initially, the path is flanked by a narrow band of alien trees, with forest on either side. The path opens into a valley that runs east-west. In the region of waypoint 132, the track opens into a wider more open area where alien trees dominate. In places, the previously disturbed sections along the track and in the valley have been colonized by pioneer forest species and/or are a mosaic of forest/thicket species (i.e. forest in succession). In others (e.g. in the region of waypoint 183), wide open grassy patches are found with alien trees (Plate 9). As for the remainder of the site, forest occurs on dune ridges and steep slopes, particularly along the south-facing slopes. Vegetation grades to that more typical of thicket in a westerly direction and on the southern-most ridge (reference from waypoint 211 and 212 where Aloes and Cotyledon species become more abundant and Plate 10).



Figure 11: Current and high resolution aerial image of Areas E and F (images provided by Robertson Baker Lochner Architects, 2016).

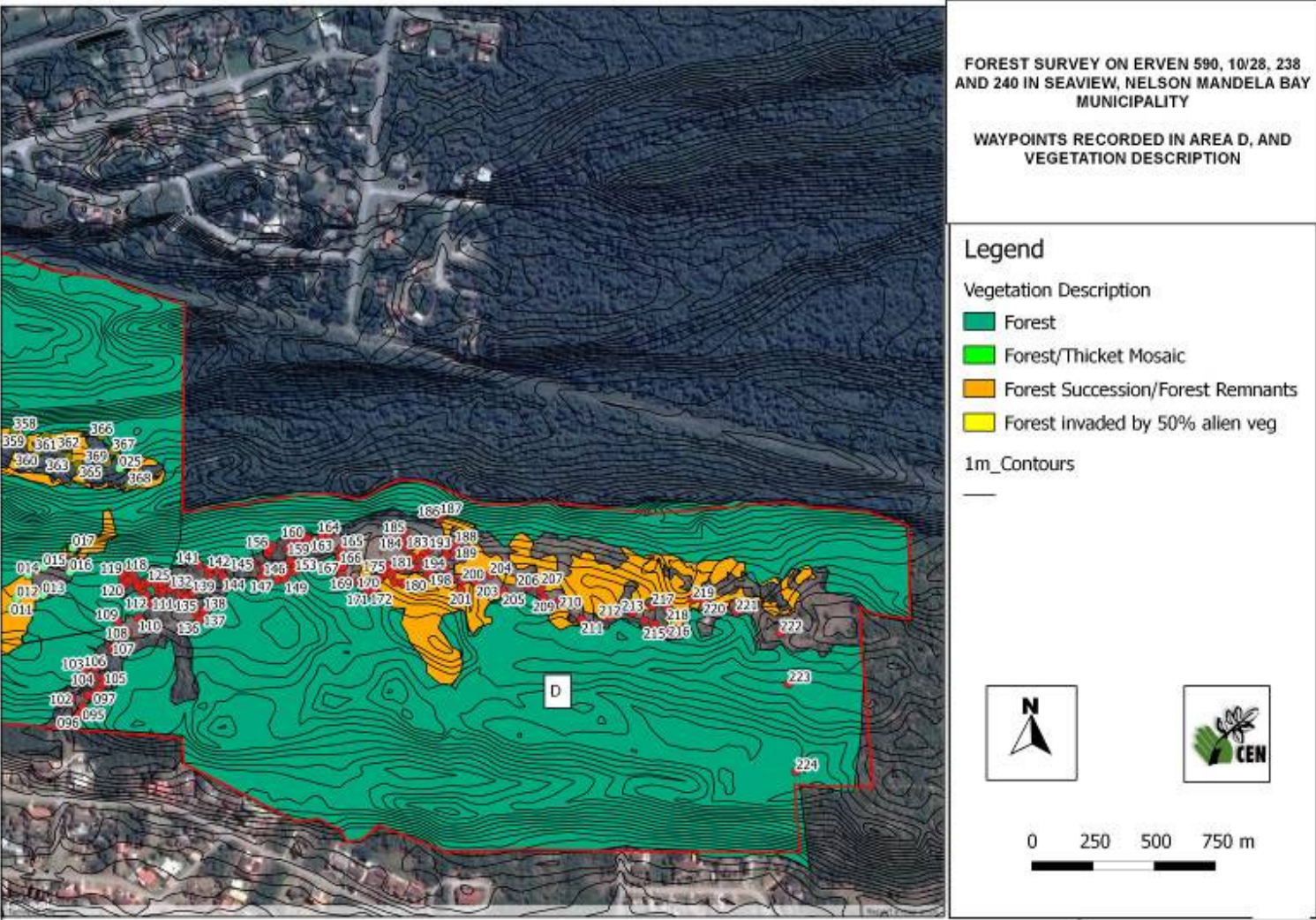


Figure 12: Map of Area D, with waypoints where vegetation was described in the survey.



Plate 8: Sections of the valley in Area D where vegetation comprises a forest/thicket mosaic.



Plate 9: A view of wide open grassy areas in the valley in Area D with some alien *Acacia* trees. Forest can be seen on the ridge to the north.



Plate 10: A view of vegetation grading into a forest/thicket mosaic in a westerly direction on the southern-most ridge, with an increase in abundance of Aloes and Cotyledon species (near waypoint 212).

1.3.5 Area H on Erf 590

Area H is a section of forest that has been cleared for the establishment of an informal settlement. Apart from a band of *Eucalyptus* trees along Seaview Road on the western side of the settlement, the settlement is predominantly nestled in forest.



Figure 13: Current and high resolution aerial image of Area H (images provided by Robertson Baker Lochner Architects, 2016).

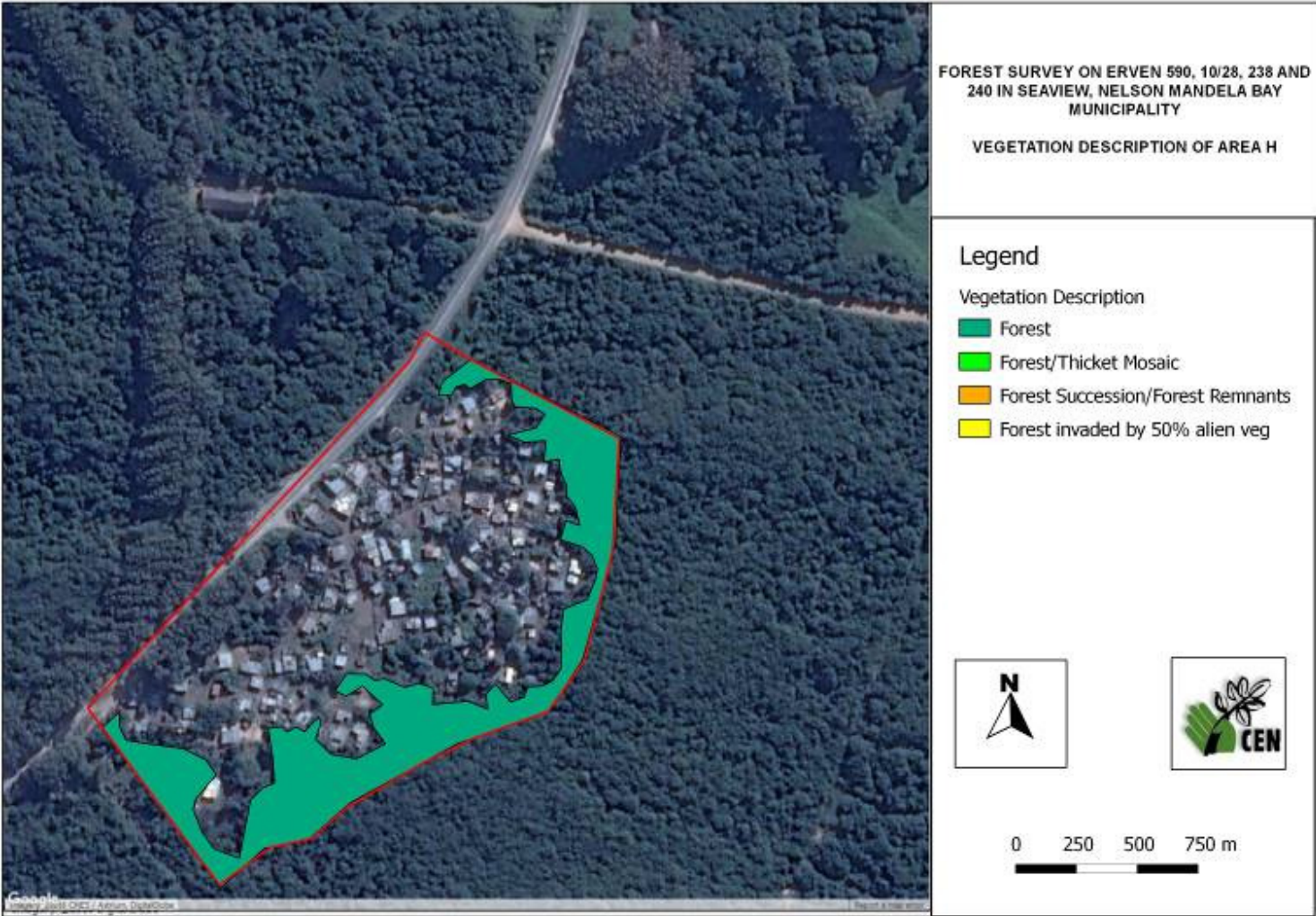


Figure 14: Map of Area H, and vegetation description.

1.4 Description of vegetation composition and structure

1.4.1 Description of the forest type according to desktop information

1.4.1.1 Map of Port Elizabeth Forests

The Department of Forestry has developed a map indicating forest areas in the Nelson Mandela Bay Municipality (Figure 15). According to this, a portion of Erf 590 and a portion of Erf 240 on the western side of Seaview Road are not forested areas – this is where informal settlements have established. The remainder of the sites surveyed are all classified as forest.

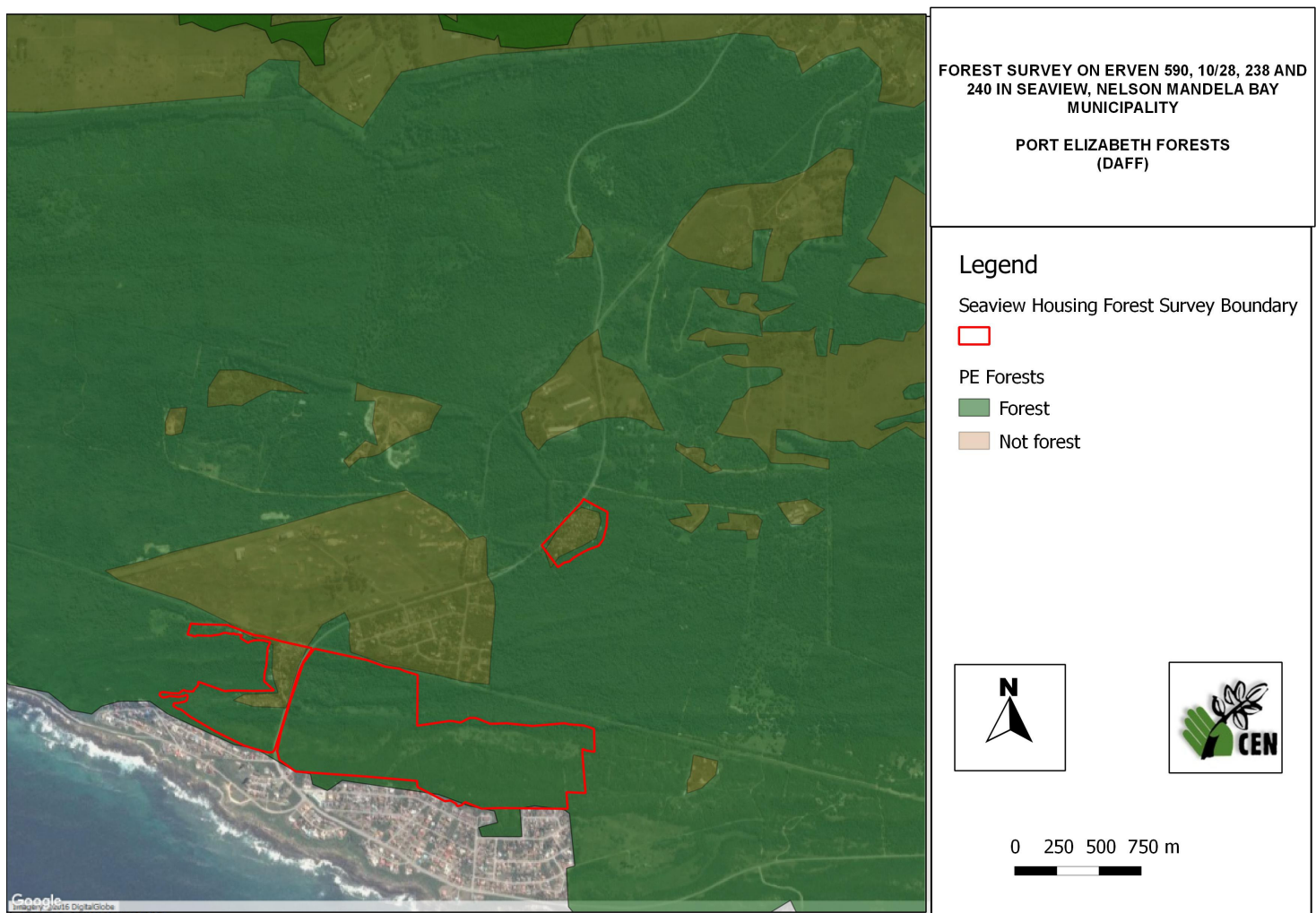


Figure 15: Map showing the extent of Port Elizabeth forests as determined by the Department of Agriculture, Forestry and Fisheries (2014).

1.4.1.2 National Vegetation Type (Mucina and Rutherford, 2012)

The national vegetation map for South Africa by Mucina and Rutherford describes vegetation in most of the survey area as 'Algoa Dune Strandveld', with only the northern part of Erf 590 falling in 'Southern Coastal Forest' (Figure 16).

Algoa Dune Strandveld is described as '*tall dense thickets on dunes mainly outside the influence of salt spray, dominated by stunted trees, shrubs (often armed with spines and thorns), abundant lianas and sparse herbaceous and grassy undergrowth*' (refer to Appendix 1). Areas classified as 'forest/thicket mosaic' occurring in inter-dune areas and on forest margins across the area would correspond relatively well with this description. In particular, vegetation on the southern-most dune ridge on the eastern and western extremities of the survey area, becomes more typical of Algoa Dune Strandveld.

Mucina and Rutherford note that forest does not occur in Algoa Dune Strandveld, even though climatic conditions are suitable. Possible reasons given for the absence of forest are because the substrate consists of Aeolian quaternary sands, salt-laden winds are prevalent in this region and because fires may periodically occur here. Despite this, the occurrence of forest on the site as determined in the site survey is plausible considering the distance from the coast (~500 m) as well as the shelter from salt spray provided by a series of well vegetated dune ridges. Fire also appears to have been excluded from the area, but may occur especially in area where disturbance has occurred opening up the vegetation and allowing for alien vegetation encroachment.

Southern Coastal Forest is described as '*low forests dominated by Celtis africana, Sideroxylon inerme, Mimusops caffra and Dovyalis rotundifolia. In the eastern regions of the distributed area, having well-developed low-tree and shrub (Brachylaena discolor, Strychnos decussata, Euclea natalensis, Dracaena alectrifomis etc.) as well as herb (Isoglossa woodii, Hypoestes aristata, Laportea grossa, Oxalis pes-caprae) layers, becoming increasingly floristically and structurally impoverished in a westward direction*'. Southern Coastal Forest occurs on '*well-drained sandy soils of the coastal (dune) origin over sedimentary rocks of Alexandria and Nanaga Formations of the Algoa Group*'.

It appears as if areas demarcated as 'forest' in the site survey correspond with the description given for Southern Coastal Forest, and that vegetation becomes more typical of Algoa Dune Strandveld in a southerly direction as distance to the coast decreases.

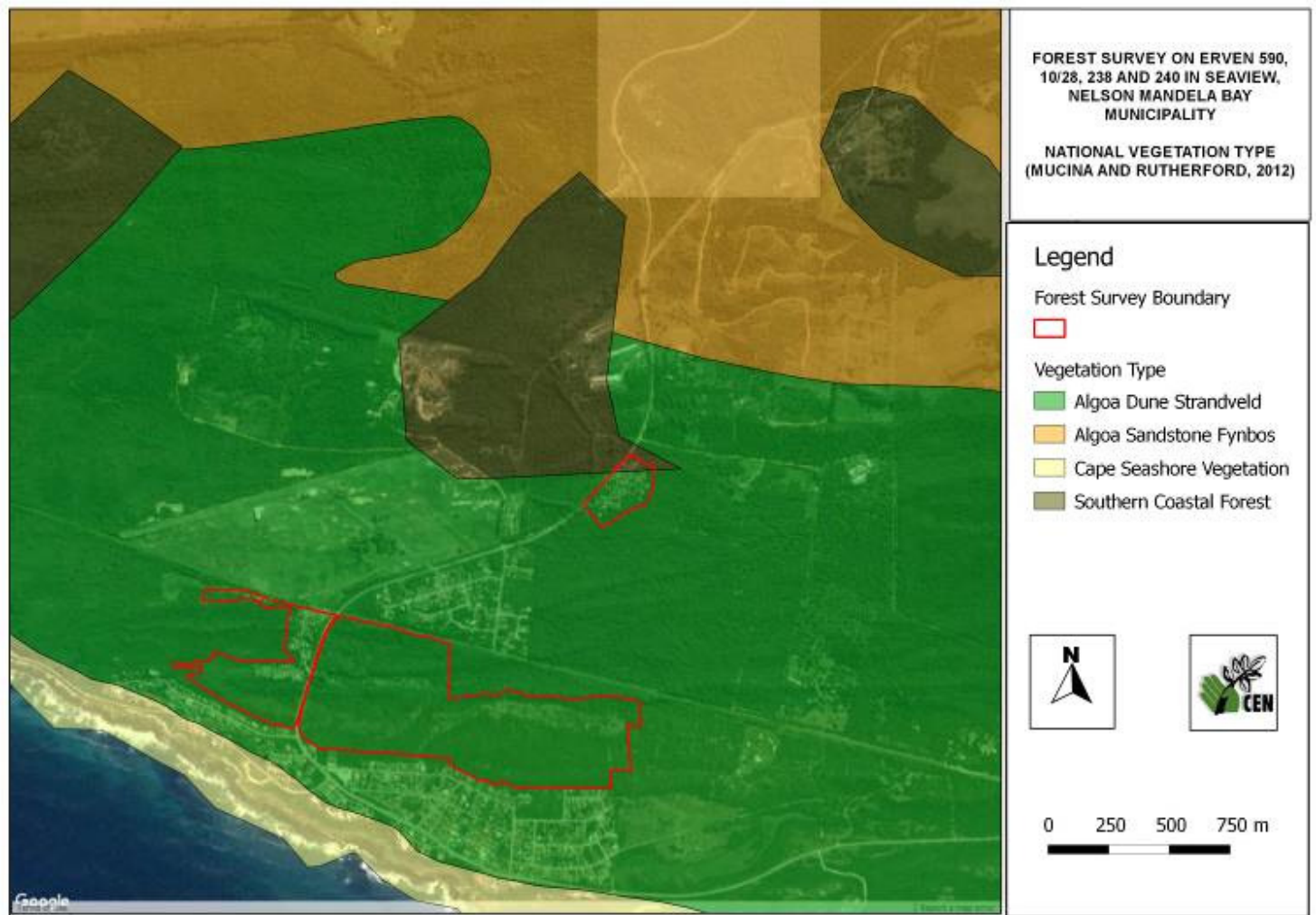


Figure 16: National Vegetation Types described by Mucina and Rutherford (2012).

1.4.1.3 National Forest Classification (2003)

A national forest classification was done for the then Department of Water Affairs and Forestry in 2003 (Environmentek CSIR, 2003). The study mapped forest distribution and defined forest types. This information was critical in assisting the Department of Forestry to adequately manage, monitor and protect forest resources in the country. The classification describes 7 forest groups and 24 forest types nationally. Using this classification system, the forest group described for the study area is the Southern Coastal Group (Figure 17), and the forest type is 'Albany Forests' (Figure 18). The profile of the Southern Coastal Group is described as *'comprises low/middle-grown subtropical forests on coastal dunes of Eastern Cape, forests covering undulating coastal plains S of Alexandria and occurring as far west as Van Stadens River canyon (W of*

Port Elizabeth). Some forests found at feet of deep river valleys in the Albany District surrounded by subtropical succulent thickets are classified within this group as well. The westernmost forest type of this group is the Western Cape Milkwood Forest found on stabilized coastal dunes and limestone outcrops in an interrupted belt along southern seaboard between Nature's Valley (Plettenberg Bay) and Llandudno (Cape Town). The dominating floral element is subtropical, although some afrotemperate elements occur in these forests as well. The tree layer is dominated by *Sideroxylon inerme*, *Mimusops caffra* and *Dovyalis rotundifolia* (**on dunes**) and *Celtis africana* (in coastal-plain and valley forests). The profile of the Albany Forest type is described as 'Dense, short-statured forest, with canopy height varying from approximately 5 to 15 m on deep sands overlaying the Nanaga and Alexandria Formations in the Port Elizabeth region (Maitland River to Kei River mouths). The presence of canopy emergents *Erythrina cafra* and *Podocarpus falcatus* and the abundance of lianas, spinescent shrubs such as *Scutia myrtina* and *Capparis sepiaria*, and of herbs (notably of the family Acanthaceae and *Solanum geniculatum*) are also characteristic. The undergrowth can form an impenetrable mass of vegetation, especially where the canopy is less than 5 m high. The forest is mostly surrounded by pasture, almost all of which is transformed Albany Forests'.

Ordination plots done in the classification of forest types showed that Albany Coastal Forest and East Cape Dune Forest are similar in floristic terms, and therefore both types fall under the Southern Coastal Group. The profile of Eastern Cape Dune Forests is described as 'Subtropical low-stature, dense-canopy forest on old stabilized coastal dune cordons fringing the Eastern Cape coast, usually dominated by *Mimusops caffra*, *Sideroxylon inerme* and *Dovyalis rotundifolia*'.

Figure 18 shows that the study area is roughly on the western extent of the Albany Forest type. Appendix 2 includes an extract of the descriptions given for the two forest types. Common canopy/sub-canopy species listed for Albany Forest and East Cape Dune Forest are similar to those that were noted on the site (e.g. *Sideroxylon inerme*, *Dovyalis rotundifolia*, *Allophylus natalensis*, *Mystroxydon aethiopicum*, and *Euclea racemosa*). Tall species such as *Podocarpus falcatus* and *P. latifolius* were not observed on site. Species in the Acanthaceae family and *Panicum deustum* were recorded in the herb layer, which are listed as typical for the forest types. Vegetation structure in areas deemed to be forest on the site is similar to that described for Eastern Cape Dune Forest. The average canopy height is 5 m, reaching a maximum of 8 m on dune ridges particularly south-facing slopes. The undergrowth/understorey vegetation comprises spinescent vegetation and is dense in places.

Both Albany Forest and Eastern Cape Dune Forest are found outside the Indian Ocean Coastal Belt (or Coastal Subtropical Forest Biome) and are surrounded either by subtropical Albany Thickets or (at the westernmost limits of distribution) by a complex of grassy fynbos and coastal thickets (Environmentek CSIR, April 2003). Vegetation distribution on site corresponds well with this description, where forest is found on old dune ridges and slopes (particularly south-facing), merging into a mosaic of forest and thicket vegetation in wider open valleys, and as the coast is approached in a southerly direction. The distinction between forest and dune thicket is less clear in the southern-most portion of the survey area, where the structure is not typical of forest however typical species are present.

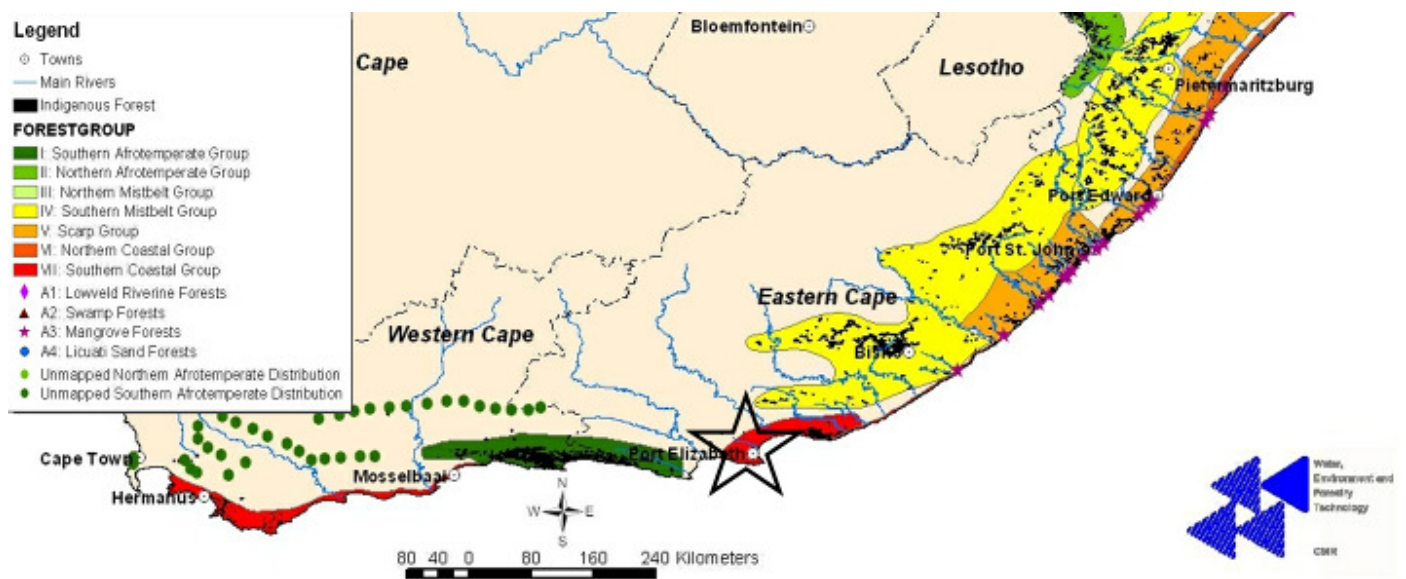


Figure 17: The forest group described for the study area (black star) is the Southern Coastal Group (VII) (Environmentek CSIR, April 2003).

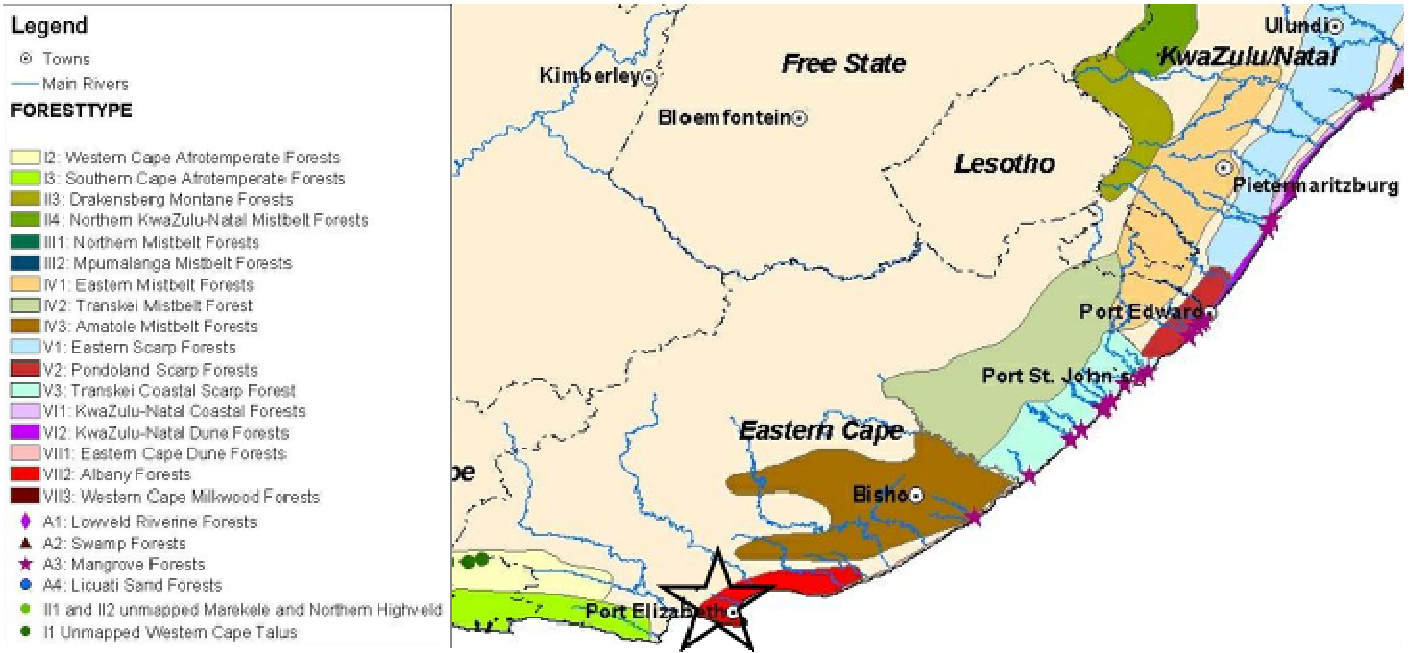


Figure 18: The forest type described for the study area (black star) is between Albany Forest (VII2) (Environmentek CSIR, April 2003). Eastern Cape Dune Forest is not clearly visible on the map, but is the thin light pink band that runs along the coast between the Transkei Wild Coast and Woody Cape (South of Alexandria).

1.4.2 Floral Species recorded during the site survey

A list of floral species recorded in the site survey is shown in Table 1. The list includes species occurring in areas classified as forest, forest/thicket mosaic, and disturbed forest. An indication is given of the threatened/protected status of the species in terms of the National Red Data List, the National Forest Act, and the Eastern Cape Nature and Environment Conservation Ordinance. Exotic/invaser species are classified according to the Conservation of Agricultural Resources Act and the list of invasive plants published under the NEM: Biodiversity Act.

Table 2 is the same floral species list, but the occurrence of each species in different areas across the site (as depicted in Figure 3) is given.

Table 1: List of floral species recorded during the site survey and threatened/protection status classification in terms of the National Red Data List, the National Forest Act, and the Eastern Cape Nature and Environment Conservation Ordinance. Exotic/invaser species are classified according to the Conservation of Agricultural Resources Act and the list of invasive plants published under the NEM: Biodiversity Act (CARA: Conservation of Agricultural Resources Act, NEM:BA: National Environmental Management Biodiversity Act, NECO: Nature and Environmental Conservation Ordinance). Species in **green text are threatened/protected, while those in **red** text are alien species.**

Family	Species	Red List of South African Plants, version 2015.1	CARA 43 of 1983	NEM:BA Invasive Plants, 2016	Nat Forests Act 84 of 1998	NECO No. 19 of 1974
ACANTHACEAE	Hypoestes aristata (Vahl) Sol. ex Roem. & Schult.	LC				
ACANTHACEAE	Hypoestes forskoolii (Vahl) R.Br.	LC				
ACANTHACEAE	Isoglossa ciliata (Nees) Lindau	LC				
AIZOACEAE	Aizoon rigidum L.f.	LC				Sched. 4: Protected
AIZOACEAE	Carpobrotus deliciosus (L.Bolus) L.Bolus	LC				Sched. 4: Protected
AIZOACEAE	Drosanthemum hispidum (L.) Schwantes	LC				Sched. 4: Protected
AIZOACEAE	Mesembryanthemum aitonis Jacq.	LC				Sched. 4: Protected
AIZOACEAE	Tetragonia fruticosa L.	LC				Sched. 4: Protected
AMARANTHACEAE	Exomis microphylla (Thunb.) Aellen var. axyrioides (Fenzl) Aellen	LC				
AMARYLLIDACEAE	Boophone disticha (L.f.) Herb.	Declining				Sched. 4: Protected
ANACARDIACEAE	Searsia crenata (Thunb.) Moffett	LC				
ANACARDIACEAE	Searsia glauca (Thunb.) Moffett	LC				
ANACARDIACEAE	Searsia pterota (C.Presl) Moffett	LC				
APOCYNACEAE	Carissa bispinosa (L.) Desf. ex Brenan	LC				
APOCYNACEAE	Cynanchum ellipticum (Harv.) R.A.Dyer	LC				

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APOCYNACEAE	<i>Cynanchum natalitium</i> Schltr.	LC				
APOCYNACEAE	<i>Secamone alpini</i> Schult.	LC				
ASPARAGACEAE	<i>Agave sisalana</i> Perrine	NE	Category 2: Invader	Category 2		
ASPARAGACEAE	<i>Asparagus africanus</i> Lam.	LC				
ASPARAGACEAE	<i>Asparagus crassicaudus</i> Jessop	LC				
ASPARAGACEAE	<i>Asparagus racemosus</i> Willd.	LC				
ASPHODELACEAE	<i>Aloe africana</i> Mill.	LC				Sched. 4: Protected
ASPHODELACEAE	<i>Aloiampelos ciliaris</i> (Haw.) Klopper & Gideon.F.Sm. var. <i>ciliaris</i>	LC				Sched. 4: Protected
ASPHODELACEAE	<i>Trachyandra ciliata</i> (L.f.) Kunth	LC				
ASTERACEAE	<i>Arctotheca calendula</i> (L.) Levyns	LC				
ASTERACEAE	<i>Conyza bonariensis</i> (L.) Cronquist	NE				
ASTERACEAE	<i>Delairea odorata</i> Lem.	LC				
ASTERACEAE	<i>Felicia amoena</i> (Sch.Bip.) Levyns	LC				
ASTERACEAE	<i>Felicia erigeroides</i> DC.	LC				
ASTERACEAE	<i>Gazania krebsiana</i> Less.	LC				
ASTERACEAE	<i>Helichrysum cymosum</i> (L.) D.Don subsp. <i>cymosum</i>	LC				
ASTERACEAE	<i>Helichrysum foetidum</i> (L.) Moench	LC				
ASTERACEAE	<i>Helichrysum teretifolium</i> (L.) D.Don	LC				
ASTERACEAE	<i>Metalasia densa</i> (Lam.) P.O.Karis	LC				
ASTERACEAE	<i>Osteospermum moniliferum</i> L.	LC				
ASTERACEAE	<i>Senecio angulatus</i> L.f.	LC				
ASTERACEAE	<i>Senecio elegans</i> L.	LC				
ASTERACEAE	<i>Senecio glutinosus</i> Thunb.	LC				
ASTERACEAE	<i>Senecio ilicifolius</i> L.	LC				
BASELLACEAE	<i>Anredera cordifolia</i> (Ten.) Steenis	NE	Category 1: Weed	Category 1b		

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BRASSICACEAE	Capparis fascicularis DC. var. zeyheri (Turcz.) Toelken	LC				
BRASSICACEAE	Capparis sepiaria L. var. citrifolia (Lam.) Toelken	LC				
BRASSICACEAE	Lepidium africanum (Burm.f.) DC. subsp. africanum	LC				
BRASSICACEAE	Maerua cafra (DC.) Pax	LC				
CACTACEAE	Opuntia ficus-indica (L.) Mill.	NE	Category 1: Weed	Category 1b		
CELASTRACEAE	Cassine peragua L.	LC				
CELASTRACEAE	Lauridia tetragona (L.f.) R.H.Archer	LC				
CELASTRACEAE	Mystroxydon aethiopicum (Thunb.) Loes.	LC				
CELASTRACEAE	Putterlickia pyracantha (L.) Szyszyl.	LC				
COLCHICACEAE	Colchicum eucomoides (Jacq.) J.C.Manning & Vinn.	LC				
CRASSULACEAE	Cotyledon velutina Hook.f.	LC				
CRASSULACEAE	Crassula expansa Dryand.	LC				
CRASSULACEAE	Crassula glomerata P.J.Bergius	LC				
CUCURBITACEAE	Coccinia quinqueloba (Thunb.) Cogn.	LC				
CYPERACEAE	Cyperus sp.	LC				
EBENACEAE	Euclea racemosa Murray	LC				
EUPHORBIACEAE	Euphorbia heterophylla L.	NE				
EUPHORBIACEAE	Euphorbia kraussiana Bernh.	LC				
EUPHORBIACEAE	Ricinus communis L. var. communis	NE	Category 2: Invader	Category 1b		
FABACEAE	Acacia cyclops A.Cunn. ex G.Don	NE	Category 2: Invader	Category 1b		
FABACEAE	Rhynchosia caribaea (Jacq.) DC.	LC				
FABACEAE	Schotia afra (L.) Thunb. var. afra	LC				
FABACEAE	Vachellia karroo (Hayne) Banfi & Gallaso	LC				
FUMARIACEAE	Fumaria muralis Sond. ex W.D.J.Koch subsp. muralis	NE				

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GERANIACEAE	<i>Pelargonium capitatum</i> (L.) L'Hér.	LC			
GERANIACEAE	<i>Pelargonium odoratissimum</i> (L.) L'Hér.	LC			
IRIDACEAE	<i>Chasmanthe aethiopica</i> (L.) N.E.Br.	LC			
LAMIACEAE	<i>Leonotis ocyimifolia</i> (Burm.f.) Iwarsson	LC			
LAMIACEAE	<i>Salvia africana-lutea</i> L.	LC			
MALVACEAE	<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC			
MALVACEAE	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC			
MALVACEAE	<i>Hermannia althaeoides</i> Link	LC			
MALVACEAE	<i>Malva parviflora</i> L. var. <i>parviflora</i>	NE			
MELIACEAE	<i>Melia azedarach</i> L.	NE			
MENISPERMACEAE	<i>Cissampelos capensis</i> L.f.	LC			
MYRTACEAE	<i>Eucalyptus</i> sp.	NE	Category 2: Invader	Category 1b	
OLEACEAE	<i>Chionanthus foveolatus</i> (E.Mey.) Stearn	LC			
OLEACEAE	<i>Jasminum angulare</i> Vahl	LC			
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	LC			
POACEAE	<i>Cynodon dactylon</i> (L.) Pers.	LC			
POACEAE	<i>Ehrharta villosa</i> J.H.Schult.	LC			
POACEAE	<i>Imperata cylindrica</i> (L.) Raeusch.	LC			
POACEAE	<i>Panicum deustum</i> Thunb.	LC			
POACEAE	<i>Panicum maximum</i> Jacq.	LC			
POACEAE	<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	NE			
POACEAE	<i>Stenotaphrum secundatum</i>	LC			
POACEAE	<i>Stipagrostis zeyheri</i> (Nees) De Winter	LC			
PRIMULACEAE	<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	NE			
RANUNCULACEAE	<i>Clematis brachiata</i> Thunb.	LC			
RHAMNACEAE	<i>Scutia myrtina</i> (Burm.f.) Kurz	LC			
RUBIACEAE	<i>Canthium inerme</i> (L.f.) Kuntze	LC			
RUBIACEAE	<i>Galium tomentosum</i> Thunb.	LC			

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RUTACEAE	<i>Clausena anisata</i> (Willd.) Hook.f. ex Benth. var. <i>anisata</i>	LC				Sched. 4: Protected
RUTACEAE	<i>Vepris lanceolata</i> (Lam.) G.Don	LC				Sched. 4: Protected
RUTACEAE	<i>Zanthoxylum capense</i> (Thunb.) Harv.	LC				Sched. 4: Protected
SALICACEAE	<i>Dovyalis rotundifolia</i> (Thunb.) Thunb. & Harv.	LC				
SALVADORACEAE	<i>Azima tetraacantha</i> Lam.	LC				
SANTALACEAE	<i>Colpoon compressum</i> P.J.Bergius	LC				
SANTALACEAE	<i>Rhoiacarpos capensis</i> (Harv.) A.DC.	LC				
SANTALACEAE	<i>Viscum rotundifolium</i> L.f.	LC				
SAPOTACEAE	<i>Sideroxylon inerme</i> L. subsp. <i>inerme</i>	LC			Protected	
SCROPHULARIACEAE	<i>Hebenstretia integrifolia</i> L.	LC				
SCROPHULARIACEAE	<i>Myoporum montanum</i> R.Br.	NE	Category 3: Weed	Category 3		
SCROPHULARIACEAE	<i>Chaenostoma campanulatum</i> Benth.	LC				
SOLANACEAE	<i>Cestrum laevigatum</i> Schldl.	NE	Category 1: Weed	Category 1b		
SOLANACEAE	<i>Lycium cinereum</i> Thunb.	LC				
SOLANACEAE	<i>Lycium ferocissimum</i> Miers	LC				
SOLANACEAE	<i>Solanum africanum</i> Mill.	LC				
SOLANACEAE	<i>Solanum linnaeanum</i> Hepper & Jaeger	LC				
URTICACEAE	<i>Urtica urens</i> L.	NE				
VITACEAE	<i>Cyphostemma cirrhosum</i> (Thunb.) Desc. ex Wild & R.B.Drumm. subsp. <i>cirrhosum</i>	LC				
VITACEAE	<i>Rhoicissus digitata</i> (L.f.) Gilg & M.Brandt	LC				
VITACEAE	<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm.	LC				
ZYGOPHYLLACEAE	<i>Zygophyllum morgsana</i> L.	LC				

Note: LC – least concern, VU – vulnerable, NE – not evaluated (includes naturalised exotics, hybrids and synonyms)

Table 2: List of floral species recorded during the site survey with an indication of the vegetation type in which each is found (and with reference to the portion of the site each species was recorded in - refer to Figure 3). Species in **green** text are threatened/protected, while those in **red** text are alien species. Note: species listed for Albany Forest are shaded in **yellow**, and those for East Cape Dune Forest in **brown**.

Species	Family	A - Forest/Thicket Mosaic in valley, with forested slopes and ridge	B - Forest on slopes and the ridge. Forest Remnants/Succession on edges of forest. Open areas in valley characterised by a mosaic of coastal shrubs, grasses and alien vegetation.	C - Forest on slopes and the ridge. Forest Remnants/Succession on edges of forest. Open areas in valley characterised by a mosaic of coastal shrubs, grasses and alien vegetation	D - Forest on slopes and the ridge. Dune trough/valley characterised by remnant clumps of forest as well as forest in an early stage of succession on forest edges. Open areas dominated by grasses, coastal shrubs and clumps of alien trees	E - Forest on dune Ridges and steeper slopes, becoming thicket/mosaic in lower-lying valleys and in a westerly direction where dune ridges merge	F - Informal settlement, with forest remnants on slopes and ridge. Forest grades to a forest/thicket mosaic in a westerly direction	G - informal settlement bordered by forest to the west, and disturbed forest between the Seaview Road and the settlement with greater than 50% alien vegetation composition
Abutilon sonneratianum (Cav.) Sweet	MALVACEAE			X	X	X		
Acacia cyclops A.Cunn. ex G.Don	FABACEAE	X	X	X	X	X	X	X
Agave sisalana Perrine	ASPARAGACEAE		X			X		X
Aizoon rigidum L.f.	AIZOACEAE	X	X	X	X		X	X
Aloe africana Mill.	ASPHODELACEAE			X	X	X		
Aloiampelos ciliaris (Haw.) Klopper & Gideon.F.Sm. var. ciliaris	ASPHODELACEAE					X		
Anagallis arvensis L. subsp. arvensis	PRIMULACEAE			X		X		
Anredera cordifolia (Ten.) Steenis	BASELLACEAE		X					X
Arctotheca calendula (L.) Levyns	ASTERACEAE			X				
Asparagus africanus Lam.	ASPARAGACEAE			X				
Asparagus crass cladus Jessop	ASPARAGACEAE			X				

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Asparagus racemosus Willd.	ASPARAGACEAE	X	X		X	X	X	X	
Azima tetraantha Lam.	SALVADORACEAE	X		X	X	X	X		X
Boophone disticha (L.f.) Herb.	AMARYLLIDACEAE			X					
Canthium inerme (L.f.) Kuntze	RUBIACEAE				X				
Capparis fascicularis DC. var. zeyheri (Turcz.) Toelken	BRASSICACEAE				X			X	
Capparis sepiaria L. var. citrifolia (Lam.) Toelken	BRASSICACEAE	X	X		X	X		X	X
Carissa bispinosa (L.) Desf. ex Brenan	APOCYNACEAE	X	X	X	X	X	X	X	X
Carpobrotus deliciosus (L.Bolus) L.Bolus	AIZOACEAE	X	X	X	X	X	X	X	
Cassine peragua L.	CELASTRACEAE								
Cestrum laevigatum Schtdl.	SOLANACEAE	X	X	X	X				X
Chaenostoma campanulatum Benth.	SCROPHULARIACEAE			X	X				
Chasmanthe aethiopica (L.) N.E.Br.	IRIDACEAE			X		X	X		
Chionanthus foveolatus (E.Mey.) Stearn	OLEACEAE							X	
Cissampelos capensis L.f.	MENISPERMACEAE	X	X		X	X	X	X	X
Clausena anisata (Willd.) Hook.f. ex Benth. var. anisata	RUTACEAE	X	X		X	X	X		
Clematis brachiata Thunb.	RANUNCULACEAE	X	X	X	X	X			
Coccinia quinqueloba (Thunb.) Cogn.	CUCURBITACEAE	X							X
Colchicum eucomoides (Jacq.) J.C.Manning & Vinn.	COLCHICACEAE			X	X				
Colpoon compressum P.J.Bergius	SANTALACEAE								
Conyza bonariensis (L.) Cronquist	ASTERACEAE								
Cotyledon velutina Hook.f.	CRASSULACEAE				X				
Crassula expansa Dryand.	CRASSULACEAE			X					
Crassula glomerata P.J.Bergius	CRASSULACEAE		X		X				
Cynanchum ellipticum (Harv.) R.A.Dyer	APOCYNACEAE		X	X	X				
Cynanchum natalitium Schltr.	APOCYNACEAE	X	X	X	X	X	X		X

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Cynodon dactylon (L.) Pers.	POACEAE				X	X			
Cyperus sp.	CYPERACEAE							X	
Cyphostemma cirrhosum (Thunb.) Desc. ex Wild & R.B.Drumm. subsp. cirrhosum	VITACEAE		X	X	X	X	X		
Delairea odorata Lem.	ASTERACEAE					X			
Dovyalis rotundifolia (Thunb.) Thunb. & Harv.	SALICACEAE	X	X	X	X	X	X	X	X
<i>Drosanthemum hispidum</i> (L.) Schwantes	AIZOACEAE	X				X		X	
Ehrharta villosa J.H.Schult.	POACEAE	X	X	X	X			X	
<i>Eucalyptus</i> sp.	MYRTACEAE		X	X					X
<i>Euclea racemosa</i> Murray	EBENACEAE	X			X	X	X	X	
<i>Euphorbia heterophylla</i> L.	EUPHORBIACEAE								X
<i>Euphorbia kraussiana</i> Bernh.	EUPHORBIACEAE				X	X	X		
<i>Exomis microphylla</i> (Thunb.) Aellen var. <i>axyrioides</i> (Fenzl) Aellen	AMARANTHACEAE					X			X
<i>Felicia amoena</i> (Sch.Bip.) Levyns	ASTERACEAE				X				
<i>Felicia erigeroides</i> DC.	ASTERACEAE	X			X	X	X	X	X
<i>Fumaria muralis</i> Sond. ex W.D.J.Koch subsp. <i>muralis</i>	FUMARIACEAE		X	X	X				
<i>Galium tomentosum</i> Thunb.	RUBIACEAE		X	X					
<i>Gazania krebsiana</i> Less.	ASTERACEAE		X						X
<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	MALVACEAE	X			X	X	X	X	
<i>Hebenstretia integrifolia</i> L.	SCROPHULARIACEAE				X				
<i>Helichrysum cymosum</i> (L.) D.Don subsp. <i>cymosum</i>	ASTERACEAE					X			
<i>Helichrysum foetidum</i> (L.) Moench	ASTERACEAE		X	X	X				
<i>Helichrysum teretifolium</i> (L.) D.Don	ASTERACEAE				X		X	X	
<i>Hermannia althaeoides</i> Link	MALVACEAE		X						
<i>Hypoestes aristata</i> (Vahl) Sol. ex Roem. & Schult.	ACANTHACEAE		X	X			X		

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<i>Hypoestes forskoolii</i> (Vahl) R.Br.	ACANTHACEAE		X		X	X		
<i>Imperata cylindrica</i> (L.) Raeusch.	POACEAE	X						
<i>Isoglossa ciliata</i> (Nees) Lindau	ACANTHACEAE	X		X	X	X		
<i>Jasminum angulare</i> Vahl	OLEACEAE	X		X	X	X		
<i>Lauridia tetragona</i> (L.f.) R.H.Archer	CELASTRACEAE				X		X	
<i>Leonotis ocyimifolia</i> (Burm.f.) Iwarsson	LAMIACEAE			X	X			
<i>Lepidium africanum</i> (Burm.f.) DC. subsp. africanum	BRASSICACEAE			X				
<i>Lycium cinereum</i> Thunb.	SOLANACEAE			X				
<i>Lycium ferocissimum</i> Miers	SOLANACEAE		X	X	X	X		
<i>Maerua cafra</i> (DC.) Pax	BRASSICACEAE	X	X	X	X	X		
<i>Malva parviflora</i> L. var. <i>parviflora</i>	MALVACEAE		X					
<i>Melia azedarach</i> L.	MELIACEAE					X		
<i>Mesembryanthemum aitonis</i> Jacq.	AIZOACEAE	X		X	X	X		
<i>Metalasia densa</i> (Lam.) P.O.Karis	ASTERACEAE	X		X			X	
<i>Myoporum montanum</i> R.Br.	SCROPHULARIACEAE			X				
<i>Mystroxydon aethiopicum</i> (Thunb.) Loes.	CELASTRACEAE	X		X	X	X		
<i>Opuntia ficus-indica</i> (L.) Mill.	CACTACEAE	X				X		
<i>Osteospermum moniliferum</i> L.	ASTERACEAE		X	X	X	X	X	X
<i>Panicum deustum</i> Thunb.	POACEAE	X	X	X	X	X		X
<i>Panicum maximum</i> Jacq.	POACEAE				X			
<i>Pelargonium capitatum</i> (L.) L'Hér.	GERANIACEAE	X		X				
<i>Pelargonium odoratissimum</i> (L.) L'Hér.	GERANIACEAE				X			
<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	POACEAE		X	X	X	X	X	X
<i>Plantago lanceolata</i> L.	PLANTAGINACEAE							
<i>Putterlickia pyracantha</i> (L.) Szyszyl.	CELASTRACEAE	X		X	X	X	X	X
<i>Rhoiacarpus capensis</i> (Harv.) A.DC.	SANTALACEAE				X			
<i>Rhoicissus digitata</i> (L.f.) Gilg & M.Brandt	VITACEAE					X		

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<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm.	VITACEAE	X					X		X					
<i>Rhynchosia caribaea</i> (Jacq.) DC.	FABACEAE								X					
<i>Ricinus communis</i> L. var. <i>communis</i>	EUPHORBIACEAE			X					X					
<i>Salvia africana-lutea</i> L.	LAMIACEAE					X			X					
<i>Schotia afra</i> (L.) Thunb. var. <i>afra</i>	FABACEAE							X						
<i>Scutia myrtina</i> (Burm.f.) Kurz	RHAMNACEAE	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Searsia crenata</i> (Thunb.) Moffett	ANACARDIACEAE	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Searsia glauca</i> (Thunb.) Moffett	ANACARDIACEAE	X			X	X	X	X	X	X	X	X	X	X
<i>Searsia pterota</i> (C.Presl) Moffett	ANACARDIACEAE	X			X	X	X	X	X	X	X	X	X	X
<i>Secamone alpini</i> Schult.	APOCYNACEAE	X									X			
<i>Senecio angulatus</i> L.f.	ASTERACEAE	X						X	X					
<i>Senecio elegans</i> L.	ASTERACEAE					X								
<i>Senecio glutinosus</i> Thunb.	ASTERACEAE					X								
<i>Senecio ilicifolius</i> L.	ASTERACEAE					X								
<i>Sideroxylon inerme</i> L. subsp. <i>inerme</i>	SAPOTACEAE	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Solanum africanum</i> Mill.	SOLANACEAE	X	X					X	X					
<i>Solanum linnaeanum</i> Hepper & Jaeger	SOLANACEAE		X			X			X					
<i>Stenotaphrum secundatum</i>	POACEAE		X			X		X	X					
<i>Stipagrostis zeyheri</i> (Nees) De Winter	POACEAE													
<i>Tetragonia fruticosa</i> L.	AIZOACEAE		X			X		X						X
<i>Trachyandra ciliata</i> (L.f.) Kunth	ASPHODELACEAE		X			X		X						
<i>Urtica urens</i> L.	URTICACEAE		X					X	X					
<i>Vachellia karroo</i> (Hayne) Banfi & Gallaso	FABACEAE	X	X			X		X						
<i>Vepris lanceolata</i> (Lam.) G.Don	RUTACEAE							X			X			
<i>Viscum rotundifolium</i> L.f.	SANTALACEAE										X			
<i>Zanthoxylum capense</i> (Thunb.) Harv.	RUTACEAE	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Zygophyllum morgsana</i> L.	ZYGOPHYLLACEAE		X					X	X		X			

Conclusion

In summary, areas delineated as forest are protected in terms of the National Forest Act and should be avoided in site development planning. Further consideration should be given to Principle 3.18 of the 'Policy Principles and Guidelines for Control of Development Affecting Natural Forests' (2009):

'Where natural forest is contained within a mosaic of other veld types that are associated with it (or which form important eco-tone habitats that contribute to diversity and ecosystem functioning), the forest must not be regarded in isolation. In such cases a landscape approach must be taken with an attempt to protect the forests together with the surrounding veld types. This approach recognizes that forests are in dynamic equilibrium with the landscapes around them, and that forest margins must be protected and managed in buffer areas. Natural corridors linking forests and other habitats must be retained as far as possible. Due consideration must be given to the minimum width of corridors and buffer zones and the minimum size requirements of natural habitats to enable fully functional ecosystems to be retained'. This principle would apply to the site and to any development plans for the site, since forest occurring on ridges and slopes is associated with the adjacent forest/thicket mosaic and inter-dune vegetation. The policy guideline notes that buffer areas will vary according to circumstances, but that it should be at least 20 m. It is important that DAFF be engaged when deciding on the necessary corridors and buffer areas in future layout plans to allow for forest persistence.

With regards to determining whether vegetation that was described in this survey as forest/thicket mosaic and/or forest succession/forest remnants should be considered as forest, the following general guidelines in the policy have relevance:

- ❖ *Pioneer forest vegetation in a dominantly natural habitat with a clear potential to become fully grown natural forest if left undisturbed, must also be considered as forest. This may be regrowth of forest in an area where forest was previously removed, or expansion of forest as a result of factors such as exclusion of fire*
- ❖ *Any areas where forests occurred and have been disturbed, or where forests are expanding, with evidence of new forest seedlings establishing or recovery of the canopy (irrespective of the stage of recovery or expansion), must be considered as forest, and the National Forests Act as well as these guidelines will apply to those areas*
- ❖ *The ecotones and vegetation types surrounding forest patches must be kept intact as a vital part of maintaining the forest habitat and its fauna and flora (some animal species for example require a variety of habitat types). Retaining a*

landscape with mosaic of forests and other vegetation types ensures optimal functioning of the ecosystem, and the more the inroads made on the habitats surrounding forests, the more the forest patches are marginalized and the greater the pressure and likelihood of deterioration of the ecosystem and loss of species

- ❖ *Invader plant species often populate disturbed forest areas (almost never the intact parts), but can be managed and controlled over time, and must never be an excuse for allowing land use change or development that could be detrimental to a forest*
- ❖ *Any decisions on land use or development that will affect natural forests must be taken with the utmost care (precautionary principle) and with due consideration for:*
 - *Keeping the dynamic forest processes intact;*
 - *Preventing disturbance to forest ecosystems, fauna and flora;*
 - *Keeping forest margins and surrounding mosaics of habitats in place as far as possible (inter alia through sufficient buffer zones, corridors and protected areas);*
 - *Not allowing disturbance caused by poor land management to be used as a motivating factor for land use change that transforms forest*

Based on the above, areas described as forest, forest/thicket mosaic and forest in succession should be regarded as 'forest' as per the NFA, and must be avoided in land use planning.

Appendix 1: Dominant floral species occurring in Algoa Dune Strandveld (Mucina and Rutherford)

- ❖ Endemic taxa: *Cotyledon adscendens*, *Gymnosporia elliptica*, *Rapanea gilliana*, *Lobelia zwartkopensis*, *Brunsvigia littoralis*.
- ❖ Succulent trees: *Aloe africana*.
- ❖ Tall shrubs: *Azima tetracantha*, *Brachylaena discolor*, *Osteospermum monilifera*, *Cussonia thyrsoiflora*, *Euclea racemosa* subsp. *racemosa*, *Maytenus procumbens*, *Mystroxydon aethiopicum*, *Pterocelastrus tricuspidatus*, *Rhus crenata*, *Schotia afra* var. *afra*, *Scutia myrtina*, *Sideroxydon inerme*, *Tarchonanthus littoralis*, *Canthium spinosum*, *Cassine peragua*, *Dovyalis rotundifolia*, *Euclea natalensis*, *Euclea racemosa* subsp. *Macrophylla*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Gymnosporia capitata*, *Nylandtia spinosa*, *Olea exasperata*, *Putterlickia pyracantha*, *Rhus glauca*, *Rhus pterota*, *Zanthoxylum capense*.
- ❖ Low shrubs: *Carissa bispinosa*, *Dimorphotheca fruticosa*, *Pelargonium suburbanum* subsp. *suburbanum*, *Robsonodendron maritimum*.
- ❖ Succulent shrubs: *Cotyledon velutina*, *Lycium cinereum*, *Zygophyllum morgsana*.
- ❖ Succulent Woody Climber: *Sarcostemma viminale*.
- ❖ Woody Climbers: *Rhoicissus digitata*, *Asparagus retrofractus*, *Solanum africanum*.
- ❖ Herbaceous Climbers: *Cynanchum natalitium*, *Cynanchum ellipticum*, *Cynanchum obtusifolium*, *Secamone alpini*.
- ❖ Succulent Herbs: *Sansevieria hyacinthoides*.
- ❖ Graminoids: *Brachiaria chusqueoides*, *Panicum deustum*

Appendix 2: Description of Albany Forest and Eastern Cape Dune Forest (Environmentek CSIR, 2003)

1.5 Albany Forest

1.5.1 Profile

Dense, short-statured forest, with canopy height varying from approximately 5 to 15 m on deep sands overlaying the Nanaga and Alexandria Formations in the Port Elizabeth region (Maitland River to Kei River mouths). The presence of canopy emergents *Erythrina cafra* and *Podocarpus falcatus* and the abundance of lianas, spinescent shrubs such as *Scutia myrtina* and *Capparis sepiaria*, and of herbs (notably of the family Acanthaceae and *Solanum geniculatum*) are also characteristic. The undergrowth can form an impenetrable mass of vegetation, especially where the canopy is less than 5 m high. The forest is mostly surrounded by pasture, almost all of which is transformed Albany Forests.

1.5.2 Distribution

The main forest stretched from Maitlands River mouth (east of Port Elizabeth) in the west to the regions near Kei River mouth in the east. The massive dune fields on the coast, and a band of dune forest between the dunes and the Alexandria Forest, ensures that this forest is always a few km from the coastline. The forest thus forms a narrow band about 50 km long and about 6 km wide, but mostly thinner than this, just inland of the coastal dunes. This forest also used to occur on the hills in and around Bathurst. It occurs from sea level to an altitude of 900 m, though most is at low altitude. In the deep river valleys of the Bushmans, Kariega and Kowie Rivers, on the south slopes where the soil is deeper, or on alluvial soils in the valley bottom, small patches of forest are embedded in the surrounding thicket vegetation.

1.5.3 Structure and Texture

1.5.3.1 Stand Structure

Primarily a short (10 m canopy) dense forest, but in some places in the wetter valley floors it can reach 15 -20 m tall. On shallower soils on the drier hilltops and towards the coast the canopy is only 5 m tall. Canopy emergents may reach 30 m in

the best-developed forest, which usually occurs in the valley bottoms where sandy soils are deeper and water supplies perennial. Inland, the undergrowth can be dense and impenetrable, while in more seaward forests there is little or no undergrowth. Where it is best developed there are three strata, a tangled understorey of creepers, shrubs (often spinescent), and herbs, a canopy of trees and canopy emergents. The high abundance of lianas in Alexandria Forest is a result of the low stature of the forest, which provides more entry points for lianas into their host canopy trees.

1.5.3.2 Life Forms

Most of the species are evergreen, but semi-deciduous or facultative deciduous trees are also common (e.g. *Celtis africana*, *Vepris undulata*, *Erythrina cafra*). Ferns, hygrophytes and epiphytes are scarce, while lianas and spinescent shrubs are more common than in many other forest types. Many species are 'pioneer type species' and are often also associated with thicket vegetation. The canopy emergents in Alexandria Forest are classic examples of this and probably regenerate best on the outskirts of the forest, rather than under the canopy.

1.5.3.3 Dominant and Diagnostic Plant Species

L	S	D	Latin Name	Note
Tc	d		<i>Celtis africana</i>	
Tc	d		<i>Erythrina caffra</i>	
Tc	d		<i>Nuxia congesta</i>	
Tc	d		<i>Podocarpus falcatus</i>	
Tc	d		<i>Rhus chirindensis</i>	
Tc	d		<i>Sideroxylon inerme</i>	
Tc	d		<i>Vepris lanceolata</i>	
Tc			<i>Calodendrum capense</i>	
Tc			<i>Podocarpus latifolius</i>	
Tcu		D	<i>Aloe speciosa</i>	
Tcyc		D	<i>Encephalarctos altensteinii</i>	endemic to E. Cape
Tcyc		C	<i>Encephalarctos latifrons</i>	endemic to Alexandria Forest
Te			<i>Cussonia spicata</i>	W limit (Groendael)
Tsuc		D	<i>Euphorbia grandidens</i>	
Tsuc		D	<i>Euphorbia triangularis</i>	
Tu	d		<i>Maytenus undata</i>	
Tu	d		<i>Schotia latifolia</i>	
Tu			<i>Brachylaena glabra</i>	Pondoland Scarp
Tu			<i>Buxus macowanii</i>	
Tu		C	<i>Atalaya capensis</i>	endemic to E. Cape*
Tu			<i>Ptaeroxylon obliquum</i>	W limit (Groendael)
Tu			<i>Zanthoxylum capense</i>	
ST			<i>Brachylaena ilicifolia</i>	Eastern Scarp
ST		C	<i>Smelophyllum capense</i>	endemic to E. Cape*
ST		C	<i>Sterculia rogersii</i>	endemic to E. Cape*
ST	d		<i>Gymnosporia buxifolia</i>	
ST			<i>Dovyalis rhamnoides</i>	
ST			<i>Eugenia capensis</i>	
ST			<i>Eugenia zeyheri</i>	
S	d		<i>Hyperacanthus amoenus</i>	W limit
S	d		<i>Trichodadus ellipticus</i>	
S			<i>Carissa bispinosa</i>	
S		D	<i>Azima tetraacantha</i>	
S		D	<i>Cordia caffra</i>	
S		D	<i>Nylandtia spinosa</i>	
S		D	<i>Phyllanthus heterophyllus</i>	
S		D	<i>Plumbago auriculata</i>	
S			<i>Gardenia thunbergia</i>	
S	d		<i>Strychnos decussata</i>	
SCw		D	<i>Tecomaria capensis</i>	
SCw			<i>Scutia myrtina</i>	
Smon	d		<i>Dracaena alectriformis</i>	
Ssoft	d	C	<i>Euphorbia kraussiana</i>	
Ssuc		D	<i>Aloe ciliata</i>	
Ssuc		D	<i>Cotyledon velutina</i>	
Ssuc		D	<i>Crassula nemorosa</i>	
Cw	d		<i>Behnia reclinata</i>	
Cw	d		<i>Rhoicissus tomentosa</i>	
Cw			<i>Asparagus asparagoides</i>	
Cw			<i>Capparis sepia</i>	
Cw			<i>Rhoicissus digitata</i>	
Cw			<i>Secamone alpini</i>	
TuSt	d		<i>Ficus thonningii</i>	
G	d		<i>Cyperus albostrigatus</i>	
G	d		<i>Ehrharta erecta</i>	
Gcr	d		<i>Oplismenus hirtellus</i>	
H	d		<i>Laportea grossa</i>	
H			<i>Galopina circaeoides</i>	

H			<i>Justicia petiolaris</i>
H			<i>Streptocarpus rexii</i>
Hcr	d		<i>Achyranthes aspera</i>
Hf			<i>Rumohra adiantifolia</i>
Hg	d	D	<i>Sansevieria hyacinthoides</i>
Hg		D	<i>Chlorophytum comosum</i>
Hg			<i>Dietes iridioides</i>
Hg			<i>Haemanthus albiflos</i>
Hg			<i>Scadoxus puniceus</i>
H/Eh			<i>Peperomia tetraphylla</i>
Eo			<i>Angraecum pusillum</i>

1.6 Eastern Cape Dune Forest

1.6.1 Profile

Subtropical low-stature, dense-canopy forest on old stabilized coastal dune cordons fringing the Eastern Cape coast, usually dominated by *Mimusops caffra*, *Sideroxylon inerme* and *Dovyalis rotundifolia*

1.6.2 Distribution

Endemic to the Eastern Cape province, the dune forests are found in small pockets as far north as the Transkei Wild Coast (Nxaxo) and as far south as Woody Cape (S of Alexandria), where this forest type abuts the Alexandria Forest (latter classified as Albany Coastal Forest). The highest density of patches of the Eastern Cape Dune Forest occurs between the Kei River mouth and Mcantzi River mouth (see the map in Burns 1986). For further distribution data consult Tinley (1985: 120, 136) and Avis (1995).

1.6.3 Vegetation Structure and Texture

1.6.4 Stand Structure

Canopy height varies from 8 - 15 m, and decreases along east-west gradient, reaching approximately 5 metres in localities such as Kenton-on-Sea (Joan Muirhead N.R.; Lubke & de Villiers 1991) and Woody Cape N.R. (L. Mucina & D.B. Hoare unpubl.). Common canopy species include *Mimusops caffra*, *Sideroxylon inerme*, *Dovyalis rotundifolia*, *Allophylus natalensis*, *Cassine aethiopica* (*Mystroxydon aethiopicum*), *Euclea natalensis* and *E. racemosa*. In dune valley forests (see Burns 1986) *Erythrina caffra*, *Diospyros natalensis*, *Harpephyllum caffrum*, *Schotia latifolia*, *Teclea natalensis*, *Zanthoxylum capense* and yellowwoods (*Podocarpus falcatus* and *P. latifolius*) may occur as canopy constituents.

The height of the sub-canopy spans 2.5 – 7 m but it is often difficult to distinguish the canopy and sub-canopy strata apart. Species such as *Acokanthera oblongifolia*, *Cassine papillosa*, *Deinbollia oblongifolia*, *Dracaena alectrifomis*, *Psychotria capensis* are dominant in the sub-canopy stratum (Burns 1986).

The woody herb *Isoglossa woodii* (Acanthaceae) can be locally common and dense in the herb layer, reaching heights of 1.5 m. *Hypoestes aristata* and some *Panicum* species are also typical of the herb layer.

1.6.5 Diversity Patterns

The species diversity of the canopy stratum is relatively low with only eleven species recorded in a sample [how big – e.g., ten 0.1 ha plots] by Burns (1986). The number of tree and shrub species in Eastern Cape dune forests is characteristically lower than in similar dune forests of KwaZulu-Natal (Burns & Raal 1993). This trend is commensurate with a north-south (and east-west) gradient of floristic impoverishment also found in other forests groups (Geldenhuis 1992, Midgley et al. 1997).

1.6.6 Dominant and Diagnostic Plant Species

Eastern Cape Dune Forest: Dominant & Diagnostic Plant Species				
L	S	D	Latin Name	Note
Tc	d		<i>Dovyalis rotundifolia</i>	W limit
Tc	d		<i>Mimusops caffra</i>	W limit
Tc	d		<i>Sideroxylon inerme</i> subsp. <i>inerme</i>	
Tc			<i>Erythrina caffra</i>	
Tc			<i>Euclea racemosa</i>	
Tc			<i>Schotia latifolia</i>	
Tcu	d		<i>Allophylus natalensis</i>	
Tcu	d		<i>Diospyros natensis</i>	
Tcu			<i>Chionanthus foveolatus</i> subsp. <i>foveolatus</i>	
Tcu			<i>Cussonia spicata</i>	
Tcu			<i>Podocarpus falcatus</i>	Afrotemperate element
Tcu			<i>Podocarpus latifolius</i>	Afrotemperate element
Tcu			<i>Pterocelastrus tricuspidatus</i>	
Tcu			<i>Zanthoxylum capense</i>	Afrotemperate element
Tu	d		<i>Cassine aethiopica</i>	
Tu	d		<i>Euclea natalensis</i>	
Tu			<i>Chionanthus peglerae</i>	
Tu			<i>Cordia caffra</i>	
Tu			<i>Elaeodendron croceum</i>	
Tu			<i>Harpephyllum caffrum</i>	
Tu			<i>Olea capensis</i> subsp. <i>macrocarpa</i>	
Tu			<i>Protorhus longifolia</i>	W limit
Tmon			<i>Strelitzia nicolai</i>	W limit
Tp			<i>Phoenix reclinata</i>	W limit
TuSt			<i>Ficus burtt-davyi</i>	
ST	d		<i>Acokanthera oblongifolia</i>	
ST	d		<i>Brachylaena discolor</i> var. <i>discolor</i>	
ST	d		<i>Deinbollia oblongifolia</i>	
ST	d		<i>Gymnosporia buxifolia</i>	
ST			<i>Chaetacme aristata</i>	W limit
ST			<i>Dovyalis lucida</i>	W limit
ST			<i>Dovyalis rhamnoides</i>	
ST			<i>Eugenia capensis</i>	
ST			<i>Gymnosporia procumbens</i>	
ST			<i>Maerua caffra</i>	
ST			<i>Psychotria capensis</i>	Afrotemperate element
ST			<i>Psydrax obovata</i> subsp. <i>obovata</i>	
ST			<i>Rhus natalensis</i>	
ST			<i>Scolopia zeyheri</i>	
ST			<i>Tarchonanthus camphoratus</i>	
ST			<i>Teclea natalensis</i>	W limit
ST			<i>Turraea obtusifolia</i>	W limit
S			<i>Carissa bispinosa</i> subsp. <i>bispinosa</i>	
S			<i>Rhus glauca</i>	
Smon			<i>Dracaena alectrififormis</i>	W limit
SCw			<i>Behnia reticulata</i>	
SCw			<i>Capparis sepiaria</i>	
Cw			<i>Dioscorea mundii</i>	
Ssoft	d		<i>Isoglossa woodii</i>	
Ssoft			<i>Hypoestes aristata</i>	
Hsc			<i>Asparagus africanus</i>	
Hsc			<i>Pupalia lappacea</i>	
G			<i>Panicum aequinerve</i>	
G			<i>Panicum deustum</i>	

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PORTION 1 OF THE FARM SEAVIEW No 28, PORT ELIZABETH, EASTERN CAPE
– AN ASSESSMENT OF THE FLORA AND VERTEBRATE FAUNA.

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1. INTRODUCTION

A survey of the vegetation and vertebrate fauna of Portion 1 of the Farm Seaview No. 28, Port Elizabeth was undertaken under the auspices of CEN Integrated Management Inc., as part of an environmental impact assessment for a proposed development. This survey took place over the period 16-17 September 2008.

2. METHODS

The area was traversed by vehicle and on foot along available roads around the perimeter of the area. Wherever possible, traverses were conducted into fynbos and thicket to assess the condition and species richness. The grassland area was traversed on foot at various points. All plants and vertebrate fauna observed or deduced as being present were recorded in a pocket note book. Lists of the fauna likely to occur were obtained from the literature and refined according to the condition of available habitats.

3. THE SITE

Portion 1 of the Farm Seaview is an elongated stretch of land lying parallel to the coast, along a gentle south facing slope between Beachview in the west and Clarendon Marine in the east. It borders a water pipeline and servitude in the south and a gravel road in the north, the latter providing access to a series of smallholdings, some of which are currently mined for sand.

The area is 151 ha in extent, and diagonally divided into 75 ha of indigenous fynbos-thicket vegetation in the west and 76 ha of grassland in the east. The latter is mostly utilized as pasture for horses. Currently the only paddocks in use are located in the vicinity of the hangers and store. An airstrip lies along the border of the indigenous vegetation. Apart from a homestead, two hangars and a store, no other buildings occur on site.

The terrain is undulating with low dune development, these extending southwest to northeast in line with the prevailing winds. No surface water is evident and perhaps with the exception of some depressions in the grassland area, unlikely to retain water for any length of time.

3.1 Vegetation

Portion 1 of the farm Seaview No. 28 lies within Veld Type AZs1 Algoa Dune Strandveld which is characterized by dense thickets on dunes, usually < 5m tall, with sparse undergrowth (Mucina & Rutherford 2006). However, as is to be expected local variations occur according to soil-moisture relationships, aspect, bedrock and climate. The vegetation communities on the Farm Seaview are an example where thicket vegetation interdigitates with areas of fynbos. The vegetation communities are further complicated by the invasion of thicket areas by Rooikrans *Acacia cyclops* and the conversion of half of the farm to grassland. These communities are briefly described as follows:

3.1.1 Fynbos

Fynbos occurs on the western half of the farm growing across an undulating dune field. The vegetation is dominated by the shrubs *Metalasia muricata* and *Olea exasperata* varying in height from 0,7 – 2 m. Large areas of predominantly one or the other occur together with other constituent species. These include *Erica chloroloma*, *Passerina* sp., *Agathosma stenopetala*, *A. apiculata*, *Muraltia ericaefolia*, *Phylica littoralis*, *Putterlickia pyracantha*, *Pterocelastrus tricuspidatus*, *Rhus glauca*, *R. laevigata*, *Felicia echinata*, *Helichrysum teretifolium*, *Rhoiacarpos capensis*, *Rapanea gilliana*, *Lauridia tetragona* and *Euclea crispa*. Some climbers such as *Cassytha ciliolata*, *Asparagus aethiopicus* and *Cynanchum obtusifolium* grew over the shrubs. The undergrowth was sparse although in some parts *Ficinia lateralis*, *F. sp.*(grass), *Tetraria* sp., restios, *Knowltonia vesicatoria*, *Carpobrotus deliciosus* as well as *Jamesbrittenia microphylla*, *Indigofera* spp., *Lotononis* sp. and *Chironia baccifera*. were recorded. Areas dominated by *Olea exasperata* appeared to be less species rich.

3.1.2 Thicket

Thicket vegetation was mostly present along the northern and southern borders of the western half of the farm, but also included extensive intrusions into the fynbos areas, mostly in the southwest. A tongue also extends from the southern end of the airstrip in an arch northeasterly. This vegetation community was unfortunately extensively invaded by Rooikrans which often obscured the composition of the original community. Species typical for this community included *Pterocelastrus tricuspidatus*, *Sideroxylon inerme*, *Cussonia thyrsoflora*, *Chionanthus foveolatus*, *Diospyros dichrophylla*, *Rhoiacarpos capensis*, *Rhus glauca*, *R. crenata*, *R. longispina*, *Hippobromus pauciflorus*, *Osyris compressa*, *Euclea crispa*, *Rapanea gilliana*, *Olea exasperata*, *Metalasia muricata*, *Scutia myrtina*, *Mystroxylum aethiopicum*, *Lauridia tetragona*, *Grewia occidentalis*, *Carissa bispinosa*, *Chrysanthemoides monilifera* and *Putterlickia pyracantha*. Rooikrans was an important constituent of thicket areas. Climbers were common, mostly *Cynanchum natalitium*, *Solanum africanum*, *Capparis sepiaria*, *Rhoicissus tridentata* and *Secamone alpinii* but also *Asparagus asparagoides*, *Zehneria scabra* and *Kedrostis nana*. The undergrowth was poor but along the margins forbs such as *Hypoestes forskoolii*, *Helichrysum teretifolium*, *Senecio elegans*, *Indigofera* sp., *Peucedanum capense*, *Otholobium decumbens* and *Cyphostemma cirrhosum* were recorded.

3.1.3 Grassland

As mentioned half of the farm area had been transformed into grassland, mostly mowed short at the time of the survey. Various grasses dominated different parts of the area according to soil moisture. Locally dominant species included Couch Grass *Cynodon dactylon*, Kikuyu *Pennisetum clandestinum* and *Stenotaphrum secundatum* but the grass composition over much of the area could not be determined due to the short dry sward. Seepage zones characterized by swards of *Imperata cylindrica* occurred widespread in the grassland usually along slopes below terraces or catchment areas.

Apart from grasses many species of shrubs and forbs, mostly constituents of the former vegetation cover, were still present amongst the grass sward, but kept short by mowing. These included *Acacia karroo*, *Putterlickia pyracantha*, *Lichtensteinia* sp., *Androcymbium* sp., *Polygala ericaefolia*, *Centella asiatica*, *Freesia* sp., *Pelargonium suburbanum*, *Asparagus asparagoides*, *Rhynchosia minima*, *Carpobrotus deliciosus*, *Ficinia* sp. (grass), *Otholobium decumbens*, *Metalasia muricata*, *Zanthoxylum capensis*, *Zehneria scabra*, *Chrysanthemoides monilifera*, *Rhoicissus tridentata*, *Hypoestes forskoolii*, *Tetragonia fruticosa*, *Pharnaceum* sp., *Sutera campanulata*, *Silene bellidioides*, *Medicago* sp., *Lessertia stenoloba*, *Tephrosia capensis*, *Anthospermum aethiopicum*, *Hebenstreitia* sp., *Helichrysum teretifolium*, *Zygophyllum uitenhagense*, *Senecio burchellii*, *Solanum rigescens*, *Lauridia tetragona*, *Bulbine frutescens*, *Rhus laevigatus*, *Felicia echinata* and many others. Most of these grew widely scattered or clumped often along the upper slopes and margins of the area. The dune grass *Ehrharta villosa* grew in sandy areas mostly devoid of other vegetation, usually the crests of former dunes.

This area therefore still exhibited a substantial species richness despite being mowed regularly.

Portion 1 of the Farm Seaview still exhibits substantial plant species richness with 148 species having been recorded (Table 1). None of these appeared to be rare or threatened according to the Red Data Book – Plants (Golding 2002).

3.2 Fauna

The fauna of the site is impoverished. A total of 24 bird species were recorded and an additional 43 species could be expected to occur (Table 2). Similarly only three mammal species were recorded but another 19 could be present (Table 3), none of which are considered rare or threatened although three are listed as Data Deficient (Friedmann & Daly 2004).

No reptiles or amphibians were seen during the survey but the possibility exists that one tortoise, 15 snake, 13 lizard and four amphibian species could occur on the site (Table 4). None of these are listed in the Red Data Books – Reptiles and Amphibians (Branch 1988, Minter, Burger, Harrison, Braack, Bishop & Kloepfer 2004).

4. DISCUSSION

As mentioned earlier the vegetation occurring on Portion 1 of the Farm Seaview No 28 is a variation of Algoa Dune Strandveld (Mucina & Rutherford 2006) differing from that considered as typical for that vegetation type by the large fynbos component. In fact with few exceptions Algoa Dune Strandveld is comprised of two distinct communities, thicket and fynbos. Although the conservation status of this vegetation type is regarded as of Least Concern, the constituent communities differ from one area to the next. Coupled with the limited distribution of this vegetation type it would seem to warrant Vulnerable status, particularly as much of it lies within development nodes.

The vegetation of the western half of Portion 1 is in good condition despite the alien encroachment and most of the fynbos areas are still in a pristine condition. Some encroachment by Rooikrans has taken place but most of this is in areas which have been disturbed by anthropogenic activities, such as along access roads, water pipeline and airfield development. Most encroachment is therefore along the northern and southern boundaries of the property and along the northern margin of the airstrip. The encroachment appears mostly to be associated with thicket communities but some incursions into fynbos have taken place. Most of the Rooikrans has been cut down along the pipeline but no effort has been made to remove the felled trees which largely prohibit access to other Rooikrans, and inhibits regeneration of the former vegetation community. In addition it will inhibit the control of new infestations arising from the germinating seeds which will sprout in the absence of mature trees. Such seed may have a shelf life of 50 years.

The eastern half of the property has been transformed to grassland but still contains a substantial reservoir of species from the former vegetation communities. Apart from grasses such as *Cynodon dactylon* and *Stenotaphrum secundatum* which have benefited from the removal of the original vegetation, the remaining indigenous species only occur in areas where impacts have been lessened, along the upper and outer margins of the area. This area exhibits a large variety of species some of which have not been recorded in the adjacent fynbos and thicket communities such as *Silene bellidioides*, *Lessertia stenoloba*, *Tephrosia capensis*, *Linum africanum*, *Mesembryanthemum aitonis*, *Hebenstreitia* sp., *Polygala ericaefolia*, *Freesia* sp., *Bulbine frutescens*, *Scabiosa columbaria*, *Stachys aethiopica*, *Pelargonium suburbanum*, *Albuca* sp. and *Aizoon rigidum*. Kikuyu *Pennisetum clandestinum* forms scattered swards in favourable areas but most of the site is too dry for the species. A clump of Bluegums *Eucalyptus* sp. is present along the access road to the homestead, near the southeast boundary of the property but does not appear to be invasive and is comprised of mature trees.

Faunally the farm is impoverished, perhaps with the exception of birds. Twenty-four species were recorded during the survey and it is likely that a further 43 species may occur (Table 2). However the stunted and relatively uniformity of the vegetation communities is a limiting factor. As it is, the list includes grassland species such as Orange-throated Longclaw *Macronyx capensis*, Grassveld Pipit *Anthus cinnamomeus* and Red-naped Lark *Mirafra afra* which would have been absent in the former vegetation communities.

The presence of four mammal species including Bushbuck *Tragelaphus scriptus*, Scrub Hare *Lepus saxatilis*, Common Molerat *Cryptomys hottentotus* and Striped Mouse *Rhabdomys pumilio* were confirmed and a further 18 species are likely to occur (Table 3). The list of species may err on the conservative side but in the absence of evidence, the site has been evaluated according to the type and condition of available habitats, food availability and anthropogenic activities in the surrounding areas.

Similarly reptiles and amphibians were conspicuous by their absence, perhaps a result of inclement weather prevailing at the time. None were seen and the list was compiled from the literature and refined according to the type and condition of the habitats present on the site. A total of 29 reptile and four amphibian species are predicted to occur (Table 4), the latter with one exception requiring shallow pools of water to breed in. It is anticipated that such pools may be seasonally available in depressions in the grassland area.

The proposed housing development within the grassland area will have a limited impact on the flora and fauna. However some development is also planned within the indigenous vegetation area. This area is considered to be of conservation importance due to the 'pristineness' of most of the Fynbos community within this area. Any development here should be planned to minimize the impact on the fynbos and perhaps should be sited within areas already impacted by alien vegetation encroachment.

5. CONCLUSION

In conclusion the vegetation of half of the area is in a relatively pristine condition, in particular the fynbos component. Some invasion by Rooikrans has taken place, mostly along the boundaries of the property, wherever soil disturbances have taken place. Plant species richness is substantial but is comprised of two components, those from the transformed site and those from the western area. Although many species are in common a number were only recorded in the grassland.

Due to the condition of the vegetation in the western half, it has high conservation value and is considered sensitive to development. It is linked to other undeveloped areas from the seashore in the south to Island State Forest in the north, an interconnectivity which should be sustained. Any development in this area should be planned and placed to minimize impacts and to retain the ecological integrity of the site.

The high density development proposed in the grassland will have a limited impact on the flora and fauna as it lies between Seaview in the south, Clarendon Marine in the east and sand quarries on smallholdings to the north.

6. BIBLIOGRAPHY

- Barnes, K.N. (ed) 2000. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg.
- Branch, W.R. (ed.) 1988. South African Red Data Book – Reptiles and Amphibians. S. Afr. Nat. Sci. Prog. Rpt 151: 1-239.
- Branch, W.R. 1998. Field guide to Snakes and other reptiles of southern Africa. Struik, Cape Town.

Friedmann, Y. & Daly, B. (editors) 2004. Red Data Book of the Mammals of South Africa: A conservation assessment: CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.

Golding, J. (ed.) 2002. Southern African Plant Red Data Lists. Southern African Botanical Diversity Network Report No. 14. SABONET, Pretoria.

Manning, J., A. Batten & H. Bokelmann 2001. Eastern Cape. South African Wild Flower Guide 11. Botanical Society of South Africa, Cape Town.

Mucina, L. & M.C. Rutherford 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Vanderplank, H.J. 1999. Wildflowers of the Port Elizabeth Area. Gamtoos to Swartkops Rivers (The Coastal Bush and Fynbos Region). Bluecliff Publishing, Hunters Retreat, Port Elizabeth.

SITE PHOTOGRAPH



View south across the fynbos on the Farm Seaview. Grey shrubs are *Metalasia muricata* and *Olea exasperata* is green in the foreground.



Thicket along the southern border, after the felling of Rooikrans.



A view south across the eastern end of the area. The shrubs in the foreground are mostly *Solanum rigescens*.



A view west across grassland with a hangar at upper right, adjacent to the airstrip. The darker patches are swards of the grass *Imperata cylindrica*.



13 October 2009
373512

Mr Schalk Potgieter
Nelson Mandela Bay Municipality
PO Box 9
Port Elizabeth 6000
Attention: Mr Schalk Potgieter

Dear Mr Potgieter

Preliminary investigation of the viability of a low cost housing development on Erf 590 Clarendon Marine, Seaview - Drafting findings

1 Introduction

The community of Zweledinga currently occupies approximately 6.3 ha of Erf 359 Clarendon Area in the Seaview area. This settlement is currently informal in nature.

Prior to the establishment of the Nelson Mandela Bay (Metropolitan) Municipality, the former Western District Council (WDC) had earmarked Erf 590 for the development of approximately 400 low cost housing units to provide formal housing for the existing occupants of the land, which had long since been invaded and informal dwellings had been established thereon. The Western District Council commenced with the necessary planning for the development and simultaneously applied for the allocation of sufficient subsidies from the Provincial Housing Department to fund the erection of the houses.

The study area previously comprised of two erven, which were subsequently consolidated into a single unit (now Erf 590). Prior to this consolidation, the one section was transferred from the WDC to the NMBM, and the other was purchased by the NMBM in order to increase the total area of the site to a viable size, for the purposes of housing the community.

The Housing and Land Directorate of the Nelson Mandela Bay Municipality (NMBM) obtained environmental authorization for a low cost housing development on Erf 590 Clarendon Marine in the Seaview area in terms of the Environment Conservation Act (No. 73 of 1989), prior to the gazetting



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of the National Environmental Management Act: EIA Regulations, in order to provide formal housing for this community. However the Record of Decision (ROD) lapsed before site development had commenced.

Subsequent to the lapsing of the RoD, the Infrastructure and Engineering Directorate of the NMBM issued an instruction for the clearing of the proposed development site. Whether this Directorate was aware of the expiry of the Record of Decision at the time of issuing this instruction is unknown. However, the necessary permits for the clearing of forest and the removal of forest species from the site in terms of the National Forests Act (Act No. 84 of 1998) were not acquired prior to the commencement of site clearing. A case was laid with the South African Police Service by a member of the public, against the Nelson Mandela Bay Municipality, due to this contravention of the National Forests Act, and the National Prosecuting Authority initiated legal action against the NMBM.

Following attempts by the NMBM to resolve the matter with the NPA and the then Department of Water Affairs and Forestry (DWAF), a meeting was held on 9 June 2009 between the NMBM, DWAF and the Provincial Department of Economic Development and Environmental Affairs. At this meeting it was agreed that an investigation should be undertaken to determine the ecological and social viability of locating a low cost housing settlement on Erf 590 Clarendon Marine (Seaview).

At this meeting, it was explained that the Indigenous Forestry Management Section (Forestry Technical and Scientific Support) of the Department of Water Affairs and Forestry's (DWAF) concerns regarding the previous illegal clearing of part of the aforementioned erf remain. Additional DWAF concerns include the social and ecological viability and general necessity of locating such a settlement on this property.

2 Scope of work

Consequently, this study was commissioned by the NMBM as a preliminary investigation of the viability of Erf 590 for the development of a low cost housing settlement.

The following Terms of Reference are applicable to the study:

1. Overview of applicable environmental legal requirements with regard to the NEMA EIA Regulations, the NEMA Biodiversity Act No. 10 of 2004, and the National Forests Act No. 84 of 1998;
2. Assessment of the availability of suitable sites for such a settlement within Nelson Mandela Bay and a 3 km radius of Erf 590;
3. Determination of the current ecological condition of the site, including previous illegal clearing and ongoing damage due to community activities within the site (e.g. woodcutting);
4. Overview of the social setting of the site, the NMBM Social Housing Programme, and the potential future expansion of the site due to population growth and in-migration (both with and without the formalisation of the site);
5. Comment on the appropriateness of Erf 590 for housing purposes, based on the above information;
6. If appropriate, determination of a potential footprint for development on the site and No-go areas, using best-practice environmental management and biodiversity assessment techniques; and
7. Recommendations regarding innovative methods to manage future environmental degradation to the site.

3 General Description of the study area

The study area is located to the immediate east of the Main Seaview Road (M9), in the south-western sector of the Nelson Mandela Bay municipal area (see Figure 3-1). The site slopes toward the coast, and is characterised by a series of low, vegetated dunes that run in a roughly west-east orientation. Erf 590 is located within the urban edge for the Seaview-Beachview-Kini Bay node (See Figure 3-2).



Figure 3-1: Location of the study area within the south-western sector of Nelson Mandela Bay

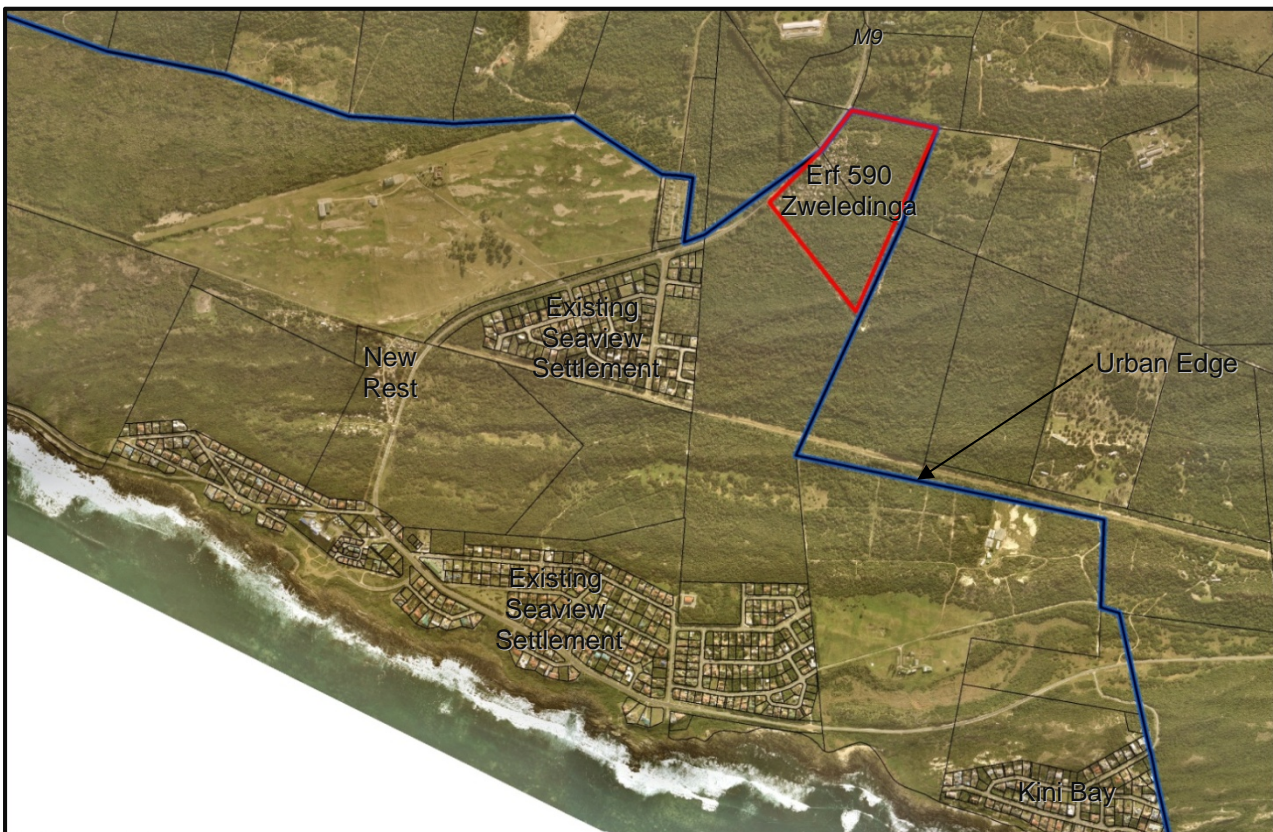


Figure 3-2: Location of the study area in relation to the urban edge for Seaview and Kini Bay

The site was inherited from the former Western District Council by the NMBM and is the only portion of land within the Seaview area that is currently under the formal administration of the NMBM (see Figure 3-3 and Figure 3-4). All other land in the area is either privately owned or still registered with the WDC. The NMBM deems the acquisition of private land nearby, as an alternative site, to provide for the housing needs of the Zweledinga community to be either too expensive (due to unrealistically high selling prices) or too lengthy in time to address the time-frames set by various political representatives for the resolution of this matter. It is also the NMBM’s opinion that the transfer of nearby land from the former-WDC to the NMBM will be too lengthy a process to address within these time-frames.

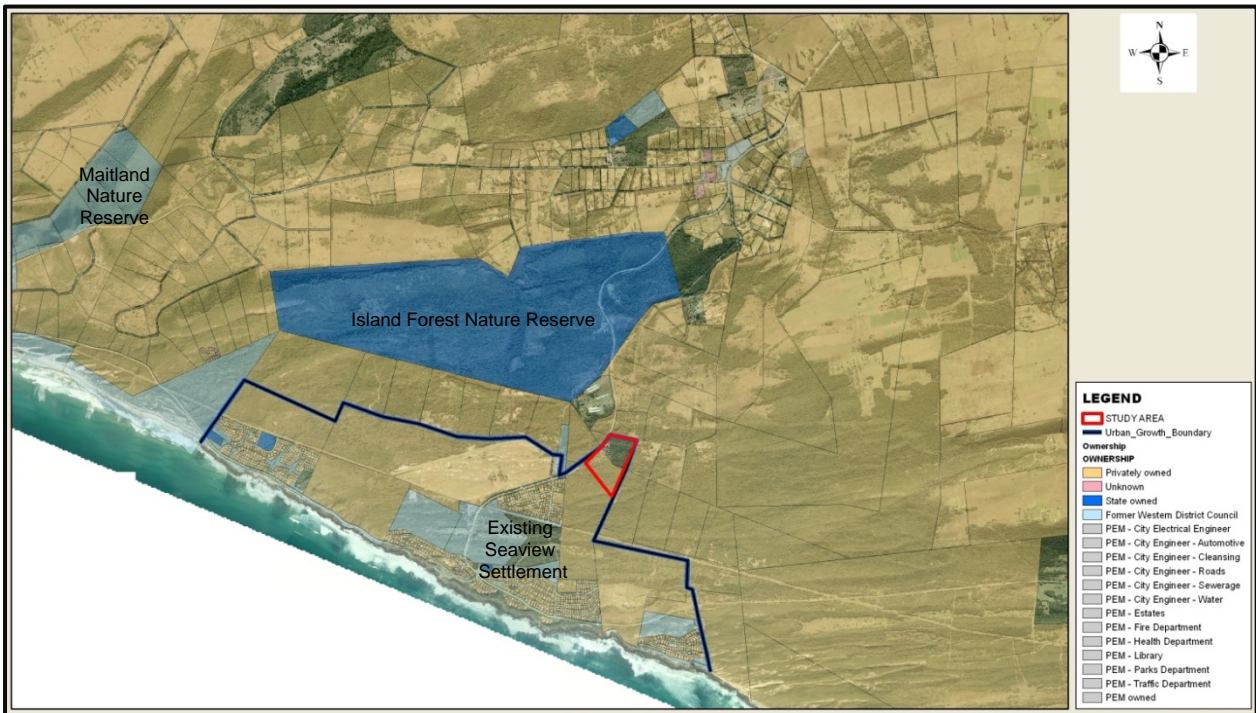


Figure 3-3: Land ownership and location of the study area in relation to the urban edge for Seaview-Beachview-Kini Bay node



Figure 3-4: Land ownership within the Seaview-KiniBay urban edge

The layout plan for Erf 590 dated January 2006 has made provision for 379 residential stands. Five business stands, three crèches, three churches and one community hall are also proposed for. However, due to the sensitive nature of the site, amendments to the layout plan are anticipated.

4 Social Context

Erf 590, which is referred to by the community as Zweledinga, is currently informally occupied (See Figure 4-1 and Figure 4-2) by 122 people, as determined via a social survey undertaken in September 2009 (NMBM, 2009). The informal settlement has only two water points, which serve the entire community (See Figure 4-3). No formal sanitation or roads are present. Windblown dust from the dunes located both within and adjacent to the settlement poses a health risk to the community.



Figure 4-1: Zweledinga looking in a westerly direction towards the Seaview Road



Figure 4-2: Zweledinga looking in a westerly direction towards the Seaview Road



Figure 4-3: One of the two water-points at Zweledinga

A further 114 reside informally at New Rest (see Figure 3-2), which is located 1.3 km to the south-west of Erf 590. Based on the current population figures for both Zweledinga and New Rest, the current layout plan¹ would be able to accommodate both these communities, and provide for further growth of 143 families.

5 Legislative and Policy Background

Below is a brief summary of applicable environmental legislation and policy for the proposed development.

5.1 NEMA: EIA Regulations

The National Environmental Management Act (NEMA) EIA regulations list activities that may have a significant impact on the environment, and which consequently require authorisation from the relevant environmental authorities.

In terms of the schedule of listed activities published in GN R387, the following applicable listed activity would trigger a Scoping and Environmental Impact Assessment Process:

2. *Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 ha or more.*

Since the proposed low cost housing development includes the above listed activity, the proponent is obliged to conduct an Environmental Impact Assessment for the proposed activity in accordance with the procedure stipulated in GN R385.

5.2 NEMA: Biodiversity Act (Act No. 10 of 2004)

The NEMA: Biodiversity Act operates within the framework of the National Environmental Management Act (Act No. 107 of 1998) and provides for the protection of species and ecosystems that warrant national protection and for the sustainable use of indigenous biological resources.

- The Act provides for the development of Bioregional Plans, which are plans for the management of biodiversity and components of biodiversity within a Bioregion. A

¹ Based on an assumption that the site is suitable for low cost housing development and the layout plan will not need to be reduced in terms of the proposed number of residential units

Bioregional Plan that will confer legal status to the NMBM conservation assessment (SRK Consulting 2009) is currently being prepared, but will not be completed or gazetted within the timeframes of the current project. The NMBM Bioregional Plan will thus not impact on the proposed development; and

- The Act governs the management of threatened species of national importance, however none of these species are found within the study area.

No provisions in terms of the act are thus likely to be of relevance to the proposed development.

5.3 Forest Act (Act No. 122 of 1984)

The Forests Act provided for the establishment of the National Botanical Institute. The Forest Act is repealed by the NEMA: Biodiversity Act. However, anything done in terms of the Forest Act, which may or must be done in terms of the Forest Act, must be regarded as having been done in terms of the NEMA: Biodiversity Act.

None of these functions are perceived to be of direct relevance to the current project.

5.4 National Forests Act (Act No. 84 of 1998)

The National Forests Act (NFA) promotes the sustainable use and development of forests, and provides special measures for the protection of certain forests and trees.

The principles of the Act in Section 3 include that “...*natural forests may not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits*”. This prescribes that no development affecting forests may be allowed unless “exceptional circumstances” can be proven.

In terms of Section 7 of the National Forests Act:

1. No person may –
 - (a) cut, disturb, damage or destroy any indigenous tree in a natural forest; or
 - (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any tree, or any forest product derived from a tree contemplated in paragraph (a), except in terms of –
 - (i) a licence issued under subsection (4) or section 23; or
 - (ii) an exemption from the provisions of this subsection published by the Minister in the Gazette on the advice of the Council.

The definition of “natural forest” in the NFA is as follows (Section 2(1)): ‘*A natural forest means a group of indigenous trees whose crowns are largely contiguous or which have been declared by the Minister to be a natural forest under section 7(2)*’

Thus in terms of the NFA, all indigenous forests are protected and no trees may be cut, damaged or removed without a licence from DWAF (or a delegated authority). If not satisfied that proper consideration has been given to the protection of a forest, DWAF has the legal right to refuse a licence, even if authorisation for development has been granted by another sphere of government.

In terms of Section 15 of the Act:

1. No person may –
 - (a) cut, disturb, damage or destroy any protected tree; or
 - (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except –
 - (i) under a licence granted by the Minister; or
 - (ii) in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette on the advice of the Council.

Any person who contravenes the provisions of Section 7 and 15 above is guilty of an offence in terms of the Act and can be sentenced to a fine or imprisonment.

The list of protected trees published under GN 1080 on 3 October 2008 includes white milkwood *Sideroxylon inerme*, which is found on the site. In order to destroy or remove this species, a permit must first be obtained from the Department of Water Affairs and Forestry (DWAF).

5.5 DWAF Guidelines for Control of Development Affecting Natural Forests (2008)

A set of policy principles and guidelines was developed in 2008 by the Department of Water Affairs and Forestry (DWAF) to promote better co-operative control over development affecting natural forests. These guidelines serve as the basis for decisions and comments made by DWAF staff when dealing with development proposals, land use planning and environmental impact assessments affecting natural forests. The policy and guidelines aid the proper implementation of existing legislation, especially the National Forests Act No 84 of 1998.

The National Forests Act of 1998 states that “...*natural forests may not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits*”².

The term “exceptional circumstance” refers to capital projects of national and provincial strategic importance. Where forests are affected by such projects, it must be proven beyond doubt that:

- The project is of strategic national or provincial interest (residential development and agriculture are not considered to fall into this category); and
- No feasible alternative is available (such as an alternative site or route).

Where the above projects that meet the above criteria are considered, the impacts on natural forests must be comprehensively investigated. This includes:

- Impacts on the buffer areas;
- Impacts on the forest fauna and flora; and
- Impacts on the forest ecosystem and dynamics.

Such impact assessment must also consider the national and provincial conservation importance and planning for the forest types and individual forest patches involved as well as the wider strategic status quo of the forest types. During such an assessment, the following guidelines apply:

- Where national, provincial and local government conservation targets, ratings or priorities for forest patches or national forest types or sub-types differ, the highest conservation or priority rating will prevail;
- Where natural forest is contained within a mosaic of other vegetation types that are associated with it, the forest must not be regarded in isolation. In such cases a landscape approach must be taken with an attempt to protect the forests together with the surrounding vegetation types; and
- Natural corridors linking forests and other habitats must be retained as far as possible.

DWAF policy guidelines for development affecting forest state that no land use that will significantly impact on forest habitats must be considered near any of the forest types. Limited building and infrastructure development of an eco-tourist nature is allowed in forest types with ratings below the status of *Endangered*, but it must be ensured that these are placed in the least sensitive parts of the forest (preferably disturbed parts). Guidelines for development affecting forest are presented in Table 5-1.

Table 5-1: DWAF policy guidelines for development affecting forest

Threat Status Rating	Guidelines	Off-Set Agreements
Critically Endangered	<ul style="list-style-type: none"> • No activities or development must be considered that will destroy forest; • Only low-impact eco-tourist facilities like boardwalks and bird-hides, but no buildings, infrastructure or bush camps. 	No, except if proven to be of national or provincial strategic importance, with no feasible alternatives.

² This does not mean that all such issues have to be referred to the Minister of Water Affairs and Forestry for a decision, but implies that mandated officials can apply the principle in decision-making, within the framework of policy and legal interpretation.

Endangered	<ul style="list-style-type: none"> No activities or development must be considered that will destroy forest; Low-impact eco-tourist facilities like boardwalks and bird-hides, and small bush-camps, but no buildings and infrastructure. 	No, except if proven to be of national or provincial strategic importance, with no feasible alternatives.
Vulnerable and Lower	<ul style="list-style-type: none"> Low-impact eco-tourist facilities like boardwalks and bird-hides, and small bush-camps. Very limited building and infrastructure development of an eco-tourist nature, such as limited numbers of chalets. These should be placed outside forests as far as possible, with forest margins intact. 	Can be considered for the above, and for limited building and infrastructure of an eco-tourist nature.

If development is allowed within natural forests (under exceptional circumstances):

- Mitigation measures must be applied to limit impacts and all feasible mitigation measures must be taken to minimise the impact; and
- An off-set agreement that will result in a nett ecological gain of the habitat type lost must be reached to compensate for the loss.
- There should be an approved environmental management plan overseen by an appropriately qualified environmental manager; and
- Monitoring must take place by the relevant government bodies.

A site visit to Erf 590 was undertaken with officials from DWAF and DEDEA on 18 September 2009 to verify the presence of forest communities and forest-associated ecosystems on the site. During this site visit, the presence of both forest communities and forest-associated ecosystems was confirmed by DWAF (formal DWAF correspondence in this regard is attached as Appendix 1).

5.6 Provincial Nature Conservation Ordinance

Besides the species of national importance that are protected by the Biodiversity Act, certain indigenous plants are also protected under the relevant provincial Ordinances or Acts dealing with nature conservation. A new provincial conservation ordinance for the Eastern Cape is in development – the Environmental Conservation Act (2003) – but has not yet been promulgated and the schedule of protected plant species within this ordinance does not yet apply. Thus, the relevant statute in the Eastern Cape remains the 1974 Provincial Nature Conservation Ordinance No. 19 (PNCO). In terms of this Ordinance, a permit must be obtained from the Department of Economic Development and Environmental Affairs (DEDEA) to remove or destroy any plants listed in the Ordinance.

5.7 Conservation Assessment and Plan for Nelson Mandela Bay (2009)

The *Conservation Assessment and Plan for Nelson Mandela Bay* (SRK Consulting 2009) (henceforth referred to as the NMBM conservation assessment) is a systematic biodiversity plan that was developed according to established protocols. Systematic biodiversity planning is a rigorous, data-driven approach for assessing the location, status and importance of a range of biodiversity features. It is widely accepted in South Africa, and internationally, as the best available science for identifying spatial biodiversity priority areas. The NMBM conservation assessment was developed in alignment with the planning products of the Cape Action for People and the Environment (C.A.P.E) (Cowling et al. 1999a & b) and Subtropical Thicket Ecosystem Programmes (STEP) (Cowling et al. 2003), and conforms to norms and standards for the publication of Bioregional Plans as developed by the South African National Biodiversity Institute (SANBI) (see SANBI 2008). As such, the NMBM conservation assessment will underpin the development of a Bioregional Plan for the NMBM, as provided for by the National Environmental Management: Biodiversity Act 10 of 2004.

The NMBM conservation assessment identified a Conservation Network for the NMBM that comprises a suite of Critical Biodiversity Areas (CBAs) and Critical Ecosystem Support Areas

(CESAs) (see Table 5-2). These are the minimum areas required to meet the conservation targets for vegetation types, species and ecological processes within the NMBM municipal area. Importantly, the Conservation Network was designed in a way that attempts to avoid conflicts with the other land use requirements in the municipality (SRK Consulting 2009).

Table 5-2: Description of the CBA categories

Category	Code	Description
National Parks , Provincial, Local, Private Nature Reserves	PA 1	Protected areas managed by SAN Parks, provincial or local authorities, parastatals (e.g. NMMU), or the private sector.
National Parks , Provincial, Local, Private Nature Reserves Pending Declaration	PA 2	Protected areas as above pending declaration.
Critical Biodiversity Areas	CBA	Critically endangered habitats, ecological process areas, ecological corridors, habitats for Species of Special Concern, and some threatened ecosystems. Such areas should form part of the formal protected area system.
Critical Ecosystem Support Area 1	CESA 1	Agricultural land that plays an important role in ecosystem functioning and/or provides connectivity between natural areas. Such areas must be maintained for these purposes.
Critical Ecosystem Support Area 2 (land viable for restoration or rehabilitation)	CESA 2	Areas severely disturbed or destroyed by human activities (e.g. mining), requiring restoration or rehabilitation, and incorporation into the formal protected area system.
Developed (Non-restorable; no natural habitat)	DEV	Areas severely disturbed or destroyed by human activities with no natural habitat remaining, including airfields, cultivated lands, forestry plantations, industry, mines and quarries, severe overgrazing, and urban and rural development.

Along with the identification of the Conservation Network, the NMBM conservation assessment provides land use management guidelines for the CBA and CESA areas that make up the network.

Relevant guidelines include:

- No further loss of natural habitat should occur in CBA areas i.e. all land in this category should be maintained as natural vegetation cover;
- These areas of land can act as possible offset receiving areas;
- Use CBAs to demarcate limits to development around settlement nodes to limit lateral expansion of urban development along corridors i.e. urban edge demarcation;
- CBAs not formally protected (public or private) should be rezoned to POS 3, declared as a protected areas in terms of NEM: Protected Areas Act and incorporated into the protected area network through Conservation Agreements and incentives. Title deed restrictions must be attached to these. Rates rebates can be obtained in return;
- No further loss of natural habitat should occur within CESA areas and all land in this category currently in an extensive agricultural state should be maintained as such, or rehabilitate or restored to a natural or semi-natural state;
- The maintenance of connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and the prevention of degradation of adjacent Critical Biodiversity Areas must be achieved;

The NMBM conservation assessment also provides guidelines for land use on land containing *Endangered*, *Vulnerable* and *Least Threatened* vegetation types outside of CBAs

- Allow some loss of natural habitat, but within the limits of cumulative impacts or the transformation threshold of the Ecosystem Status;
- Where natural vegetation occurs close to CBAs, biodiversity-friendly forms of management and even restoration options, where appropriate, should be implemented;

- For vegetation types outside of CBAs and CESAs 1 and 2, development should be subject to biodiversity offsets if the impact of habitat loss is of a medium significance or greater in the following ratios:
 - *Endangered* Areas should be subject to an offset ratio of 20:1;
 - *Vulnerable* Areas should be subject to an offset ratio of 10:1;
 - *Least Threatened* Areas should not require an offset.
- Such ratios can be increased if other important biodiversity features are present e.g. species of special concern, ecological processes etc.

6 Current ecological condition of the site

6.8 Vegetation types

The pattern of vegetation observed on the site is dependent on the scale at which it is examined. At the national and regional scale, the vegetation is classified as Albany Forest. At the municipal level, the fine-scale (1:10,000) NMBM Conservation Assessment (SRK Consulting 2009) records two vegetation types within the study area:

- Sardinia Bay Forest Thicket – a predominantly thicket vegetation type with forest elements / patches. It is present on aeolian sand; and
- Bushy Park Indian Ocean Forest - a predominantly forest vegetation type (> 3 m tall) with thicket elements / clumps. It is present on moderately fertile aeolianite or calcareous sandstone or sand on south facing slopes (see Figure 6-1).

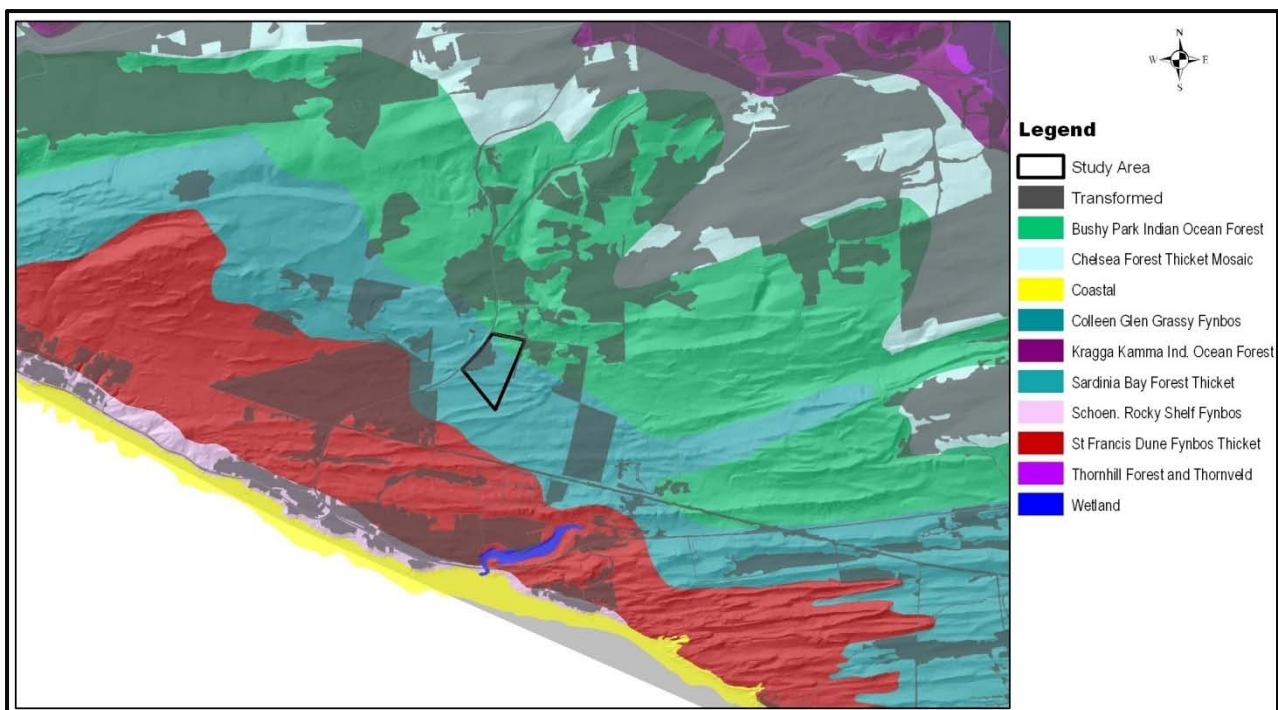


Figure 6-1: Vegetation types within the study area and surrounds, as determined via the NMBM Conservation Assessment and Plan (SRK Consulting, 2009).

These vegetation types have a close affinity to one other, both comprising a continuum of forest and thicket communities, making it difficult to draw precise boundaries between these vegetation types. According to the NMBM conservation assessment, these two vegetation types historically occurred as a relatively continuous swathe that ran roughly parallel to, and inland of (within about 1 km) the south coast of the Nelson Mandela Bay municipal area (see Figure 6-1).

At the site level, communities can be distinguished within the vegetation types (see Figure 6-2). However, even at this level of examination, the boundaries between communities are not as distinct as they appear on the map, as the communities themselves are comprised of a mosaic of forest, thicket and/or fynbos species.



Figure 6-2: Plant communities within the study area and surrounds (Pote, 2009).

The forest communities are generally present on south-facing slopes, which are wetter and have more developed and organic soils. It is dominated by species such as *Secamone alpini*, *Scutia myrtina*, *Gymnosporia heterophylla*, *Ptaeroxylon obliquum*, *Sideroxylon inerme*, *Zanthoxylum capense* and *Maerua caffra*. Forest is most dominant on the northern part of the site.



Figure 6-3: Natural forest within the study area

Thicket occurs on the other aspects where soils are drier, sandy and less developed and the dominant species include *Cynanchum natalitium*, *Imperata cylindrica*, *Agathosma ovata*, *Cassine tetragona*, *Rhus dentata* and *Olea capensis*.

Fynbos elements (e.g. *Metalsia sp.* and *Passerina falcifolia*) are present on the dune crests and slacks, particularly within the southern part of the site.

6.9 Ecosystem Status

The NMBM conservation assessment set a target³ for each of the vegetation types within the municipality. These targets represent the amount of natural vegetation that is required to effectively conserve each of the vegetation types.

Ecosystem Status categories were then determined based on the area of each vegetation type required for target achievement and the remaining area of the vegetation type (see Figure 6-4). Where the target was greater than 75 % of the extant habitat, then the vegetation type fell into the *Critically Endangered* category (see Table 2 16 and Figure 2 14); where target was 75% or less and greater than 40% of the extent habitat of the vegetation type, it was categorised as *Endangered*; where the target was 40% or less and greater than 20%, it was categorised as *Vulnerable*; and where the target was 20% or less than extant habitat, it was categorised as *Least Threatened* (Stewart 2008).

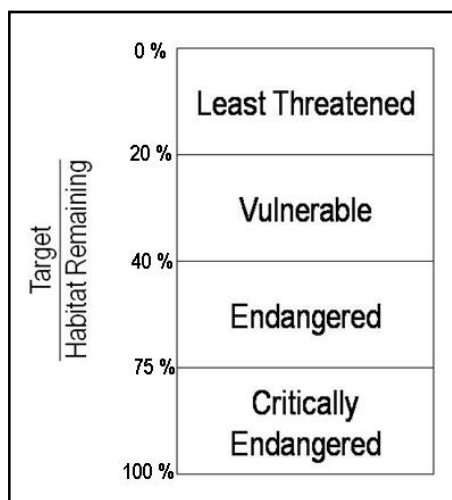


Figure 6-4: Ecosystem Status of vegetation types (Driver et al. 2005)

Based on the above, Sardinia Bay Forest Thicket was classified as a *Vulnerable* vegetation type. The historical extent of Sardinia Bay Forest Thicket was approximately 5 300 ha and approximately 2 600 ha remain. Bushy Park Indian Ocean Forest was classified as a *Critically Endangered* vegetation type. The historical extent of Bushy Park Indian Ocean Forest was approximately 2 900 ha and approximately 1 800 ha remain.

Vulnerable vegetation types can withstand limited loss of natural area through disturbance or development. *Critically Endangered* ecosystems, in contrast, cannot withstand any further loss of natural area through disturbance or development (Pierce & Mader 2006).

6.10 Species of special concern

A survey of plant species of special concern was undertaken by a specialist botanist, Mr Jamie Pote. The survey was conducted in late August 2009.

From the survey, it was observed that the majority of species present within the site have widespread distributions and would thus not be under any significant threat as a result of the proposed development.

³ The systematic conservation planning process for forests was undertaken by DWAF at a national level and set conservation targets for the formal protection of each forest type within the country. The forests within the NMBM fall within the Albany Forests broad classification. The target set in terms of the national planning process for forests was adopted by the finer-scale NMBM conservation assessment, which split the broad-level forest classification into finer-scale forest vegetation types.

The following observations were made during the survey:

- No Red Listed plant species were within the study area;
- Six species that are protected in terms of the PNCO were recorded (*Acrolophia capensis*, *Astephanus marginatus*, *Carpobrotus sp.*, *Cynanchum natalitium*, *Scadoxus puniceus* and *Secamone alpini*); and
- One species protected under the NFA, white milkwood *Sideroxylon inerme*, was recorded.

6.11 Habitat transformation and degradation

A gradient exists in terms of the habitat transformation and degradation on site, with areas near to the informal settlement being more degraded than areas that are further away. Approximately 8 ha of the western extent of the site have been transformed through informal housing. However, within the informal housing area, indigenous trees have been retained for the shade and shelter they provide.

No browsing of livestock or cultivation was observed during the site visit. It was noted that exotic trees were preferred over indigenous trees for use as firewood and building materials. The adjacent habitat has thus not been severely impacted upon through the harvesting of trees for these purposes. Dogs are kept as pets and since there are no walls or fences between the dwellings, they are not restricted to the settlement. It is assumed that dogs will occasionally hunt or disturb the indigenous fauna, particularly small to medium sized mammals.

There has been some dumping of household waste, but this is largely confined to areas immediately adjacent to the settlement. It is assumed that plants are harvested for medicinal and cultural purposes and that the intensity of this is greatest around the settlement and along established paths.

The site is invaded by rooikrans *Acacia cyclops*, but the invasion is not widespread and is limited to several discrete rooikrans clumps, primarily within the dune slacks.

Estimates of the intensity of various sources of habitat transformation and degradation within the site are provided in Table 6-1 below. The remaining extent of natural vegetation within the study area is provided in Table 6-2.

Table 6-1: Sources of habitat transformation and degradation

Source	Intensity	Note
Cultivation	None	No cultivation observed
Browsing of livestock	None	No livestock observed
Harvesting trees for firewood	Low	Exotic trees preferred
Harvesting trees for building material	Low	Exotic trees preferred
Impact of pets (especially dogs)	Low-Mod	Dogs are likely to hunt / disturb indigenous small-medium sized mammals
Dumping of waste	Low-Mod	Mostly around the existing settlement
Harvesting of medicinal plants	Moderate	More intense around the existing settlement and along paths
Clearing vegetation to construct new dwellings	High	Likely to continue to expand

Table 6-2: Remaining extent of natural vegetation within the study area

Vegetation Type	Impacted	Invaded	Transformed	Natural	Forest	Thicket	Total
Bushy Park Indian Ocean Forest	0.3	0.0	0.3	2.9	1.9	1.0	3.2
Sardinia Bay Forest Thicket	7.8	1.8	6.0	10.2	5.7	4.5	18.1
Total	8.1	1.8	6.3	13.1	7.6	5.5	21.3

In summary, while the study area has experienced a degree of habitat degradation, particularly associated with the activities from the informal settlement, the overall condition of the natural vegetation on the study area is considered to be good.

6.12 Ecological Processes and the NMBM Conservation Network

Ecological processes are the interactions between organisms, and between organisms and their physical environments, that generate and maintain biodiversity. In order to ensure the persistence of biodiversity, it is necessary to conserve critical ecological processes (Cowling *et al.* 2003).

An important consideration for the conservation of critical ecological processes is the maintenance of broad scale corridors for the movement of biodiversity.

A set of Critical Biodiversity Areas (CBAs) and Critical Ecosystem Support Areas (CESAs) were identified for the achievement of conservation targets for vegetation types, species of special concern and ecological processes in Nelson Mandela Bay, in accordance with the Bioregional Planning Guidelines (DEAT, 2008). The CBA and CESA areas within the NMBM Conservation Network function as corridors and developments should not compromise connectivity within these corridors.

Although the study area does not fall within the NMBM Conservation Network, it is located immediately adjacent to a CBA (to the north of the study area; see Figure 6-5). This CBA forms part of a corridor that links the Maitland Local Authority Reserve to the Island Nature Reserve and then continues eastward through Bushy Park to Providentia / Lovemore Park, providing an east-west passage for the movement of biota.

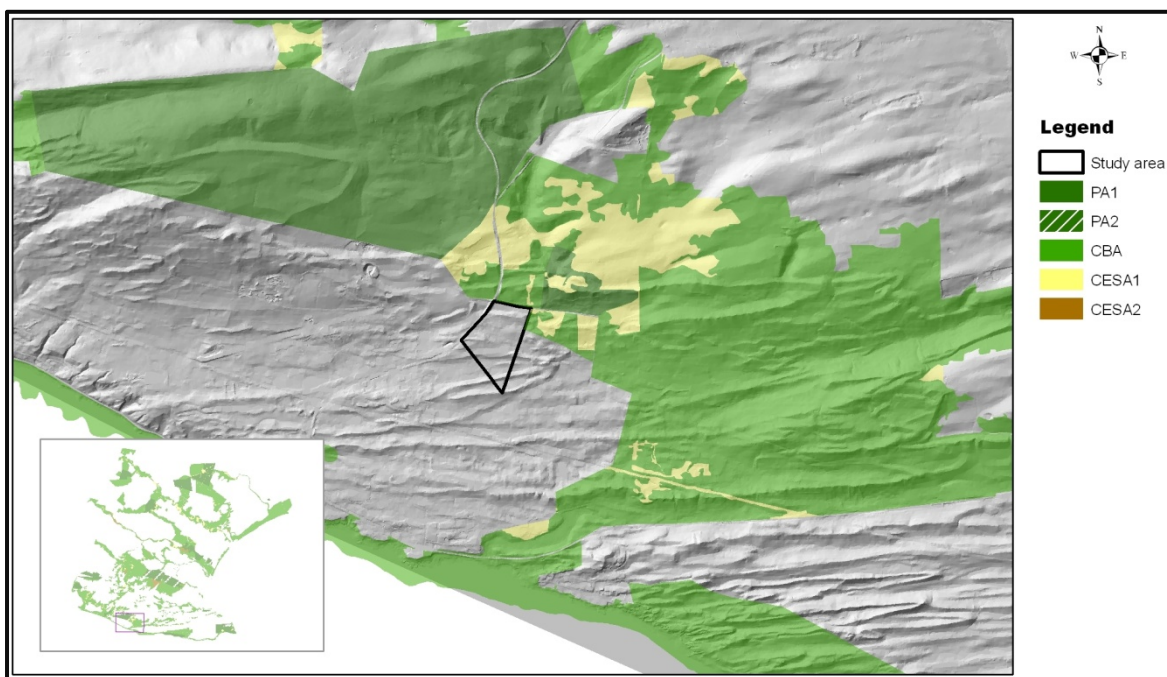


Figure 6-5: The NMBM Conservation Network adjacent to Erf 590.

7 Conclusion

Divergence exists between the recommendations and requirements of the *NMBM Conservation Assessment 2009* and the National Forests Act, in terms of the implications of the potential development of Erf 590 for low cost housing purposes.

In terms of the *NMBM Conservation Assessment 2009*, potential for housing development does exist due to the following factors:

1. The majority of the vegetation on the site was classified in the NMBM conservation assessment as Sardinia Bay Forest Thicket, which is a *Vulnerable* vegetation type that can withstand limited loss of natural area;

2. The specialist botanical study did not record any threatened plant species within the study area; and
3. The site does not fall within the NMBM Conservation Network – thus the site does not constitute one of the priority areas for the achievement of the NMBM’s conservation targets.

However, the extent of housing development on the site would be constrained by the following factors:

1. The condition of much of the natural habitat within the study area is good. Habitat degradation has not occurred to the extent that it reduces the site’s conservation value;
2. The northern section of the site is classified as Bushy Park Indian Ocean Forest, which is a *Critically Endangered* ecosystem that can only withstand a very small degree of loss of natural area through development. Development of the entire site will result in a loss of approximately 3 ha of this vegetation type;
3. The edge effects of the development on the adjacent Conservation Network would need to be mitigated against; and
4. The loss of forest habitat on the site is likely to result in a moderate to high residual impact, which would need to be addressed via the institution of a biodiversity offset.

Therefore, if development was to be pursued on the site by the NMBM, the following minimum requirements should be implemented:

1. A biodiversity offset must be instituted to compensate for the loss of natural habitat. Such an offset must result in currently unprotected land, containing Bushy Park Indian Ocean Forest and Sardinia Bay Forest Thicket, being set aside within the NMBM Conservation Network, declared as a nature reserve and managed as such;
2. A 30 m buffer (minimum) should be maintained between the development and the CBA area to the north and north-east, to avoid the *Critically Endangered* Bushy Park Indian Ocean Forest in the north of the site, if possible. Maintaining the portion of Bushy Park Indian Ocean Forest on Erf 590 as a conservation buffer as illustrated in Figure 7-1 below will largely achieve this;
3. New informal dwellings should not be allowed to become established in this area, and the NMBM should actively monitor the erection of such structures and ensure their immediate removal;
4. Where possible, clumps of trees (especially milkwood plants) should be retained during site clearing and levelling, particularly in low lying dune slacks; and
5. Protected plant species should be relocated (if this is not possible, the necessary permits must be obtained for their destruction).



Figure 7-1: Proposed No-Development Buffer, if development of the site is pursued by the NMBM

However, it is understood that the DWAF *Policy Principles and Guidelines for control of development affecting natural forests, June 2008* does not make provision for the removal of forest under the circumstances presented by the proposed development of Erf 590 (see attached report from DWAF in Appendix 1). Of major relevance is that Bushy Park Indian Ocean Forest and Sardinia Bay Forest Thicket contain patches of natural forest, and therefore constitute a forest ecosystem. Development of forest is subject to the National Forest Act, which disallows the destruction of natural forest except under exceptional circumstances. The clearing of forest for the development of housing within the study area is not supported by DWAF policy and guidelines, unless it can be proven that the development constitutes an exceptional circumstance. In order to be considered an exceptional circumstance, it must be shown that no other suitable alternatives exist and that the project is of strategic national or provincial importance; and

Therefore, if the NMBM wishes to pursue the development of Erf 590 for low cost housing purposes, it will be necessary for the NMBM to engage with DWAF at a senior level and submit a motivation for the determination of this development as an “exceptional circumstance”.

Yours faithfully,

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SRK Consulting

8 References

- Pierce, S.M. & Mader, A. 2006. *The STEP Mapbook 2nd Edition, part of: The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development.* Terrestrial Ecology Research Unit Report No. 47. University of Port Elizabeth, South Africa.
- Cowling, R.M., Lombard, A.T., Rouget, M., Kerley, G.I.H., Wolf, T., Sims-Castley, R., Knight, A., Vlok J.H.J., Pierce, S.M., Boshoff, A.F., Wilson, S.L. 2003. A Conservation Assessment for the Subtropical Thicket Biome. Report 43 to the Terrestrial Ecology Research Unit, University of Port Elizabeth, South Africa.
- SRK Consulting, 2009. *Final Conservation Assessment and Plan for the Nelson Mandela Bay Municipality.* Port Elizabeth, South Africa.
- Stewart, W.I. 2008. *A Biodiversity Conservation Assessment and Plan for the Nelson Mandela Bay Municipality, Cape Floristic Region, South Africa.* MSc Thesis. Nelson Mandela Metropolitan University, Port Elizabeth.

Appendices

Appendix 1: Results of site inspection by DWAF