

Appendix D: Specialist reports

Appendix D1: Vegetation report

Vegetation Report for the proposed Alexandria Community Health Centre in KwaNonkqubela Township

(done in-house by Merika Louw, CEN IEM Unit)

Vegetation Maps and Conservation Plans

Mucina and Rutherford (2006) have mapped the vegetation at the proposed Alexandria Community Health Centre site as Albany Coastal Belt (AT9) vegetation (Figure 5 in Appendix A), which falls within the Albany Thicket Biome. Albany Coastal Belt vegetation is assigned a conservation status of Least Threatened, and a protection status of Poorly Protected [Conservation target: 19%; Protected: 1%; Remaining habitat: 80.9%; Mucina and Rutherford, 2006].

Albany Coastal Belt vegetation is described as present on the 'gently to moderately undulating landscapes and dissected hilltop slopes close to the coast, dominated by short grasslands punctuated by scattered bushclumps or solitary *Acacia natalitia* trees' (Mucina and Rutherford, 2006). It is presumed that the current state of Albany Coastal Belt vegetation i.e. a mosaic of grassland with thicket and forest patches, was created by large-scale clearing, of what would have been solid thicket at the time, by early settlers for agriculture.

The **Eastern Cape Biodiversity Conservation Plan (2007)** indicates that the entire site falls within Terrestrial Critical Biodiversity Area 2: Corridor 1 (Figure 4 in Appendix A). Terrestrial CBA2 areas are included within Biodiversity Land Management Class 2: Near natural landscapes. The recommended land use objectives for BLMC 2 areas are 'maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted'. Recommended permissible land uses under BLMC2, include: conservation, game farming, and communal livestock keeping (ECBCP, 2007).

As the site was found to have low biodiversity, and vegetation is no longer in a 'near natural state' i.e. has been transformed due to past and present agricultural practices, and dumping of building rubble – these land use objectives should no longer apply. Rather, the site should be included under BLMC4: Transformed landscapes, where the recommended land use objective is 'manage for sustainable development', and the recommended permissible land use is 'settlement'. The building of a clinic would, therefore, be a permissible land use, and with mitigation and management measures in place, the ecological integrity of the surrounding open space areas – including the stream / drainage line, which is an Ecological Support Area (Addo BSP, 2012) – will be maintained.

The site does not fall within an Aquatic CBA, as mapped in the ECBCP (2007).

The **Subtropical Thicket Ecosystem Project (2006)**, which has largely been used to inform CBA layers of the ECBCP (2007), identifies the proposed site as falling within a Least Threatened ecosystem i.e. 'ecosystems which cover most of their original extent and which

are mostly intact, healthy and functioning' (Pierce, 2006). Least Threatened ecosystems are able to withstand some loss of, and disturbance to, natural areas. It is recommended that disturbed portions of land are developed in these ecosystems, before undisturbed portions are developed.

The **National Freshwater Ecosystem Priority Areas project (2011)** does not classify the stream / drainage line to the north-east as being part a priority area. It is part of quaternary catchment P20A (ECBCP, 2007), within Sub Water Management Area: Bushmans, in the larger Fish to Tsitsikamma Water Management Area. The stream feeds into the larger Boknes River (20_N_U), a system which is classified as Class D: Largely Modified (NFEPA, 2011).

The **Addo Biodiversity Sector Plan (2012) (Sector: Ndlambe Municipality)** has mapped most of the proposed site as falling within Land Cover category 'Intensive Agriculture'. 'Land Cover' refers to 'the level of change or transformation of natural ecosystems, which can range from natural, degraded and overgrazed, to areas which have been irreversibly transformed' (Vromans *et al.*, 2012). Based on the Land Cover category, as well the presence of threatened terrestrial ecosystems, and wetlands / estuaries / riparian corridors, a Critical Biodiversity Areas Map is produced. The CBA Map for the Ndlambe Municipality indicates that the site falls within CBA category 'No Natural Areas Remaining (NNR)' (Figures 3 and 4 in Appendix A) – NNR areas are areas that have been (i) irreversibly transformed through development, (ii) contain no natural areas, and (iii) are not required as an Ecological Support Area (ESA) (Vromans *et al.*, 2012). NNR areas 'no longer contribute to the biodiversity of the area and are favoured areas for development' (Vromans *et al.*, 2012).

The north / north-eastern border of the site, along the stream banks, falls within an ESA, even though Land Cover is still categorised as 'Agriculture', and vegetation has been largely transformed. This is due to the presence of the stream / drainage line within a 100 m buffer of this section of the site (Figure 4 in Appendix A). The stream is classified as 'Transformed: other river buffer 100 m'.

An ESA acts as a buffer, or supporting zone, to: a) prevent degradation of CBA's and Protected Areas, and b) protect other catchment and process areas (rivers, wetlands, estuaries and their buffers) that are, in turn, required to prevent degradation of Critical Biodiversity Areas and formal Protected Areas (Vromans *et al.*, 2012). ESA's include 'areas that are already transformed or degraded, but which are currently or potentially still important for supporting ecological processes e.g. transformed or alien plant infested-areas, that have transformed or degraded the natural buffer area of an estuary, wetland or river'. ESA's are a 'focus for rehabilitation, and the intensification of land-use should be avoided' (Vromans *et al.*, 2012).

The desired management objective for ESA's is to *maintain ecological processes*, and for NNR areas is *Sustainable Management within general rural landuse principles*. NNR areas are the 'favoured areas for Development' (Vromans *et al.*, 2012).

Vegetation / Site Description

The proposed development site for the Alexandria CHC slopes gently to north / north-east / east, towards a stream / drainage line. Vegetation is dominated by grasses i.e. *Stenotaphrum secundatum* (Buffalo Grass), *Cynodon dactylon* (Couch Grass), and

Pennisetum clandestinum (Kikuyu Grass). Grass cover is maintained by cattle that graze the area. Grasses are interspersed with weedy herbs i.e. *Arctotheca calendula*, *Trifolium repens* and *Verbena aristigera*; shrubs characteristic of brackish soils i.e. *Exomis microphylla* var. *axyrioides*, and remnant, spinescent Thicket species i.e. *Lycium ferocissimum* and *Scutia myrtina*. As the site has low indigenous plant species richness and diversity, and low biodiversity, in general, with a high number of alien / invasive plant species, the site can be considered to be degraded, transformed, and of low conservation value.

Protected Plants and Species of Conservation Concern (SCC's)

Seventy-five plant species were identified on site, of which 29 are exotic and/or invasive species (see Table I, below). Eight of the exotic species are categorised as invasive under the Conservation of Agricultural Resources Act 43 of 1983, and the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published August 2014).

Protected plants (other than trees) identified on site include: *Aloe maculata* (a garden escapee, likely planted); *Hypoxis* sp., and a number of commonly-found mesembs. Protected plants require permits from the relevant authorities i.e. DEDEAT and DAFF, prior to their disturbance (which includes trimming of the branches of protected trees), removal, and/or transplantation.

Planted specimens of *Podocarpus falcatus* (Outeniqua Yellowwood) are found bordering the park / play area, just south of the proposed site – these trees are Protected under the National Forests Act 84 of 1998 (updated 7 September 2012), are to remain on site, and are not to be disturbed in any way (as aforementioned). The planted specimens of *Erythrina caffra* (Coral Tree) are also to remain on site.

Soils

Soils on site are mapped as an association of soil classes 17 and 19 (National Soils layer: Soil Classes) i.e. 'structureless and textural contrast soils'. Favourable properties of these soil classes include 'somewhat high natural fertility' and a 'relative wetness favourable in dry areas. Limitations of these soil classes are 'restricted depth, imperfect drainage, high erodibility; slow water infiltration, and seasonal wetness' (Biodiversity GIS online interactive maps, 2007).

The general soil description for soil on site is that of soils with a 'marked clay accumulation', that are 'strongly structured and non-reddish in colour' and which 'may occur associated with one or more vertic, melanic and plinthic soils' (Biodiversity GIS online interactive maps, 2007).

Table I. List of plant species identified at the proposed Alexandria Community Health Centre site.

Family	Species	Red List of South African Plants, version 2014.1	CARA 43 of 1983 / NEMBA No. 10 of 2004 (Amended 2014)	Eastern Province Nature and Env. Cons. Ordinance, 1974
AGAVACEAE	<i>Agave sisalana</i> Perrine	NE	CARA 2, NEMBA 2	
AIZOACEAE	<i>Galenia</i> sp.	LC		
ALLIACEAE	<i>Nothoscordum borbonicum</i> Kunth	NE		
AMARANTHACEAE	<i>Aerva lanata</i> (L.) Juss. ex Schult.	LC		
APIACEAE	<i>Ciclospermum leptophyllum</i> (Pers.) Eichler	NE		
APIACEAE	<i>Centella asiatica</i> (L.) Urb.	LC		
ASPARAGACEAE	<i>Asparagus capensis</i> L. var. <i>capensis</i>	LC		
ASPHODELACEAE	<i>Aloe maculata</i> All.	LC		Schedule 4 Protected
ASTERACEAE	<i>Arctotheca calendula</i> (L.) Levyns	LC		
ASTERACEAE	<i>Conyza bonariensis</i> (L.) Cronquist	NE		
ASTERACEAE	<i>Hypochoeris radicata</i> L.	NE		
ASTERACEAE	<i>Xanthium spinosum</i> L.	NE	CARA 1, NEMBA 1b	
ASTERACEAE	<i>Taraxacum officinale</i> Weber	NE		
ASTERACEAE	<i>Senecio ilicifolius</i> L.	LC		
ASTERACEAE	<i>Taraxacum bessarabicum</i> (Hornem.) Hand.-Mazz.	NE		
ASTERACEAE	<i>Senecio glutinosus</i> Thunb.	LC		
ASTERACEAE	<i>Carduus tenuiflorus</i> Curtis	NE		
ASTERACEAE	<i>Carduus macrocephalus</i> Desf.	NE	NEMBA 1b	
ASTERACEAE	<i>Felicia erigeroides</i> DC.	LC		
ASTERACEAE	<i>Cotula sericea</i> L.f.	LC		
ASTERACEAE	<i>Chrysocoma ciliata</i> L.	LC		
BRASSICACEAE	<i>Capsella bursa-pastoris</i> (L.) Medik.	NE		
BRASSICACEAE	<i>Lepidium africanum</i> (Burm.f.) DC.	LC		
CACTACEAE	<i>Opuntia ficus-indica</i> (L.) Mill.	NE	CARA 1, NEMBA 1b	
CARYOPHYLLACEAE	<i>Spergula arvensis</i> L.	NE		
CHENOPODIACEAE	<i>Chenopodium carinatum</i> R.Br.	NE		
CHENOPODIACEAE	<i>Exomis microphylla</i> (Thunb.) Aellen var. <i>axyrioides</i> (Fenzl) Aellen	LC		
COLCHICACEAE	<i>Colchicum</i> sp.			
CUCURBITACEAE	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	LC		
FABACEAE	<i>Senna didymobotrya</i> (Fresen.) H.S.Irwin & Barneby	NE	CARA 3, NEMBA 1b	
FABACEAE	<i>Trifolium repens</i> L.	NE		
FABACEAE	<i>Lessertia frutescens</i> (L.) Goldblatt & J.C.Manning	LC		
FABACEAE	<i>Indigofera heterophylla</i> Thunb.	LC		
FABACEAE	<i>Acacia karroo</i> Hayne	LC		

Family	Species	Red List of South African Plants, version 2014.1	CARA 43 of 1983 / NEMBA No. 10 of 2004 (Amended 2014)	Eastern Province Nature and Env. Cons. Ordinance, 1974
FABACEAE	<i>Erythrina caffra</i> Thunb.	LC		
FABACEAE	<i>Lotus subbiflorus</i> Lag. subsp. <i>subbiflorus</i>	NE		
FABACEAE	<i>Vicia sativa</i> L.	NE		
FABACEAE	<i>Melolobium candicans</i> (E.Mey.) Eckl. & Zeyh.	LC		
HYPOXIDACEAE	<i>Hypoxis</i> sp.			
LAMIACEAE	<i>Plectranthus barbatus</i> Andrews var. <i>grandis</i>	NE	CARA 3, NEMBA 1b	
LAMIACEAE	<i>Leonotis ocymifolia</i> (Burm.f.) Iwarsson	LC		
LOBELIACEAE	<i>Lobelia flaccida</i> (C.Presl) A.DC.	LC		
LOBELIACEAE	<i>Monopsis scabra</i> (Thunb.) Urb.	LC		
MALVACEAE	<i>Sida rhombifolia</i> L. subsp. <i>rhombifolia</i>	LC		
MALVACEAE	<i>Abutilon sonneratianum</i> (Cav.) Sweet	LC		
MESEMBRYANTHEMACEAE	<i>Mesembryanthemum aitonis</i> Jacq.	LC		Schedule 4 Protected
MESEMBRYANTHEMACEAE	<i>Delosperma</i> sp.			Schedule 4 Protected
OXALIDACEAE	<i>Oxalis corniculata</i> L.	NE		
PLANTAGINACEAE	<i>Plantago lanceolata</i> L.	LC		
POACEAE	<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	NE		
POACEAE	<i>Cynodon dactylon</i> (L.) Pers.	LC		
POACEAE	<i>Stenotaphrum secundatum</i> (Walter) Kuntze	LC		
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC		
POACEAE	<i>Eragrostis capensis</i> (Thunb.) Trin.	LC		
POACEAE	<i>Lolium perenne</i> L.	NE		
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>torta</i> (Stapf) Clayton	LC		
PODOCARPACEAE	<i>Podocarpus falcatus</i> (Thunb.) R.Br. ex Mirb.	LC		
POLYGALACEAE	<i>Polygala ericaefolia</i> DC.	LC		
POLYGONACEAE	<i>Rumex acetosella</i> L.	NE		
POLYGONACEAE	<i>Emex australis</i> Steinh.	NE		
PRIMULACEAE	<i>Anagallis arvensis</i> L. subsp. <i>arvensis</i>	NE		
RANUNCULACEAE	<i>Ranunculus multifidus</i> Forssk.	LC		
RHAMNACEAE	<i>Scutia myrtina</i> (Burm.f.) Kurz	LC		
SANTALACEAE	<i>Thesium</i> sp.			
SCROPHULARIACEAE	<i>Chaenostoma campanulatum</i> Benth.	LC		
SCROPHULARIACEAE	<i>Nemesia fruticans</i> (Thunb.) Benth.	LC		
SCROPHULARIACEAE	<i>Selago corymbosa</i> L.	LC		
SOLANACEAE	<i>Datura stramonium</i> L.	NE	CARA 1, NEMBA 1b	
SOLANACEAE	<i>Lycium ferocissimum</i> Miers	LC		

Family	Species	Red List of South African Plants, version 2014.1	CARA 43 of 1983 / NEMBA No. 10 of 2004 (Amended 2014)	Eastern Province Nature and Env. Cons. Ordinance, 1974
SOLANACEAE	<i>Solanum linnaeanum</i> Hepper & Jaeger	LC		
SOLANACEAE	<i>Cestrum laevigatum</i> Schtdl.	LC		
THYMELACEAE	<i>Struthiola parviflora</i> Bartl. ex Meisn.	LC		
VERBENACEAE	<i>Verbena officinalis</i> L.	NE		
VERBENACEAE	<i>Verbena aristigera</i> S.Moore	NE		
VERBENACEAE	<i>Verbena brasiliensis</i> Vell.	NE	NEMBA 1b	

References:

BiodiversityGIS (BGIS) online interactive maps. South African National Biodiversity Institute. 2007.

Mucina, L. and M.C. Rutherford (Eds.). 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute: Pretoria. 807 pp.

Pierce, S.M. 2006. The STEP Mapbook, part of: *The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development*. Centre for African Conservation Ecology Report Number 47 (Revised Edition). Nelson Mandela Metropolitan University, South Africa.

Vromans, D.C., Maree, K.S., Holness, S.D. and Skowno, A.L. 2012. The Biodiversity Sector Plan for the Ndlambe Municipality. *Supporting land-use planning and decision-making in Critical Biodiversity Areas and Ecological Support Areas for sustainable development. Addo Elephant National Park Mainstreaming Biodiversity Project. South African National Parks*. Port Elizabeth, South Africa.

Appendix D2: Archaeological Heritage report

Appendix D3: Geotechnical report

Appendix D4: Infrastructure Site Analysis report

