

APPENDIX C4 – VEGETATION REPORT

Vegetation Report

***Application for rectification in terms of Section 24G –
Farm Blaauwater No. 65 in the Dr Beyers Naudé Municipality in
the Eastern Cape***

Report done in-house by

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1. Introduction

CEN IEM Unit was appointed by the Applicant, Mr J. Kingwill, to undertake a Section 24G Application for the rectification process for the commencement of unauthorised activities in terms of the Environmental Impact Assessment Regulations (2014), as amended. These activities were undertaken on the Farm Blaauwater No. 65 and No. 67, and Farm No. 519 (Rem), in the Dr Beyers Naudé Municipality in the Eastern Cape. Activities undertaken included: the clearing of indigenous vegetation in a Critical Biodiversity Area (ECBCP, 2007); construction of infrastructure within a watercourse i.e. dam walls / berms / embankments, sluice gates, and flood-irrigation basins in an old, silted-up dam planted up with lucerne (as a cattle feed), and the removal and infill of material (soil) within a watercourse.

The purpose of this vegetation report is to describe the present state of vegetation at the two main areas impacted by recent construction within the watercourse (which is a tributary of the greater Sundays River system) i.e. a new sluice gate 'upstream' of the old dam which diverts floodwaters to the irrigation basins, and the damaged wall / embankments along the diverted tributary channel, and at the base of the old dam / spillway area.

See **Figure 1**, below, showing the locations of areas visited on site.



Figure 1. Google Earth aerial image showing the location of the newly-constructed sluice gate, 'upstream' to the north-west, diverting floodwaters to the old dam. An old sluice gate and irrigation channel are located amid Poplar trees to the south-east, 'downstream' of the spillway of the old dam (which also feeds a series of flood-irrigation basins planted up with lucerne).

2. Vegetation Maps and Conservation Plans

The following legislation, biodiversity conservation plans and associated maps are available for, and relevant to the Blaauwater Farm area –

2.1 Mucina and Rutherford (2006) / National Vegetation Map (2012 beta 2)

Mucina and Rutherford (2006) have mapped vegetation on site as **NKu4 Eastern Upper Karoo**, which falls with the Upper Karoo Bioregion, in the Nama Karoo Biome. NKu4 Eastern Upper Karoo vegetation is assigned a conservation status of *Least threatened* [conservation target: 21%; Mucina and Rutherford, 2006].

Eastern Upper Karoo vegetation is described as occurring on 'flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast' (Mucina and Rutherford, 2006).

Important Taxa which occur in NKu4 Eastern Upper Karoo vegetation [from Mucina and Rutherford, 2006] –

Important Taxa Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*. Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*. Succulent Shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*. Geophytic Herbs: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*. Succulent Herbs: *Psilocaulon coriarium*, *Tridentea jucunda*, *T. virescens*. Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.

Endemic Taxa Succulent Shrubs: *Chasmatophyllum rouxii*, *Hertia cluytiifolia*, *Rabiea albinota*, *Salsola tetrandra*. Tall Shrub: *Phymaspermum scoparium*. Low Shrubs: *Aspalathus acicularis* subsp. *planifolia*, *Selago persimilis*, *S. walpersii*.

2.2 National List of Threatened Ecosystems (2011)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004): National List of Threatened Ecosystems (2011) does not classify the site as falling within a threatened ecosystem.

2.3 Eastern Cape Biodiversity Conservation Plan (2007)

The Eastern Cape Biodiversity Conservation Plan (2007) indicates that the site falls within a **Terrestrial Critical Biodiversity Area¹ 2** [CBA_corr2 Corridor2, CBA_corr1 Corridor1]. Terrestrial CBA 2 areas are included within *Biodiversity Land Management Class² 2: Near-natural landscapes*. The recommended land use objectives for BLMC 2 areas are to 'maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted' (Berliner *et al.*, 2007).

The site also falls within a **Freshwater Aquatic CBA 2** [CBA_aqua A2a, CBA_Aquatic CBA2]. It falls within the Sundays River system, in quaternary catchment N11A (EST_nbsap 74; ECBCP, 2007). Freshwater Aquatic CBA 2 areas are included within *Aquatic BLMC³ 2a: Near natural state*. These areas include important sub-catchments, and primary catchment management areas for E2 estuaries. The recommended transformation threshold for Aquatic BLMC 2a areas are 'less than 15 % of the total area of the sub-quaternary catchment' (Berliner *et al.*, 2007).

2.4 National Freshwater Ecosystem Priority Areas project (2011)

The site is located within the Sundays Sub-Water Management Area, in the larger Fish to Tsitsikamma Water Management Area, and is classified as falling within a **National Freshwater Ecosystem Priority Area – Upstream** (NFEPA, 2011). *Upstream Management Areas* are classified as 'subquaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas' (Nel *et al.*, 2011).

The tributary affected by the construction of sluice gates, dam berms / embankments, irrigation basins etc. is part of the Sundays River system [River: Sondags; River type: 18_N_U; Present Ecological State (1999): Class D: Largely modified; River condition: D; NFEPA Rivers]. The old dam / now flood-irrigation basin area is classified as an Artificial wetland, of the type Upper Nama Karoo_Channelled valley-bottom (National Wetlands Map 4 – NFEPA Wetlands Map).

¹ Critical Biodiversity Areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning.

² Biodiversity Land Management Class sets out the desired ecological state that an area should be kept in to ensure biodiversity persistence.

³ Recommended limits (thresholds) to the total amount of land transformation that should be allowed in an Aquatic BLMC, if biodiversity is to be conserved.

3. Site description

3.1 Assessment methodology

The sites were accessed by 4X4 vehicle and surveyed on foot by members of CEN IEM Unit on 25 June 2019. Important environmental features i.e. the presence of protected plants and trees, changes in vegetation structure / habitat type, evidence of disturbance or other human impacts etc. were noted and GPS coordinates were recorded, and photographs were taken at various points on site. Plant species observed on site were also recorded.

Please note: Plant species richness and diversity is mostly likely *underrepresented* in this assessment due to the winter sampling time. The number of grass species and autumn and spring-flowering bulbs are most likely underrepresented due to the season, and absence of inflorescences and / or leaves of some geophytic species during the winter dormancy period. The general Graaff-Reinet area was also experiencing an extended period of drought at the time of the site survey (and is still experiencing drought, at present).

3.2 Vegetation description

The disturbed area around the newly-constructed sluice gate i.e. north of the old dam, currently consists of very sparse secondary growth of weedy, sprawling herbs and forbs. It would have consisted of Karroid shrubs i.e. *Lycium* spp., *Gymnosporia* sp., *Diospyros austro-africana*, *Elytropappus rhinocerotis*, *Passerina* sp., and *Asparagus* spp., as well as low-growing daises and grasses, as seen growing on the western bank of the tributary to the north and south. The river channel, itself, is dry and very sparsely-vegetated in this area, with only a few sedges and grasses present.

The old dam, now consisting of flood-irrigated basins, is planted up with lucerne as a supplementary cattle fodder during periods of drought. The basins are surrounded by sparse, weedy secondary growth of herbs, forbs and grasses on the berms, at the sluice gates, and along the new berm / embankment running north to south, and forming the eastern 'dam wall', thereby diverting the main channel of the Sundays River tributary to the east. The spillway area at the sluice gate below the old dam was still somewhat wet, and still houses moisture-loving / freshwater aquatic species i.e. *Gomphostigma virgatum*, *Berula erecta*, *Juncus* sp., *Cyperus* sp., and *Nidorella ivifolia*, as well as weedy pioneers of disturbed soil i.e. *Gomphocarpus fruticosus* and *Cirsium vulgare*, and grasses and sedges in the river channel, itself.

The area at the stand of Poplar trees, south of the spillway of the old dam, included a few ponds of standing water in the river channel, itself, with *Phragmites australis* (Common Reed) present, surrounded by remnant indigenous trees and shrubs i.e. *Searsia* sp., *Gymnosporia* sp., and *Lycium* spp. The stand of Poplar trees at the old sluice gate, in the old irrigation canal leading to the south-eastern flood-irrigated lucerne fields, is quite dense, with little to no undergrowth.

The low vegetation cover present in disturbed / impacted areas on site can be attributed to sampling time i.e. it being mid-winter, as well as the short period of time lapsed after

disturbance events i.e. flooding of the watercourse after summer rainfall (a few months earlier), and after construction of sluice gates and berms / embankments in response to flood events. Overall plant species richness and diversity in disturbed areas, as well as the surrounding riparian and floodplain areas were, however, also low at the time of sampling, and this was as expected. It can be attributed to it being mid-winter; the extended period of drought being experienced (besides summer flooding events); past disturbance events in the area i.e. flooding, artificial irrigation schemes, grazing by cattle and other domestic animals, and the general changeable nature of riparian and surrounding floodplain areas (due to soil erosion after flooding).

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

The following legislation was consulted when annotating the list of plant species identified on site:

- National Environmental Management: Biodiversity Act No. 10 of 2004 – Alien and Invasive Species Lists (published 29 July 2016);
- Red List of South African Plants (version 2017.1);
- National Forests Act No. 84 of 1998 – List of Protected Trees (published 8 September 2017);
- National Environmental Management: Biodiversity Act 10 of 2004 – Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List (14 December 2007);
- Eastern Province Nature Conservation Ordinance No. 19 of 1974;
- Eastern Cape Environmental Conservation Bill, 2003.

A total of 59 plant species were identified on site, of which 15 are exotic and / or alien invasive plants (see **Tables I and III**, below). **Table II** provides a list of species identified 1) at the newly-constructed sluice and surrounding river bank area; 2) at the old dam to the south-east of the new sluice, and 3) just south of the old dam at a stand of Poplar trees (growing along an old sluice / irrigation canal leading south-east).

Four of the exotic plants identified on site are listed as Category 1b Invaders under the National Environmental Management: Biodiversity Act No. 10 of 2004 – Alien and Invasive Species Lists (published 29 July 2016), and one is listed as Category 2 (see **Table III**).

Three Protected plants, listed under the EP Nature Conservation Ordinance, 1974, and the EC Environmental Conservation Bill, 2003, were identified on site i.e. *Gomphocarpus fruticosus*, *Moraea polystachya*, and *Rubia petiolaris*.

Please note: Protected plants and trees require permits from the relevant authorities i.e. the Department of Agriculture, Forestry and Fisheries, and the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism – prior to their (further?) disturbance (which includes the trimming of branches of protected trees), removal, and / or transplantation.

3.2.2 Soils

The general description for soil on site is 'soils with a marked clay accumulation, strongly structured and a reddish colour' (gs_b PL1; BGIS, 2017).

Soils are classed as an Association of classes 7 and 14: Undifferentiated texture contrast soils. A favourable property of this soil class is that it has a somewhat high natural fertility or relative wetness, favourable in dry areas. Limitations include restricted effective depth, slow water infiltration, seasonal wetness, and high erodibility (soil_id S19; BGIS, 2017).

Table I. Full annotated list of plant species identified on site. Species in **GREEN** are Protected Plants / Species of Conservation Concern (SCC's). Species in **RED** are exotic and / or alien invasive plants.

Family	Species	Red List of South African Plants, v. 2017.1	Eastern Province Nature Conservation Ordinance, 1974	Eastern Cape Environmental Conservation Bill, 2003
AMARANTHACEAE	<i>Alternanthera pungens</i> Kunth	NE		
AMARANTHACEAE	<i>Amaranthus</i> sp.1	NE		
AMARANTHACEAE	<i>Amaranthus</i> sp.2	NE		
AMARANTHACEAE	<i>Atriplex semibaccata</i> R.Br. var. <i>appendiculata</i> Aellen	LC		
ANACARDIACEAE	<i>Searsia</i> sp. (cf. <i>pyroides</i> (Burch.) Moffett)	LC		
APIACEAE	<i>Berula erecta</i> (Huds.) Coville	NE		
APOCYNACEAE	<i>Gomphocarpus fruticosus</i> (L.) Aiton f.	LC	Schedule 4: Protected	Schedule 5: Protected
ASPARAGACEAE	<i>Asparagus burchellii</i> Baker	LC		
ASPARAGACEAE	<i>Asparagus retrofractus</i> L.	LC		
ASTERACEAE	<i>Arctotheca calendula</i> (L.) Levyns	LC		
ASTERACEAE	<i>Artemisia afra</i> Jacq. ex Willd. var. <i>afra</i>	LC		
ASTERACEAE	<i>Berkheya</i> sp.			
ASTERACEAE	<i>Bidens pilosa</i> L.	NE		
ASTERACEAE	<i>Cirsium vulgare</i> (Savi) Ten.	NE		
ASTERACEAE	<i>Elytropappus rhinocerotis</i> (L.f.) Less.	LC		
ASTERACEAE	<i>Eriocephalus ericoides</i> (L.f.) Druce	LC		
ASTERACEAE	<i>Felicia muricata</i> (Thunb.) Nees	LC		
ASTERACEAE	<i>Garuleum bipinnatum</i> (Thunb.) Less.	LC		
ASTERACEAE	<i>Pseudognaphalium undulatum</i> (L.) Hilliard & B.L.Burt	LC		
ASTERACEAE	<i>Helichrysum</i> sp. (very soft, woolly leaves)			

Family	Species	Red List of South African Plants, v. 2017.1	Eastern Province Nature Conservation Ordinance, 1974	Eastern Cape Environmental Conservation Bill, 2003
ASTERACEAE	Helichrysum zeyheri Less.	LC		
ASTERACEAE	Nidorella ivifolia (L.) J.C.Manning & Goldblatt	LC		
ASTERACEAE	Pentzia incana (Thunb.) Kuntze	LC		
ASTERACEAE	Phymaspermum parvifolium (DC.) Benth. & Hook. ex B.D.Jacks.	LC		
ASTERACEAE	Schkuhria pinnata (Lam.) Kuntze ex Thell.	NE		
ASTERACEAE	Tagetes minuta L.	NE		
ASTERACEAE	Xanthium spinosum L.	NE		
BRASSICACEAE	Lepidium africanum (Burm.f.) DC.	LC		
CELASTRACEAE	Gymnosporia buxifolia (L.) Szyszyl.	LC		
CONVOLVULACEAE	Convolvulus sagittatus Thunb.	LC		
CYPERACEAE	Cyperus sp.	LC		
EBENACEAE	Diospyros austro-africana De Winter	LC		
FABACEAE	Medicago sativa L.	NE		
IRIDACEAE	Moraea polystachya (Thunb.) Ker Gawl.	LC	Schedule 4: Protected	Schedule 5: Protected
JUNCACEAE	Juncus sp. (cf. effusus L.)	LC		
LAMIACEAE	Ballota africana (L.) Benth.	LC		
LAMIACEAE	Salvia disermas L.	LC		
MALVACEAE	Erodium sp.	NE		
MELIANTHACEAE	Melianthus comosus Vahl	LC		
PAPAVERACEAE	Argemone ochroleuca Sweet subsp. ochroleuca	NE		
POACEAE	Cenchrus ciliaris L.	LC		
POACEAE	Chloris virgata Sw.	LC		
POACEAE	Eragrostis curvula (Schrad.) Nees	LC		
POACEAE	Eragrostis lehmanniana Nees var. lehmanniana	LC		
POACEAE	Festuca sp.	NE		

Family	Species	Red List of South African Plants, v. 2017.1	Eastern Province Nature Conservation Ordinance, 1974	Eastern Cape Environmental Conservation Bill, 2003
POACEAE	Phragmites australis (Cav.) Steud.	LC		
POACEAE	Themeda triandra Forssk.	LC		
RUBIACEAE	Rubia petiolaris DC.	LC		Schedule 5: Protected
SALICACEAE	Populus × canescens (Aiton) Sm.	NE		
SCROPHULARIACEAE	Aptosimum procumbens (Lehm.) Steud.	LC		
SCROPHULARIACEAE	Gomphostigma virgatum (L.f.) Baill.	LC		
SCROPHULARIACEAE	Hermannia sp.			
SCROPHULARIACEAE	Nemesia (cf. fruticans (Thunb.) Benth.)	LC		
SCROPHULARIACEAE	Selago sp. (cf. geniculata L.f.)	LC		
SOLANACEAE	Datura stramonium L.	NE		
SOLANACEAE	Lycium cinereum Thunb.	LC		
SOLANACEAE	Lycium oxycarpum Dunal	LC		
THYMELAEACEAE	Passerina sp.			
	Unknown sp. (fine-leaved, dull lime green)			
	Total: 59			

Table II. Plant species identified in the different areas surveyed on site.

At new sluice gate and surrounding river banks	River banks / dam wall / embankments at old dam	At Poplar trees below old dam
Amaranthus sp.2	Amaranthus sp.1	Asparagus burchellii Baker
Aptosimum procumbens (Lehm.) Steud.	Arctotheca calendula (L.) Levyns	Ballota africana (L.) Benth.
Argemone ochroleuca Sweet subsp. ochroleuca	Atriplex semibaccata R.Br. var. appendiculata Aellen	Eragrostis curvula (Schrad.) Nees
Artemisia afra Jacq. ex Willd. var. afra	Bidens pilosa L.	Eragrostis lehmanniana Nees var. lehmanniana
Asparagus burchellii Baker	Chloris virgata Sw.	Gomphocarpus fruticosus (L.) Aiton f.
Asparagus retrofractus L.	Convolvulus sagittatus Thunb.	Lycium oxycarpum Dunal
Cenchrus ciliaris L.	Felicia muricata (Thunb.) Nees	Phragmites australis (Cav.) Steud.
Cirsium vulgare (Savi) Ten.	Festuca sp.	Populus x canescens (Aiton) Sm.
Convolvulus sagittatus Thunb.	Garuleum bipinnatum (Thunb.) Less.	Unknown sp. (fine-leaved, dull lime green)
Cyperus sp.	Gomphocarpus fruticosus (L.) Aiton f.	
Diospyros austro-africana De Winter	Gomphostigma virgatum (L.f.) Baill.	
Elytropappus rhinocerotis (L.f.) Less.	Juncus sp. (cf. effusus L.)	
Eragrostis curvula (Schrad.) Nees	Medicago sativa L.	

At new sluice gate and surrounding river banks	River banks / dam wall / embankments at old dam	At Poplar trees below old dam
Eriocephalus ericoides (L.f.) Druce	Nemesia (cf. fruticans (Thunb.) Benth.)	
Erodium sp.	Nidorella ivifolia (L.) J.C.Manning & Goldblatt	
Felicia muricata (Thunb.) Nees	Pentzia incana (Thunb.) Kuntze	
Garuleum bipinnatum (Thunb.) Less.	Schkuhria pinnata (Lam.) Kuntze ex Thell.	
Gomphocarpus fruticosus (L.) Aiton f.	Tagetes minuta L.	
Gymnosporia buxifolia (L.) Szyszyl.		
Juncus sp. (cf. effusus L.)		
Lepidium africanum (Burm.f.) DC.		
Lycium cinereum Thunb.		
Lycium oxycarpum Dunal		
Melianthus comosus Vahl		
Moraea polystachya (Thunb.) Ker Gawl.		
Nidorella ivifolia (L.) J.C.Manning & Goldblatt		
Passerina sp.		

At new sluice gate and surrounding river banks	River banks / dam wall / embankments at old dam	At Poplar trees below old dam
Pentzia incana (Thunb.) Kuntze		
Rubia petiolaris DC.		
Salvia disermas L.		
Searsia sp. (cf. pyroides (Burch.) Moffett)		
Selago sp. (cf. geniculata L.f.)		
Tagetes minuta L.		
Themeda triandra Forssk.		
Unknown sp. (fine-leaved, dull lime green)		
Xanthium spinosum L.		
Total: 36	18	9

Table III. Exotic and / or alien invasive plants identified on site, and listed under the National Environmental Management: Biodiversity Act 10 of 2004 – Alien and Invasive Species Lists (published July 2016).

Family	Species	Common name	NEM:BA, 2004 – Alien and Invasive Plants (July 2016) category
AMARANTHACEAE	<i>Alternanthera pungens</i> Kunth	Khaki weed	
AMARANTHACEAE	<i>Amaranthus</i> sp.1	Amaranth / Pig weed	
AMARANTHACEAE	<i>Amaranthus</i> sp.2	Amaranth / Pig weed	
APIACEAE	<i>Berula erecta</i> (Huds.) Coville	Lesser water-parsnip	
ASTERACEAE	<i>Bidens pilosa</i> L.	Black-jack	
ASTERACEAE	<i>Cirsium vulgare</i> (Savi) Ten.	Spear thistle, Scotch thistle	Category 1b
ASTERACEAE	<i>Schkuhria pinnata</i> (Lam.) Kuntze ex Thell.	Dwarf Mexican marigold	
ASTERACEAE	<i>Tagetes minuta</i> L.	Khaki bush	
ASTERACEAE	<i>Xanthium spinosum</i> L.	Spiny cocklebur	Category 1b
FABACEAE	<i>Medicago sativa</i> L.	Lucerne	
MALVACEAE	<i>Erodium</i> sp.	Stork's bill	
PAPAVERACEAE	<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	White-flowered Mexican poppy	Category 1b
POACEAE	<i>Festuca</i> sp.	New Zealand fescue	
SALICACEAE	<i>Populus x canescens</i> (Aiton) Sm.	Grey poplar, Matchwood poplar	Category 2
SOLANACEAE	<i>Datura stramonium</i> L.	Common thorn apple	Category 1b
	Total: 15		

4. References

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