

# Vegetation Report

## **Tongaat Hulett Developments: Assessment of Vegetation on Portion 2026 of Cotton Lands No. 1575, Canelands**

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## 1. INTRODUCTION

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GroundTruth was appointed by Tongaat Hulett Developments (THD) to conduct a vegetation assessment of Portion 2026 of Cotton Lands No 1575, hereafter referred to as the “site” (Figure 1-1). This ecological report was produced in conjunction with the wetland assessment and rehabilitation plan (Reference: GTW248-280214-01) and therefore makes cross reference to the vegetation aspects of the wetland report.

The site, which is approximately 7.3 hectares, is adjacent to existing industrial developments and located just north of Verulam in the eThekweni Municipality, KwaZulu-Natal (Figure 1-1). A watercourse, flowing roughly in a north westerly direction, drains through the northern half of the site. The proposed development footprint occurs in the southern portion of the site and covers an area of 1.6 hectares.

### 1.1 Objectives

The primary aim of this study is to assess the ecological condition of the vegetation and habitats associated with the site within the context of the proposed development. The following objectives were therefore considered for the purpose achieving the overall aim:

- Identify and map vegetation/ecological units that occur within the site using aerial imagery and other available desktop information.
- Conduct field surveys to verify and validate desktop information, to assess ecological condition of the vegetation/habitats, identify species of conservation concern, and highlight indicator species (including alien invasive plants).
- Identify and map areas of importance from an ecological perspective.
- Provide recommendations in terms of development constraints and opportunities particularly in terms of achieving sustainable development and utilisation of the present environment.

### 1.2 Methodology

The following desktop and field-based procedures were employed in this study:

- **Desktop assessment:** Data and literature relating to the vegetation/habitats occurring within the site was sourced and used to identify and define ecological units. The potential vegetation reference state was established using the vegetation types of South Africa classification system and map (Mucina and Rutherford, 2006), which describes the spatial distribution of naturally occurring vegetation within major habitat biomes. Aerial imagery was then used to verify the occurrence of natural vegetation as well as to map the distribution and extent of vegetation/habitats and land use that currently define the site. Mapping was done using ArcMap 10 Geographical Information System (GIS).

- **Field-based assessment:** A site visit was conducted on 21 September 2012 to provide site-specific details in order to verify and validate the ecological units identified during the desktop assessment process. Information obtained included plant species diversity, presence and abundance of plant ecological indicators (including alien invasive species), occurrences of species of conservation concern, as well as any additional detail that may facilitate the overall study. The purpose of the flora component of this study was primarily to provide a synthesis of floristic biodiversity for the study area.

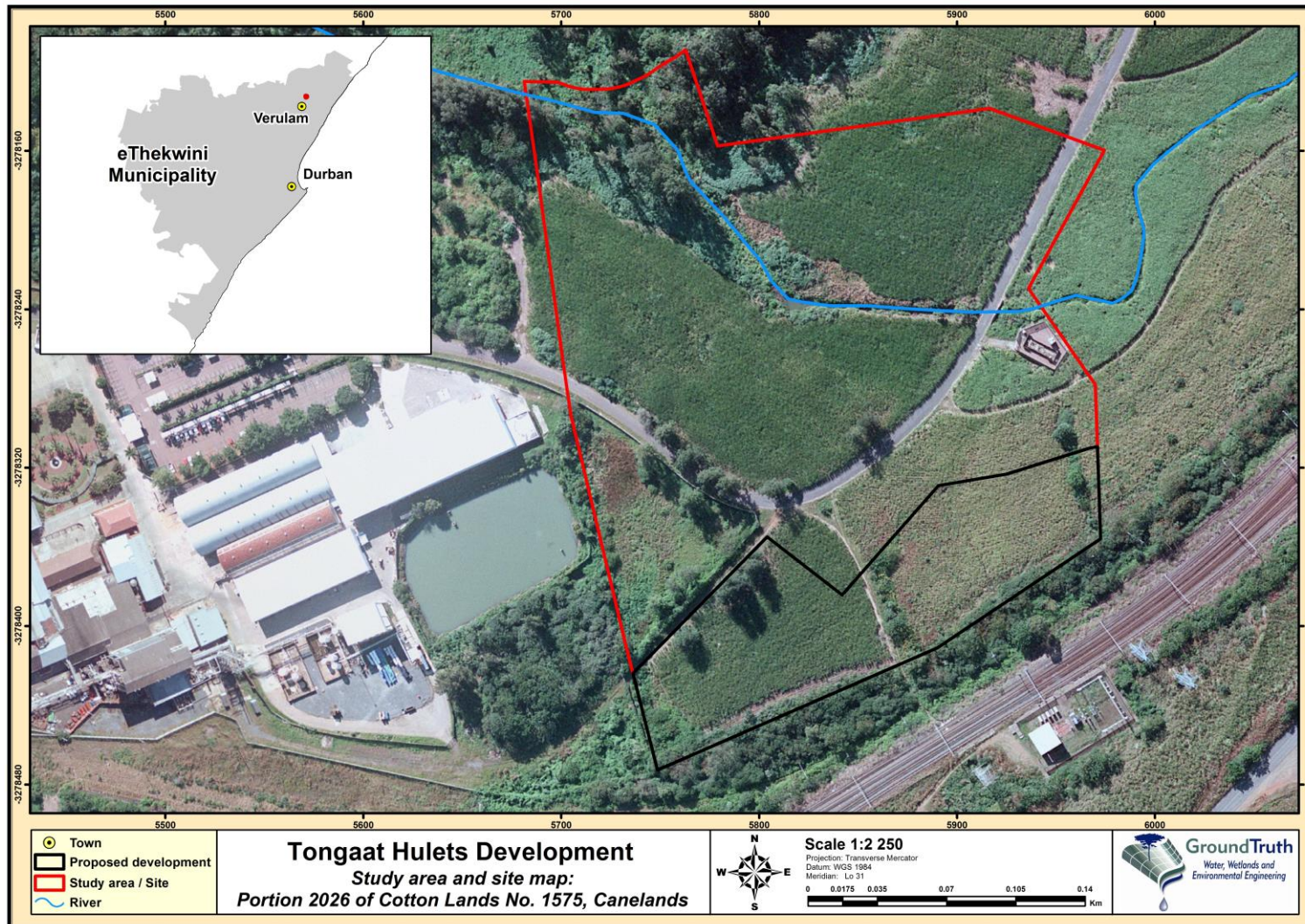


Figure 1-1 Study area and site map for the proposed development on portion 2026 of Cotton Lands no. 1575, Canelands

## 2. DESCRIPTION OF REFERENCE VEGETATION

The site and broader study area occurs within the KwaZulu-Natal Coastal Belt (see Appendix 5), an **Endangered** vegetation type (Mucina *et al.*, 2006). The KwaZulu-Natal Coastal Belt occupies a long, and in places broad, coastal strip along the KwaZulu-Natal coast extending roughly from Mtunzini in the north to Port Edward in the south (Mucina *et al.*, 2006). In natural situations, this vegetation type is defined by various types of subtropical coastal forest interspersed with *Themeda triandra* grassland. An extract of important, biogeographically important and endemic plant taxa from Mucina *et al.* (2006) is provided in Table 2-1.

**Table 2-1 List of important, biogeographically important and endemic plant taxa defining the KwaZulu-Natal Coastal Belt (Mucina *et al.*, 2006)**

Plant growth form	Species
<b>Important taxa<sup>2</sup></b>	
Graminoids	<i>Aristida junciformis</i> subsp. <i>galpinii</i> , <i>Digitaria eriantha</i> , <i>Panicum maximum</i> , <i>Themeda triandra</i> , <i>Alloteropsis semialata</i> subsp. <i>eckloniana</i> , <i>Cymbopogon filipendula</i> , <i>Melinis repens</i> .
Herbs	<i>Berkheya speciosa</i> subsp. <i>speciosa</i> , <i>Cyanotis speciosa</i> , <i>Senecio glaberrimus</i> , <i>Alepidea longifolia</i> , <i>Centella glabrata</i> , <i>Cephalaria oblongifolia</i> , <i>Chamaecrista mimosoides</i> , <i>Conostomium natalense</i> , <i>Crotalaria lanceolata</i> , <i>Dissotis canescens</i> , <i>Eriosema squarrosus</i> , <i>Gerbera ambigua</i> , <i>Hebenstretia comosa</i> , <i>Helichrysum cymosum</i> subsp. <i>cymosum</i> , <i>H. pallidum</i> , <i>Hibiscus pedunculatus</i> , <i>Hybanthus capensis</i> , <i>Indigofera hiliaris</i> , <i>Pentansia prunelloides</i> subsp. <i>latifolia</i> , <i>Senecio albanesis</i> , <i>S. bupleuroides</i> , <i>S. coronatus</i> , <i>S. nigricans</i> , <i>Veronia galpinii</i> , <i>V. oliogocephala</i> .
Geophytic herbs	<i>Bulbine asphodeloides</i> , <i>Disa polygonoides</i> , <i>Hypoxis filiformis</i> , <i>Ledebouria floribunda</i> , <i>Pachycarpus asperifolius</i> , <i>Schizocarpus nervosus</i> , <i>Tritonia disticha</i> .
Low shrubs	<i>Clutia pulchella</i> , <i>Gnidia kraussiana</i> , <i>Phyllanthus glaucophyllus</i> , <i>Tephrosia polystachya</i> .
Woody climbers	<i>Abrus laevigatus</i> , <i>Asparagus racemosus</i> , <i>Smilax anceps</i> .
Small trees and tall shrubs	<i>Bridelia micrantha</i> , <i>Phoenix reclinata</i> , <i>Syzgium cordatum</i> , <i>Acacia natalitia</i> , <i>Albizia adianthifolia</i> , <i>Antedasma venosum</i> .
<b>Biogeographically important taxa<sup>3</sup></b>	
Graminoids	<i>Cyperus natalensis</i> , <i>Eragrostis lappula</i> .
Herbs	<i>Helichrysum longifolium</i> , <i>Selago tarachodes</i> , <i>Senecio dregeanus</i> , <i>Sphenostylis angustifolia</i> .
Geophytic herbs	<i>Knipofia gracilis</i> , <i>K. littoralis</i> , <i>K. rooperi</i> , <i>Pachystigma venosum</i> , <i>Zeuxine africana</i> .
Low shrubs	<i>Helichrysum kraussii</i> , <i>Agathisanthemum bojeri</i> , <i>Desmodium dregeanum</i> .
Megaherb	<i>Strelizia Nicolai</i> .

<sup>2</sup> Species (and lower taxa) that have a high abundance, a frequent occurrence or are prominent in the landscape.

<sup>3</sup> Taxa that are not necessarily endemic, and are important, but carry additional importance being limited to a small group of vegetation units, they are listed a regionally endemic in an established Centre of Endemism, they occur at the limits of their distribution area and they show a very disjunct distribution pattern.

Plant growth form	Species
Geoxylic suffrutices	<i>Ancylobotrys petersiana</i> , <i>Eugenia albanensis</i> , <i>Salacia kraussii</i> .
Small trees and tall shrubs	<i>Anastrabe integerrima</i> , <i>Acacia nilotica</i> subsp. <i>kraussiana</i> .
Endemic taxa <sup>4</sup>	
Herb	<i>Veronia africana</i> (extinct)
Geophytic herb	<i>Knipophia pauciflora</i>
Low shrub	<i>Barleria natalensis</i> (extinct)

Over the years, the natural vegetation of this unit has been highly transformed and fragmented, primarily from extensive sugarcane cultivation, timber plantations and urban sprawl. Due to the extensive transformation, the natural vegetation has been replaced by a mosaic of secondary grasslands (dominated by *Aristida* sp.), seral thickets and bushveld most of which is severely threatened by alien plant invasion. Currently only a very small area (i.e. less than 1% of original area) is protected in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves.

Lower order vegetation units (e.g. grassland, forest, wetland, etc.) are also nested in the part of the KwaZulu-Natal Coastal Belt. However, due to the degraded nature of the vegetation, little can be referred back to these units in their original state.

<sup>4</sup> Plant taxa that occur exclusively within the vegetation unit concerned (i.e. KwaZulu-Natal Coastal Belt).



### 3. DESCRIPTION OF THE SITE'S VEGETATION

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#### 3.1 Classification and mapping of vegetation/ecological units

The site contains several units as per the prevailing vegetation communities and land use. Definitions and descriptions of each unit are as follows:

- **Thicket** – Generally disturbed land comprising a high proportion of both woody and herbaceous alien species, with a limited presence of pioneer, indigenous woody species or more common indigenous herbaceous species. Thicket within the site is generally confined to the southern boundary along the railway servitude (Figure 3-1) and is identified by dense stands of trees or tall shrubs, dominated by a few species.
- **Riparian habitat** – Riparian habitat occur along watercourses draining valley bottoms. In natural situations, the vegetation is mostly evergreen and characterised by trees and other plant species that tolerate soils with high water content or that are completely saturated. The National Water Act (Act 36 of 1998) defines riparian habitat as the “physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas” (NWA, 1998). The vegetation associated with the riparian areas, extending across the site to the northwestern corner (Figure 3-1), is defined as riverine scrub.
- **Wetland habitat** – The mapping and characterisation of wetland habitat is as determined in the wetland report (Reference: GTW248-280214-01). This includes the typha-dominated wetland and wetland habitat associated with the watercourse and sugarcane (Figure 3-1).
- **Sugarcane** – Land comprising cultivated sugarcane (Figure 3-1).
- **Roads/infrastructure** – Areas that have been developed for roads and various infrastructure (Figure 3-1).

Figure 3-1 shows the spatial extent and distribution of the aforementioned vegetation/ecological units occurring within the site.

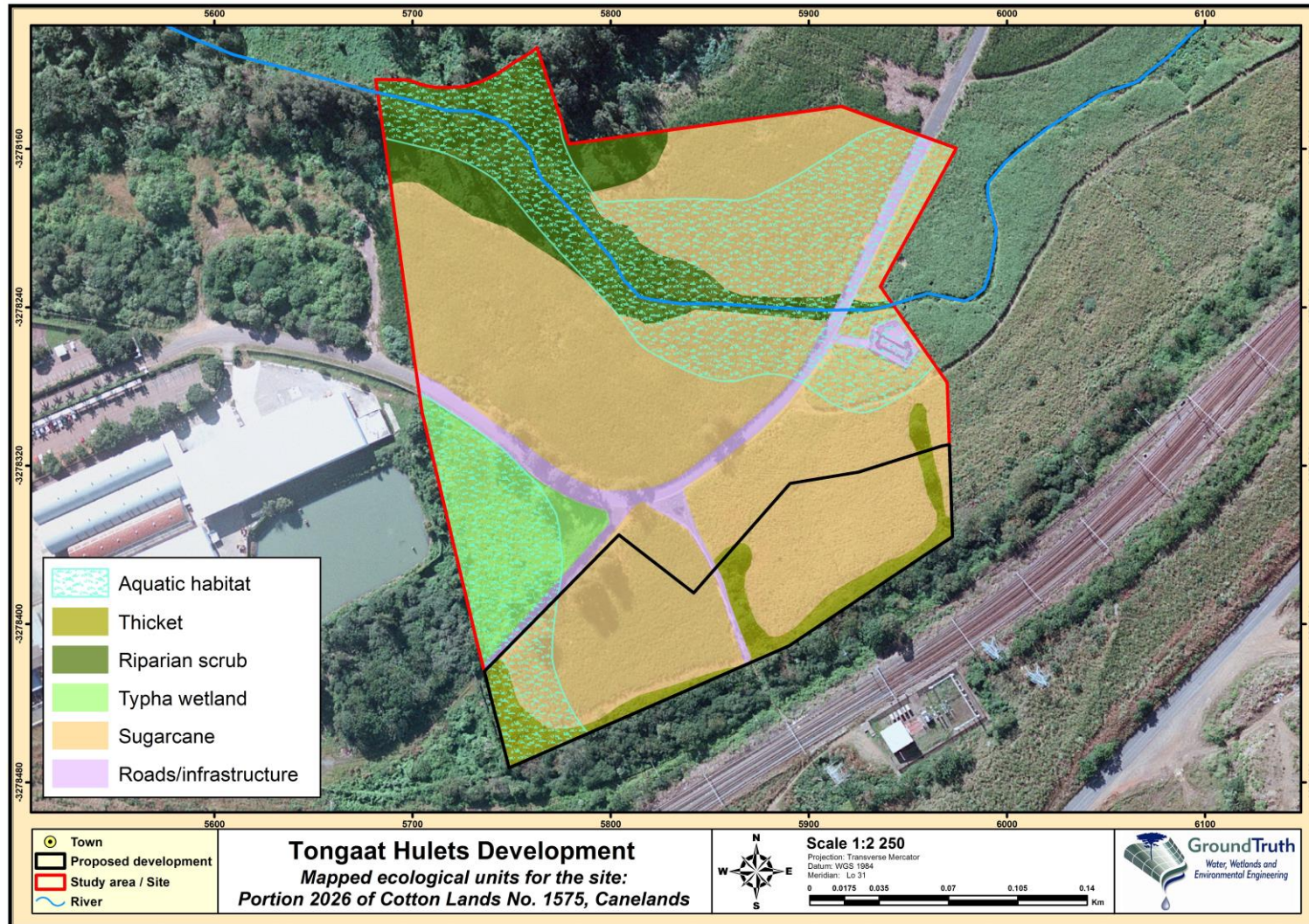


Figure 3-1 Mapped ecological units within portion 2026 of Cotton Lands no. 1575, Canelands

Table 3-1 summarises the areas of each vegetation/ecological unit as determined by the desktop mapping and field-based verification procedures. The site is dominated by sugarcane (67%). In terms of the remaining vegetation, riverine scrub is dominant (15%), followed by typha wetland (8%) and thicket (5%) (Table 3-1). The wetland habitat as defined in the wetland report (Reference: GTW248-280214-01) intercepts a significant portion (~43%) of the vegetation units mapped for the site (Figure 3-1).

**Table 3-1 Ecological units and their respective areas within the study area as derived from the available vegetation types**

Ecological Unit	Study area	
	Area (ha)	Percent of total area (%)
Thicket	1.1	5
Riverine scrub	0.4	15
Typha wetland	4.8	8
Sugarcane	0.3	67
Roads/infrastructure	0.6	6
<b>Total</b>	<b>7.3 ha</b>	

### 3.2 Present state of vegetation

The vegetation cover of the site is dominated by cultivated sugarcane (Genus: *Saccharum*), a tall perennial grass, introduced to South Africa for sugar production. The remaining open spaces that are not developed or cultivated are disturbed and are largely dominated by invasive alien plant species. The few indigenous plant species that remain form insignificant and isolated components within the site. Furthermore, no elements resembling the natural reference vegetation for the area, i.e. KwaZulu-Natal Coastal Belt (*c.f.* Section 2), are associated with the site. As a result, the vegetation on the site is considered **highly transformed**. Appendix 1 provides a list of plant species identified within the site.

A general description of vegetation associated with the mapped ecological units (*c.f.* Section 3.1) is as follows:

- **Thicket** – The thicket vegetation along the southern boundary is overwhelmingly dominated by invasive alien trees, notably *Melia azedarach* (Syringa) and *Schinus terebinthifolius* (Brazilian Pepper).
- **Riverine scrub** – The riverine scrub contains a mosaic of different plant growth forms (e.g. trees, shrubs, herbs and grasses) made up mostly of invasive alien species. The few indigenous elements that remain include *Anomatheca laxa* (Small Red Iris), *Phragmites australis* (Common Reed), *Senecio polyanthemoides*, *Trichillia emetica* (Natal Mahogany) and *Strelitzia nicolai* (Wild Banana).
- **Typha wetland** – The wetland located near the southwestern corner of the site is dominated by *Typha capensis* (Bulrush), but flanked by a variety of invasive alien shrubs, herbs and climbers.

### 3.3 Conservation important species

No Red Listed or other conservation important plant species were observed within the site.

### 3.4 Invasive/alien plant species

Majority (~70%) of the plants identified during the site visit are invasive alien species which supports the fact that the vegetation is generally highly disturbed (Appendix 1). Problematic species include:

- **Trees:** *Casuarina equisetifolia* (Casuarina), *Eucalyptus grandis* (Saligna Gum), *Grevillea banksii* (Scarlet Silky Oak), *Leucaena leucocephala* (Leucaena), *Melia azedarach* (Syringa), *Schinus terebinthifolius* (Brazilian Pepper Tree), *Solanum mauritianum* (Bugweed) and *Syzygium cuminii* (Jambolan Plum);
- **Shrubs:** *Chromolaena odorata* (Triffid Weed), *Lantana camara* (Lantana), *Ricinus communis* (Castor-oil Plant), *Senna didymobotrya* (Peanut-butter Cassia), *Sesbania punicea* (Brazilian Glory Pea) and *Tithonia diversifolia* (Mexican Sunflower);
- **Herbs:** *Ageratum houstonianum* (Blue Weed) and *Canna indica* (Canna);
- **Climbers:** *Cardiospermum grandiflorum* (Balloon Vine), *Ipomea purpurea* (Common Morning Glory) and *Passiflora subpeltata* (Wild Granidilla); and
- **Grass:** *Arundo donax* (Giant Reed).

### 3.5 Important habitats and ecosystems

No vegetation that occurs within the site requires protection and/or specific management. However, it is important that the aquatic ecosystems associated with the site (i.e. riparian and wetland habitats) are protected under the auspices of the National Water Act (Act 36 of 1998). The functionality of these systems should be maintained, and where possible improved, to ensure the continued supply of ecological and hydrological services in the landscape (e.g. improving water quality, streamflow regulation, groundwater recharge, erosion control, and maintenance of wetland-dependant biodiversity). The extent and distribution of aquatic ecosystems is as mapped and described in the wetland report (Reference: GTW248-280214-01).

## 4. DISCUSSION

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### 4.1 Assumptions and limitations

This report was produced based on a single site visit conducted during September. It is therefore possible that certain floral elements may have been undetected due to the timing of the survey and the limited presence of flowering material. However, given the dominance of alien/weedy plant species and high levels of disturbance observed, it is likely that this study provides a reasonably accurate representation of the actual plant diversity expected for the site. As a result, it was not necessary to comprehensively catalogue the diversity of plants. Furthermore, the possibility of conservation important species (i.e. Red Listed, rare and endemic species) occurring in the site, at most, very low.

### 4.2 Impacts affecting the study area

The site is currently affected by various impacts, these include:

- **Removal of vegetation** – Majority (>70%) of the site's vegetation has been removed or is transformed, primarily through sugarcane agriculture and construction of roads.
- **Alien invasive plants** – The remaining areas with natural vegetation are heavily infested with invasive alien plants (c.f. Section 3.2). As a result, the ecological functionality and integrity of natural vegetation has been significantly affected.
- **Erosion** – The riparian areas are impacted by bank collapse and incision of the river channel, particularly just downstream of the Duiker road crossing.
- **Solid waste dumping** – Localised sites of illegal solid waste dumping occur throughout the site.

### 4.3 Recommendations

The following recommendations are provided to avoid and/or mitigate impacts that may arise from construction and/or operations:

- Ensure minimal or no disturbance outside of the development footprint area, particularly during construction.
- Ensure that the stormwater management plan for the development minimises flow-related impacts to aquatic ecosystems located downstream. Interventions that can be considered, in addition to the stormwater runoff recommendations of the wetland report (Reference: GTW248-280214-01), include:
  - On-site storage/attenuation structures incorporated into the overall design layout.

- Open swales<sup>5</sup>, properly sized to accommodate excess stormwater, particularly from roofs and paved areas.
- Permeable pavers incorporated, where practical, into the design and construction of parking areas, walkways, etc.
- Mature, indigenous trees occurring within the development footprint should be incorporated, as far as possible, into the landscaping plan. Indigenous trees should be clearly marked to avoid accidental removal/damage.
- Topsoil from development area should be stockpiled in appropriately designated areas for re-use during landscaping and revegetation/rehabilitation.
- All construction materials and solid/liquid waste should be disposed in an appropriate and sensible manner.
- Develop and implement a comprehensive alien weed control programme to remove problematic plant species and prevent further spread and establishment. Invasive alien plants should be removed from the wetland/riparian areas and planned open spaces prior to rehabilitation and revegetation taking place. Allowance should be made for routine follow-ups until the time that there is either no presence or a negligible presence of these plants. Alien plant control work needs to be carried out by competent contractors.
- As part of the rehabilitation process, erosion control measures (e.g. sediment traps, geo-membranes, etc.) should be employed to reduce erosion, particularly on steep slopes and banks within riparian areas.
- Active planting of indigenous vegetation should consider the following:
  - Revegetation should commence as soon as possible to create vegetative cover on bare/exposed soils.
  - Landscaping of the development area should include strategic planting of indigenous plants that are representative of the area.
  - Open spaces should be revegetated using an indigenous grass-seed mix, with preference for important grasses of the KwaZulu-Natal Coastal Belt (*c.f.* Table 2-1). Appropriate indigenous herbs may be inter-planted into the grassland to speed up the process of natural recruitment and succession.
  - Suitable riparian trees and shrubs should be planted along the watercourse draining through the site. Planting efforts should ensure that a multi-layered, undisturbed vegetative community established within the riparian areas over time. A detailed list of appropriate species is provided in the rehabilitation plan (Reference: GTW248-280214-01).

The objective of the active planting and revegetation should be to improve biodiversity and ecosystem service delivery, buffer the aquatic ecosystems from

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<sup>5</sup> Open swales are vegetated, shallow depressions that are often used along roadsides to capture surface runoff. The increased surface roughness helps to reduce velocities of surface runoff thereby increasing infiltration of water into the soil layers.

impacts associated with the development and surrounding land use activities, and to limit establishment of alien/ruderal vegetation. To achieve this, it will be important that these areas are managed and maintained indefinitely, particularly in terms of control of invasive alien plants.

It is important that the aforementioned recommendations are incorporated into the development's Environmental Management Programme (EMPr). The EMPr should also include routine monitoring of the open spaces and riparian habitats with specifications for the management and maintenance of these areas.

#### **4.4 Conclusion**

With exception to loss of wetland habitat, the proposed development will not have a significant impact on the ecological state of the vegetation that is directly affected. Furthermore, opportunities exist to rehabilitate non-developed areas of the site to allow establishment of natural vegetation. Not only will this improve the integrity and functionality of terrestrial and aquatic ecosystems on site, but will also enhance ecological connectivity within the broader landscape setting.

## 5. Acknowledgements

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GroundTruth would like to thank and acknowledge David Styles for his assistance and botanical expertise with conducting this study.

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## 7. Appendices

### APPENDIX 1: List of plants recorded from the study area, 21 September 2012

Family	Scientific Name	Common Name	Type	CARA/NEMBA Category *
Malvaceae	<i>Abutilon sonneriatum</i>	Forest Abutilon	Indigenous	
Fabaceae	<i>Acacia sieberiana</i> var. <i>woodii</i>	Paperbark Thorn	Indigenous	
Asteraceae	<i>Ageratum houstonianum</i>	Mexican Ageratum	Alien invasive	1b
Asteraceae	<i>Ambrosia artemisiifolia</i>	Ragweed	Alien invasive	
Iridaceae	<i>Anomatheca laxa</i>	Small Red Iris	Indigenous	
Poaceae	<i>Arundo donax</i>	Spanish Reed	Alien invasive	1b
Cannaceae	<i>Canna indica</i>	Canna	Alien invasive	1b
Sapindaceae	<i>Cardiospermum grandiflorum</i>	Balloon Vine	Alien invasive	1b
Casuarinaceae	<i>Casuarina equisetifolia</i>	Casuarina	Alien invasive	2
Asteraceae	<i>Chromolaena odorata</i>	Chromolaena	Alien invasive	1b
Lamiaceae	<i>Clerodendrum glabrum</i>	White Cat's Whiskers	Indigenous	
Asteraceae	<i>Conzysa</i> sp.		Alien invasive	
Cyperaceae	<i>Cyperus dives</i>	Giant Sedge	Indigenous	
Myrtaceae	<i>Eucalyptus grandis</i>	Saligna Gum	Alien invasive	1b/2
Asparagaceae	<i>Furcraea foetida</i>	Furcraea	Alien invasive	
Proteaceae	<i>Grevillea banksii</i>	Scarlet Silky Oak	Alien invasive	1b
Convolvulaceae	<i>Ipomoea indica</i>	Morning Glory	Alien invasive	1b
Verbenaceae	<i>Lantana camara</i>	Lantana	Alien invasive	1b
Fabaceae	<i>Leucaena leucocephala</i>	Leucaena	Alien invasive	2
Anacardiaceae	<i>Mangifera indica</i>	Mango	Alien invasive	
Meliaceae	<i>Melia azedarach</i>	Syringa	Alien invasive	1b
Fabaceae	<i>Neonotonia wightii</i>	Robust Pioneer Creeper	Alien invasive	
Passifloraceae	<i>Passiflora subpeltata</i>	Granidila	Alien invasive	1b
Poaceae	<i>Phragmites australis</i>	Common Reed	Indigenous	
Phyllanthaceae	<i>Phyllanthus burchellii</i>		Indigenous weed	
Plantaginaceae	<i>Plantago major</i>	Broadleafed Ribwort	Alien invasive	
Euphorbiaceae	<i>Ricinus communis</i>	Castor Oil Bush	Alien invasive	1b
Anacardiaceae	<i>Schinus terebinthifolius</i>	Brazilian Pepper	Alien invasive	1b
Asteraceae	<i>Senecio deltoideus</i>		Indigenous	

Family	Scientific Name	Common Name	Type	CARA/NEMBA Category *
Asteraceae	<i>Senecio madagascariensis</i>		Alien invasive	
Asteraceae	<i>Senecio polyanthemoides</i>		Indigenous weed	
Fabaceae	<i>Senna didymobotrya</i>	Peanut Cassia	Alien invasive	1b
Fabaceae	<i>Sesbania punicea</i>	Brazilian Glory Pea	Alien invasive	1b
Solanaceae	<i>Solanum mauritianum</i>	Bugweed	Alien invasive	1b
Strelitziaceae	<i>Strelitzia nicolai</i>	Wild Banana	Indigenous	
Myrtaceae	<i>Syzygium cuminii</i>	Jambolan Plum	Alien invasive	1b
Asteraceae	<i>Tithonia diversifolia</i>	Mexican Daisy	Alien invasive	1b
Meliaceae	<i>Trichilia emetica</i>	Natal Mahogany	Indigenous	
Typhaceae	<i>Typha capensis</i>	Bulrush	Indigenous	

\* **Category 1a:** High priority emerging plant species requiring compulsory control

**Category 1b:** Widespread invasive plant species controlled by a management programme

**Category 2:** Invasive plant species controlled by area. Can be grown under permit conditions in a demarcated area

**Category 3:** Ornamental plants and other species that are permitted on a property but may no longer be planted or sold