PRELIMINARY ECOLOGICAL HABITAT ASSESSMENT & MANAGEMENT RECOMMENDATIONS FOR THE PROPOSED NTASHANA ROAD; KWAZULU-NATAL

Compiled for **Royal HaskoningDHV** by:
Mr. C.L.COOK (MSc. Zool.)* *Pr.Sci.Nat.* 400084/08
Specialist Faunal/Ecological Consultant
Cell No. 082 688 9585
Giant.bullfrog@gmail.com

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*** DWAF accredited to undertake wetland and riparian delineations (2008)**

1. INTRODUCTION

Royal HaskoningDHV as an Independent Environmental Practitioner appointed Mr. C.L. Cook to provide a basic ecological assessment and description of the current habitat integrity of the proposed current Ntashana access road and to provide appropriate management recommendations for the proposed road. There is no current access road between the D1050 and the D20 to the east and the steep hillslopes are extremely difficult to transverse. The surrounding community have to walk extremely long distances to the Public Transport areas.

The proposed Ntashana road project requires the construction of approximately a 2 km new road linking with the existing roads. The proposed Ntashana road traverses *Aristida junciformis* hillslopes as well as hillslope seepage wetlands, two drainage lines and a proposed bridge crossing over a section of the Mtwlaume River. Two alternatives have been proposed. Due to severe time and financial constraints the site visitation for the preliminary ecological habitat assessment focused on the preferred alignment; from an engineering perspective.

The project involves the construction of a new 2 km section of a 5m wide, 7a gravel road. The new section of Ntashana road will improve access for the adjacent community towards the public transport system.

The assignment is interpreted as follows: Determine the current ecological status of the proposed Ntashana access road and the ecological impact of the road as well as an environmental management plan for the construction of the access road. In order to compile the report the following had to be done:

Initial preparations*:*

- Obtain all relevant maps including aerial photographs (Google images) of the proposed Ntashana access road and adjacent land usage, and information on the natural environment around the proposed alignment (approximately 100m).
- An initial site investigation (4th August 2011) to assess the current environmental status of the alignment of the Ntashana access road with special emphasis on remaining natural habitats.
- Identify problematic areas which require immediate attention as well as management, e.g. gully erosion, degraded areas, reclamation areas, alien vegetation.
- Make management recommendations for the current impacts especially pertaining to the wetland habitats around the proposed access road.

1.1 OBJECTIVES OF THE PRELIMINARY ECOLOGICAL SURVEY/ HABITAT ASSESSMENT

- To provide a basic description of the vegetation and fauna occurring around the proposed Ntashana access road.
- To provide a description of any threatened plant or animal (mammals, birds, reptiles and amphibians) occurring or likely to occur around the proposed Ntashana access road and immediate surrounding the road alignment.
- To describe the wetland and riverine habitats around the proposed alignment as well as potential areas of important conservation value or areas most likely to form important habitat for remaining threatened plant and animal species.
- To determine potential impacts of the construction of the Ntashana access road on the wetland habitats and remaining natural vegetation and associated fauna.
- To provide management recommendations to mitigate negative and enhance positive impacts of the proposed Ntashana access road.

1.2 SCOPE OF STUDY

- An initial ecological survey documenting the dominant vegetation on the site and recording sightings and/or evidence of present fauna.
- An assessment of the wetland and *Aristida* hillslopes habitats, evaluating conservation importance and significance with special emphasis on the current status of any threatened animal species (Red Data Species), within the proposed Ntashana access road alignment.
- Literature investigations with which to augment field data were necessary.
- Identification of potential ecological impacts that could occur as a result of the construction of the Ntashana access road and assess the significance of these, where possible.
- Investigate feasible and practical management recommendations that should be implemented to reduce or minimize the impacts, should the project be approved.
- Documentation of the findings of the study in a report.

1.3 CONSTRAINTS AND LIMITATIONS OF SHORT DURATION ECOLOGICAL AND FAUNAL SURVEYS

- Limitation to a base-line ecological survey for only 1 day (8 hours) during the late summer months (April 2013). No specialist vegetation or faunal surveys conducted but merely a basic ecological/habitat assessment based on a single site visit.
- The wetland boundaries of the hillslope seepage wetlands extend for significant distances around the proposed alignment so outer edges are determined from a desktop perspective.
- The majority of habitats adjacent to the proposed alignment have already been completely transformed during previous the construction of housing platforms and adjacent rural and agricultural activities (kraals, small scale agricultural lands) as well as extensive overgrazing of livestock.
- The vegetation along the existing ~1km section of the proposed upgraded road reserve is completely transformed and dominated by weedy pioneer plants (rurals) as well as alien invasive species.
- The majority of threatened plant species are seasonal flowering at particular periods during the wet summer months. Ideally vegetation surveys should be conducted throughout the wet summer months or during the flowering period of threatened plant species.
- The majority of animal species are extremely seasonal only emerging after sufficient heavy early summer rainfall (October-November). No comprehensive faunal surveys have been conducted on the site.
- The majority of threatened faunal species are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons/ years.
- Limitation of historic data and available databases for the area.
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records) and previous surveys conducted in similar habitats between 2010-2013).

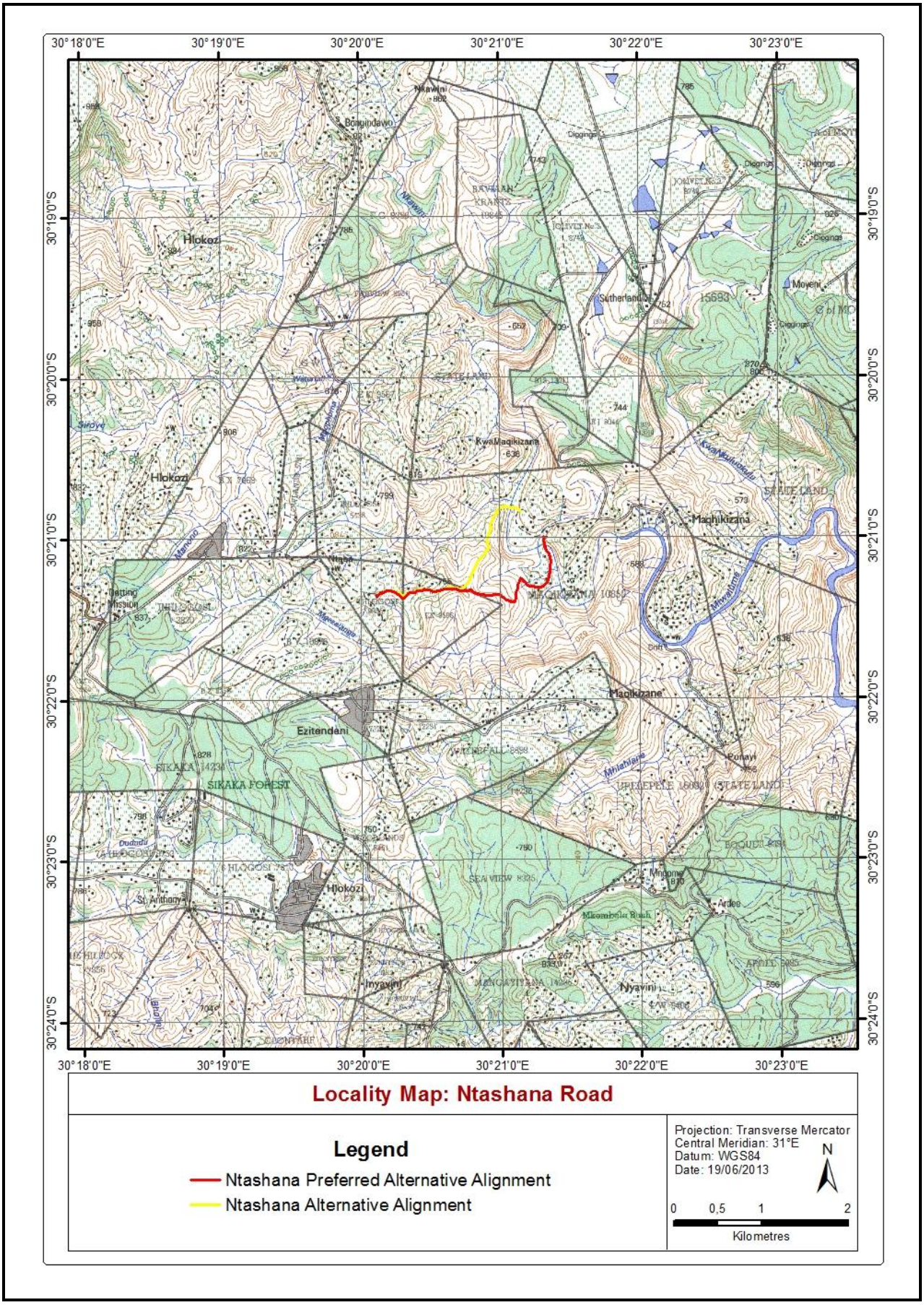

Figure1. Locality map of the proposed Ntashana road.

2. METHODOLOGY

A survey of the current Ntashana access road and immediate adjacent hillslope areas was carried out by driving around the adjacent areas by car and closer inspection of the proposed Ntashana alignment carried out on foot. As the site is situated around rural homesteads as well as agricultural areas the majority of natural vegetation consisting of **Kwazulu-Natal Coastal Belt (CB 3)** and **Ngongoni Veld** (SVs 4) has been historically transformed into terraced small scale agricultural lands, in-cut residential platforms as well as livestock enclosures (kraals). The site was visited predominantly during daylight hours (9h30-16h30) on the 30th April 2013. It must be stressed that due to time and financial constraints no comprehensive vegetation or faunal surveys were undertaken during the brief ecological survey. Data was heavily supplemented by literature investigations; personal records, historic data and previous surveys conducted in the area.

Different habitats were explored to identify any sensitive or specialised species which could possibly occur on the site. Habitats explored included the *Aristida junciformis* hillslopes, hillslope seepage wetlands, drainage lines (perennial and non-perennial), Mtwalume River and associated riparian zones.

The vegetation literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al,* 2009). **Mammal** names are as used by Skinner and Chimimba (2005), **Bird** names by Hockey, Dean & Ryan (2006); **Reptile** names by Branch (1998) and **Amphibian** names by Carruthers & Du Preez (2009).

3.1 STUDY AREA

The Ntashana road is situated within the rural agricultural areas of Ntashana which falls under the District Municipality. The site is situated approximately 50km to the east of Umzinto and is accessed via the R612 and the D20. The site falls within the transional zone between **Kwazulu-Natal Coastal Belt (CB 3**) and **Ngongoni Veld (SVs 4) vegetation units** (Mucina & Rutherford 2006).

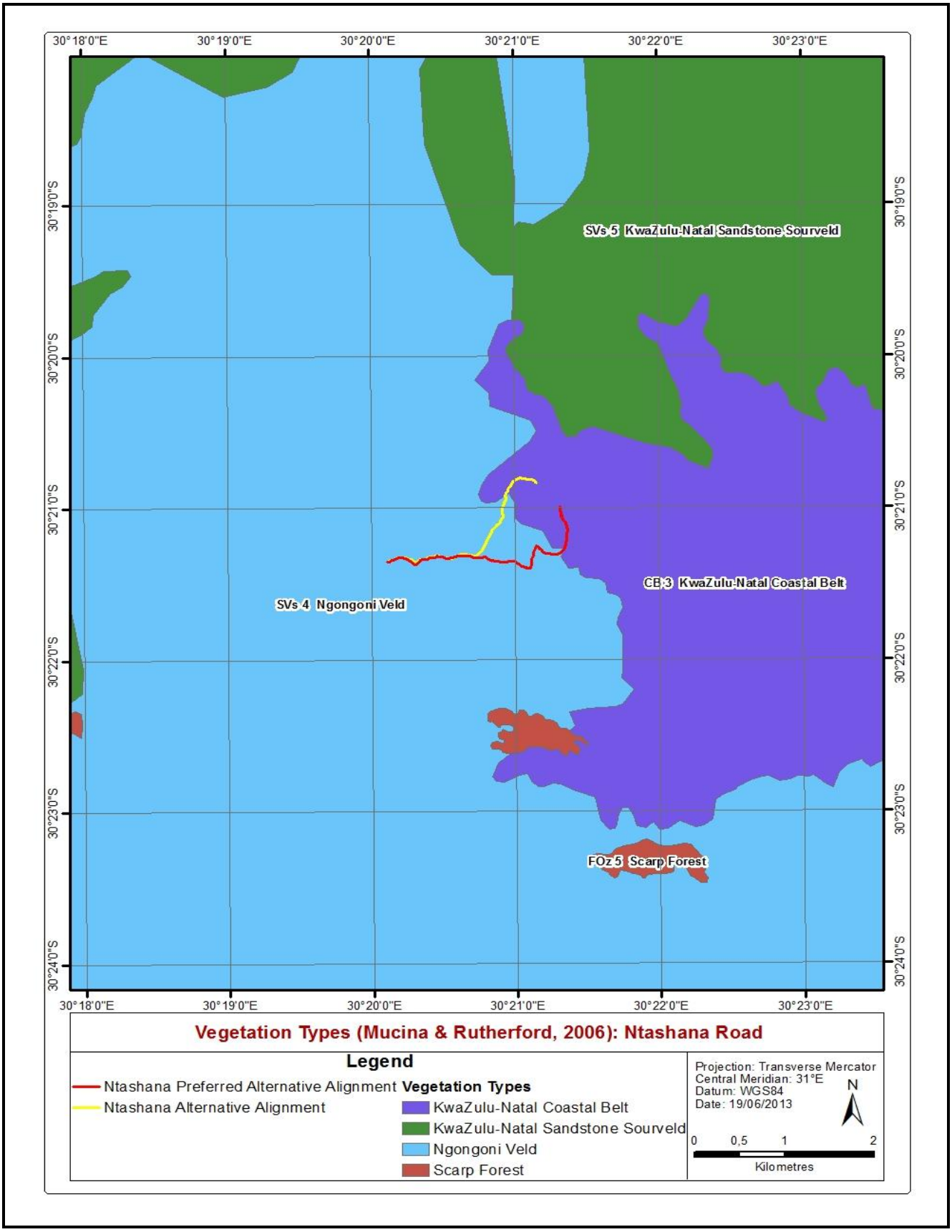

Figure2. The proposed Ntashana road which falls in the transional zone between **Kwazulu-Natal Coastal Belt (CB 3**) and **Ngongoni Veld (SVs 4)** vegetation units (adapted from Mucina & Rutherford 2006).

The north-eastern section of the alignment around the mid and lower foot-slopes stretching towards the Mtwalume River comprises Kwazulu-Natal Coastal Belt (CB 3) vegetation unit (Mucina & Rutherford 2006). This vegetation unit is distributed along the coastal strip of Kwazulu-Natal from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. Altitude ranges from 20-450 m, with the altitude at the site being 255 m. The south-western section situated within the summit of the hillslopes including the upgraded section of the Ntashana Road vegetation unit comprises Ngongoni Veld (SVs 4) which occurs in Kwazulu-Natal and Eastern Cape Provinces from Melmoth in the north to near Libode in the former Transkei and includes Eshowe, New Hanover, Camperdown, Eston, Richmond, Dumisa, Harding, Lusiksiki and the Lobode area. Altitude ranges from 20-450 m, with the altitude at the site being 255 m.

Figure3. A collage of photographs displaying the major vegetation units observed within and around the proposed Ntashana road. A: The majority of the proposed new access road is situated within moist *Aristida junciformis* hillslopes. **B:** Situated along the lower-lying drainage lines are remnant patches of indigenous riparian vegetation although large sections have become degraded due to extensive wood harvesting activities as well as medium-high infestations of alien invasive vegetation. **C:** The lower slopes have historically been ploughed and terraces for small scale-agricultural activities, residential platforms, livestock enclosures and comprises transformed or secondary succession grasslands. **D:** Situated along the macro-channel banks of the Mtwalume River are patches of seasonally inundated hygrophilous sedge and grass dominated seepage wetlands.

3.2 VEGETATION AND LANDSCAPE FEATURES

Kwazulu-Natal Coastal Belt (CB 3)

Highly dissected undulating coastal plains which presumably used to be covered to a great extent with various types of subtropical coastal forests (Northern Coastal Forest). Some primary grassland dominated by Red Grass (*Themeda triandra*) still occurs in hilly, high-rainfall areas where pressure from natural fire and grazing regimes prevailed. At present the Kwazulu-Natal Coastal Belt is effected by an intricate mosaic of very extensive sugar cane fields, banana plantations, timber plantations and coastal holiday resorts, with interspersed secondary *Aristida* grasslands, thickets and patches of coastal thornveld (Mucina *et al*. 2006).

Ngongoni Veld (SVs 4)

Dense, tall grassland overwhelmingly dominated by unpalatable, wiry Ngongoni Grass (*Aristida junciformis*), with this mono-dominance associated with low species diversity. Wooded areas (thornveld) are found in the valleys at lower altitudes, where this vegetation unit grades into Kwazulu-Natal Hinterland Thornveld (Svs 3). Termitaria support bush clumps with *Acacia* species, *Cussonia spicata*, *Ziziphus mucronata*, *Coddia rudis* and *Ehretia rigida* (Mucina *et al*. 2006).

The vegetation along the approximately 1km upgraded section of the road comprises completely transformed road reserves dominated by pioneer weedy and alien invasive vegetation. The current servitude comprised mainly of pioneer weedy rurals such as *Ambrosia artemisifolia, Ageratum houstonianum*, Ageratum conyzoides**, *Bidens pilosa, Conyza bonariensis* and *Parthenium hyserophorus**; alien invasive vegetation such as *Lantana camara*, Chromolaena odorata*[*]*, Solanum mauritianum*, Psidium guajava*, Tithonia diversifolia, Senna septemtrionalis** as well as secondary succession grasslands dominated by *Aristida junciformis* subsp. *galpinii*, *Digitaria eriantha, Panicum maximum, Cynodon dactylon, Cymbopogon caesius, Eragrostis curvula, Imperata cylindrica, Hyparrhenia fillipendula* and *Melinis repens.*

The majority of hillslope *Aristida junciformis* grassland has been historically transformed around the proposed Ntashana access road. Several terraced agricultural fields as well as old livestock enclosures occur on the lower slopes. The proposed new access road bisects a remnant patch of scattered low-lying rocky extrusions/ outcrops adjacent to an incised non-perennial drainage line.

[*] alien invasive vegetation

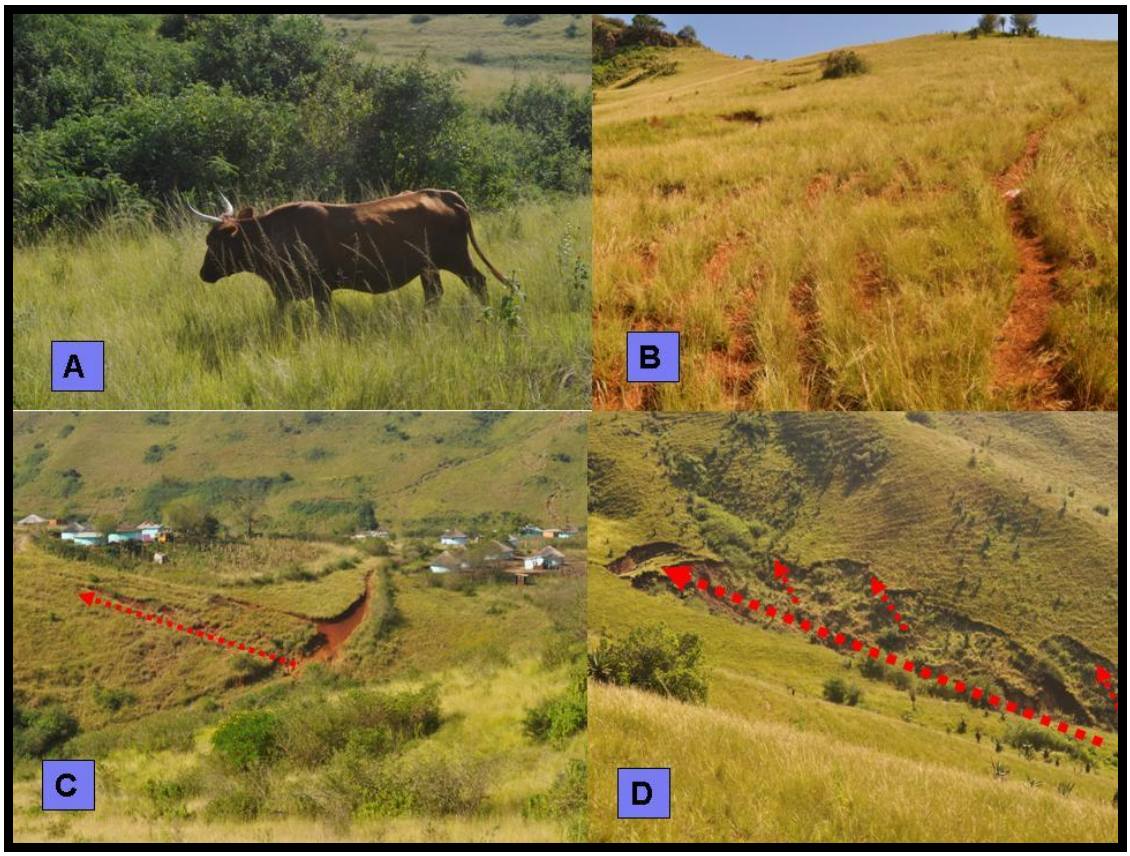

Figure4. A conglomerate of photographs displaying the impacts on un-controlled livestock grazing and trampling along the drainage lines and moist hillslope seepage wetlands. A: The hillslopes have been extensively utilised for livestock (cattle and goats) grazing and terraced agricultural lands. **B:** The livestock pathways result in clearance of vegetation, compaction of the soils and extensive rill erosion (stormwater) channels. **C:** The grazing of cattle within the moist hillslope seepage wetlands results in disturbances to the vegetation by overgrazing and trampling as well as compaction and erosion of the hydric soils. **D:** Extensive head cut erosion as well as gully erosion was observed along the perennial drainage line. (The red lines indicates the direction of the major head cuts).

Extensive gully erosion was observed along the drainage lines due to uncontrolled livestock grazing and trampling within the adjacent moist hillslope seepage wetlands. The moist hillslope vegetation around the present access road has been heavily impacted on by adjacent rural as well as agricultural activities including wood harvesting and extensive alien vegetation invasion. Pockets of indigenous, mostly closed woodland occurs within the ravines as well as northern embankments of the Mtwalume River.

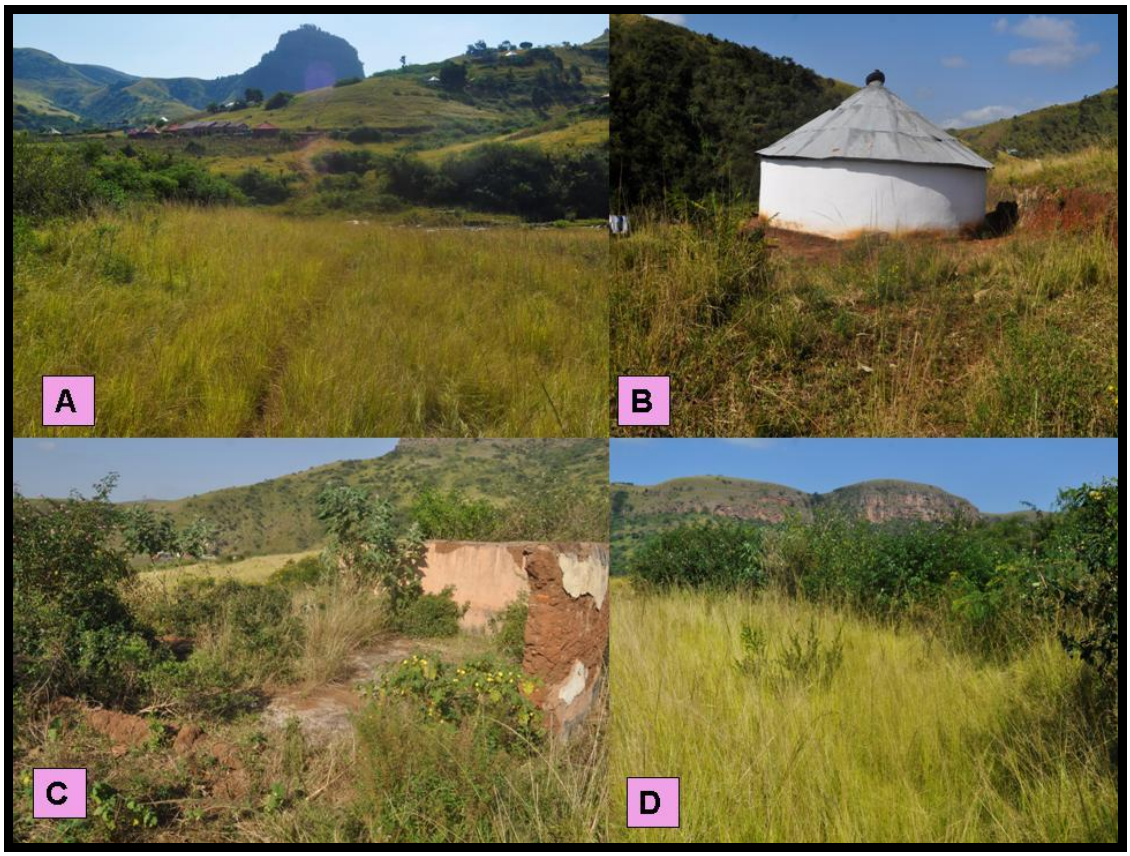

Figure5. A Conglomerate of photographs displaying the current impacts observed around the proposed Ntashana road alignment. A: The hillslopes are dominated by *Aristida junciformis* grasslands in various stages of transformation and degradation. The grasslands have been extensively utilised for livestock grazing activities as well as old terraced agricultural lands. **B:** A few scattered residential platforms occur adjacent to the proposed access road mainly on the lower slopes and summit. **C:** Abandoned houses and old livestock enclosures have become heavily invaded by alien invasive and weedy plant species. **D:** Three drainage lines ranging from small perennial streams to non-perennial or seasonal drainage lines occur adjacent to the proposed alignment. Uncontrolled livestock grazing, trampling and compaction of hydric soils along the drainage lines has resulted in severe gully erosion and invasion of alien invasive vegetation.

The majority of the vegetation adjacent to the proposed Ntashana road is situated within transformed (old agricultural lands) and secondary succession *Aristida junciformis* grasslands. The majority of the study area is dominated by rural agricultural practices with current and old terraced agricultural lands. Ploughing along the contours as well as within the temporary wet zones of hillslope seeps and the adjacent valley bottom wetlands. Extensive soil erosion occurs within disturbed areas such as rill erosion or stormwater channels along existing livestock pathways as well as in-cut roads, residential platforms as well as gully erosion within certain degraded drainage lines. The gully erosion channels are heavily infested with alien invasive specie. Dense alien invasive vegetation occurs within fire protected kloofs; as well as

old livestock enclosures, road and existing pipeline reserves and fallow agricultural lands.

Figure6. A conglomerate of photographs displaying plant species observed around the proposed Ntashana road. A: Wild Dagga (*Leonotis leeonorus*), **B:** Invading Ageratum (*Ageratum conyzoides**) Category 1 Weed, **C:** Lemon Bush (*Lippia javanica*); **D:** Mexican Sunflower (*Tithonia diversifolia**) Category 1 Weed and **E:** A Poor Man's or Ground Cycad (*Encephalartos villosus*) has been planted adjacent to a homestead. All Cycads are protected plant species and permits are required for their removal as well as possession. The single Cycad will not be impacted on by the current road alignment.

Figure7. The majority of the hillslopes in which the proposed Ntashana access road is situated on a shallow Orthic A layer with an underlying hard lithocutanic B horizon typical of the Glenrosa Form. The shallow soil layer is prone to erosion especially along the perennial and non-perennial drainage lines.

Figure8. Clear Yellow-orange iron concretions (mottling) were observed within the top 5-20 cm of auger samples taken from the temporary wet zones of the mid and upper hillslope seepage wetlands and drainage lines.

Figure9. Photograph clearly indicating the oxidised rhizospheres which form around the roots of hygrophilous vegetation (grasses and sedges) and were mainly observed in the seasonally wet zones of the foot-slope seepage wetlands adjacent to the Mtwalume River.

Geology and Soils

Acid, leached, heavy soils are derived from the Karoo Supergroup sediments (including significant Dwyka tillites) and intrusive dolerites. The soils supported by the above-mentioned rocks are shallow over hard sandstones and deeper over younger, softer rocks. Soil form includes Glenrosa and Mispah soils. Hydric indicators (mottling) of permanent, seasonal and temporary inundation or wetness were observed within the soil augers and increased in number within the lower-lying areas adjacent to the Mtwalume River. Hydric soils of permanent inundation where observed within the Mtwalume River, gleyed clays with high organic layer and extensive mottling and rhizospheres was observed within the macro-channel banks of the lower-lying seepage wetlands. Sandy soils with temporary inundation were observed within the mid and upper slopes adjacent to the drainage lines. Land types Fa, Ab, Ac and Aa.

Climate

Summer rainfall area but with some rain during winter. Mean Annual Precipitation (MAP) is around 700- 1 100mm. Some valleys are sheltered and may show weak rainshadow effects. Frost infrequent, occurring mainly where cold air becomes trapped in the valleys.

Conservation

Kwazulu-Natal Coastal Belt (CB 3) is an **Endangered** vegetation unit with only a small part statutorily conserve in Ngoye, Mbumazi and Vernon Crookes Nature Reserves. About 50% is transformed for cultivation, urban sprawl and road-building. Conservation target is 25% conserved.

Ngongoni Veld (SVs 4) is classified as a **Vulnerable** vegetation unit with only a small part statutorily conserved (1%) in the Ophathe and Vernon Crookes Nature Reserves. About 39% is transformed for cultivation, urban sprawl and plantations. Conservation target is 25% conserved. **Alien invasive vegetation** includes *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum* (Mucina & Rutherford 2006).

3.3 *ARISTIDA JUNCIFORMIS* HILLSLOPES

Vegetation Type	Kwazulu-Natal Coastal Belt (CB 3)	**Tree cover**	0-5 %
Soil	Sandy-Clayey Loams	**Shrub cover**	0-10 %
Topography	Undulating Hillslopes	**Herb cover**	0-20%
Land use	Rural-agricultural homesteads	**Grass cover**	0-90 %
Dominant spp.	*Aristida junciformis* subsp. *galpinii, Hyparrhenia fillipendula, Panicum maximum, Melinis repens, Hypoxis argentea, Eragrostis curvula, Leonotis leeonorus, Lippia javanica Tagetes minuta, Cirsium vulgare*; Cyanotis speciosa, Thunbergia dregeana, Verbena aristigera*, Pentasia angustifolia, Psidium guajava*, Eragrostis curvula, Cynodon dactylon; Datura strumonium*, Solanum sisymbrifolium*, Lantana camara*, Solanum mauritianum*, Tithonia diversifolia*, Rubus cuneifolius*, Parthenium hyserophorus, Bekeyha speciosa, Berkheya setifera*		

The secondary succession *Aristida junciformis* hillslope areas unit comprises the largest component of the study area. The area consists of rural homesteads and agricultural fields (old and current) that are mostly located on the hillslope seeps as well as seepage wetlands adjacent to the lower-lying Mtwealume River and valley bottom moist grasslands on loamy to clayey soil. These areas are utilised in various ways ranging from houses to ploughed lands, kraals to grassland used for grazing purposes. As a result the natural grassland vegetation has become degraded and is mostly transformed. The grassland areas used for grazing purposes are grazed to approximately 0.1-0.5 m above ground level and are dominated by the grasses *Aristida junciformis* subsp. *galpinii, Cynodon dactylon, Digitaria eriantha, Panicum maximum, Cymbopogon caesius, Eragrostis curvula, Imperata cylindrica, Hyparrhenia fillipendula, Imperata cylindrica and Melinis repens.*

The grasses cover approximately 70-80% of the area and the forbs 5-10% (mainly alien invasive species). Forbs were dominated by pioneer weedy plant species such as Tall Fleabane (*Conyza albida*), Flax-Leaf Fleabane (*Conyza bonariensis*), Common Black Jack (*Bidens pilosa*), Tall Khaki weed (*Tagetes minuta*), Mexican Poppy (*Argemone ochroleuca*), *Verbena bonariensis.* On the old agricultural fields, especially the lower-lying areas *Caesalpinia decapetala**, *Lantana camara** as well as *Senna didymobotrya** are also present and have in some cases, closer to the rivers, become densified in the drainage channels with extensive alien thickets present and signs of bank erosion evident. Various alien invasive plant species such as *Agave americana** *Ageratum conyzoides**, *Arundo donax**, *Acacia mearnsii*, *Bambusa vulgaris*, Caesalpinia decapetala**, *Campuloclinium macrocephalum**, *Chromolaena odorata**, *Eucalyptus camaldulensis**, *Eucalyptus grandis**, *Lantana camara**, *Ricinus communis**, *Senna didymobotrya**, *Solanum mauritianum**, *Tithonia diversifolia** are present throughout this large unit.

Various human and livestock footpaths and informal two-spoor roads are present in these areas. No rare or threatened plants were recorded within this transformed vegetation unit or are likely to occur within the hillslopes immediately adjacent to the proposed road alignment.

3.4 HILLSLOPE & FOOTSLOPE SEEPAGE WETLANDS

Vegetation Type	Kwazulu-Natal Coastal Belt	**Tree cover (Riparian zone)**	0-80%
Soil	Sandy-Clay-Loams as well as hydromorphic gleyed clays within foot-slope seepage wetlands adjacent to the Mtwalume River.	**Shrub cover (mainly alien invasive species)**	0-80%
Topography	Moist Hillslopes & Valley Bottom	**Herb cover**	10-30%
Land use	Rural-agricultural (Livestock drinking & small-scale lands)	**Grass cover**	30-80%
Dominant spp. (mainly upstream from bridge crossing site)	*Typha capensis*, *Cyperus immensus*, *Cyperus sexangularis, Cyperus textilis, Mariscus congestus*, *Imperata cylindrica, Juncus* spp., *Typha capensis*, *Gunnera perspensa*, *Scirpus ficinoides, Carex* spp., *Eleocharis* spp., *Pycreus nitidus*, *Pteridium aquilinum, Mohria sp., Zantedeschia aethiopica*, *Disa woodii*, *Senecio speciosus, Persicaria serrulata, Persicaria senegalensis*, *Colocasia esculenta**, *Phoenix reclinata, Albizia adiathifolia, Syzigium cordatum, Trema orientalis, Erythrina lyssistemon, Monopsis decipiens, Sesbania punicea*, Canna indica*, Rubus cuneifolius*, Persicaria senegalensis, Cirsium vulgare*, Setaria sp., Zantedeschia aethiopica, Panicum maximum, Eragrostis curvula*		

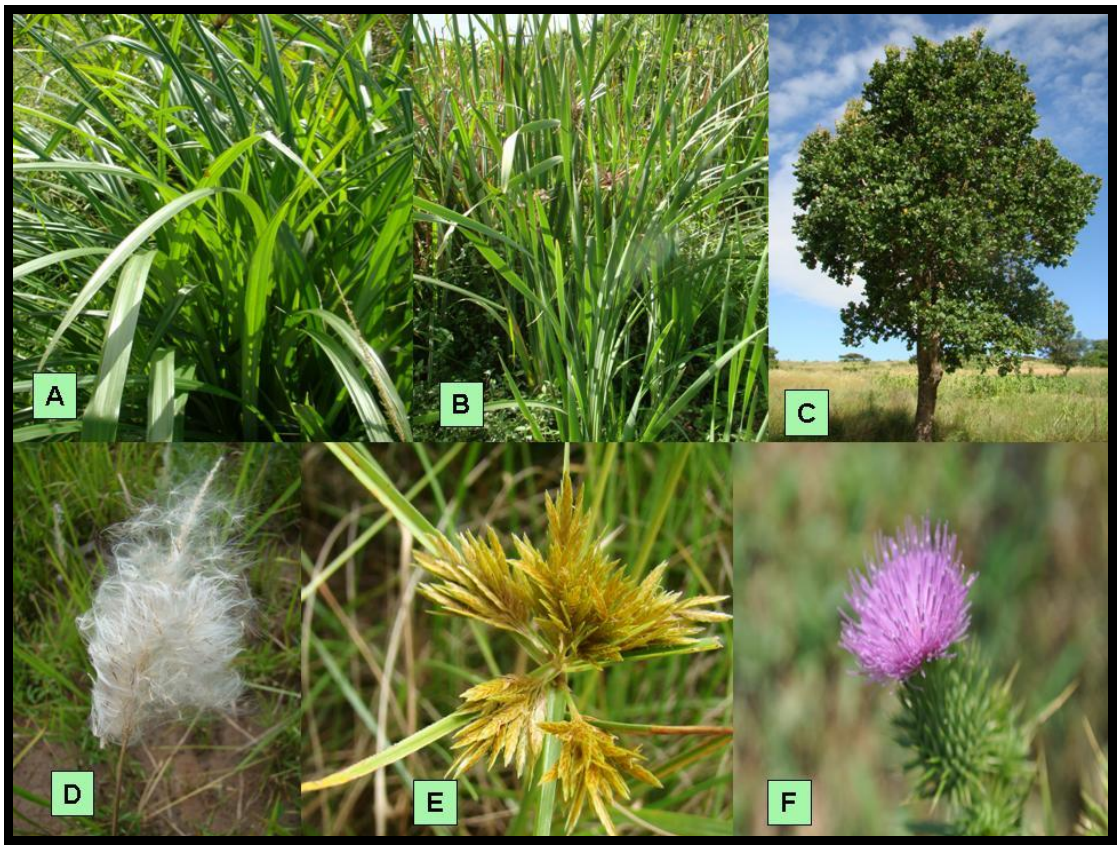

Figure10. A conglomerate of photographs of hydrophilic and hygrophilous plant species located within the permanent, seasonal and temporary wet zones of the hillslope and foot-slope seepage wetlands. **A:** Giant Sedge (*Cyperus dives*) permanent and seasonal wet zone **B:** Bulrush (*Typha capensis*) permanent and seasonal wet zone; **C:** Umdoni Waterberry (*Syzigium cordatum*) **D:** Cottonwool Grass (*Imperata cylindrica*) Temporary wet zone; **E:** Inconcodwane/Sedge (*Pycreus polystachyos*) seasonal wet zone and **F:** Scotch-Thistle (*Cirsium vulgare**) temporary wet zone.

Aristida junciformis dominates the moist hillslope seepage wetlands with a limited hydrophilic herb component due to cattle and goat grazing activities. The lower-lying footslope seepage wetlands adjacent to the Mtwalume River are dominated by hygrophilous sedges and grasses. Species recorded included *Typha capensis*, *Cyperus immensus*, *Cyperus sexangularis, Cyperus textilis, Mariscus congestus*, *Imperata cylindrica, Juncus* spp., *Shoenoplectus spp.*, *Scirpus ficinoides, Carex* spp., *Eleocharis* spp., *Pycreus nitidus*, *Zantedeschia aethiopica*, *Persicaria serrulata, Persicaria senegalensis* as well as planted *Colocasia esculenta*.

The vegetation is typical of the valley bottom wetlands are characterised by the dominance of various *Cyperus and Juncus* species. The forbs *Typha capensis, Cyperus immensus, Cyperus sexangularis, Schoenoplectus corymbosus* prominent throughout the valley bottom wetlands. *Cyperus textilis, Mariscus congestus*, *Imperata cylindrica, Juncus* spp., *Scirpus fiicinoides, Carex* spp., *Eleocharis* spp., *Pycreus nitidus*, *Zantedeschia aethiopica*, *Persicaria serrulata, Persicaria senegalensis* as well as planted *Colocasia esculenta*. Other species in the seasonally wet zones include the grasses *Schizachyrium sanguineum, Setaria sphacelata, Paspalum urvillei, Leersia hexandra, Agrostis lachnantha* and the forbs *Mariscus congestus, Persicaria lapathifolia* and *Juncus* spp. The seasonal and temporary wet zones are characterised by the presence of the grasses *Imperata cylindrica, Hyparrhenia tamba, Eragrostis plana,* and the forbs *Pelargonium luridum, Berkeyha radula, Nidorella anomala* and *Wahelenbergia caledonica.* Several clumps of White Arums *(Zantedeschia aethiopica)* were observed within the seasonally inundated zones of the valley bottom wetlands.

Figure11. Collage of photographs of the perennial and non-perennial drainage lines A: Two perennial drainage lines feed into the Mtwalume River adjacent to the proposed access road. The drainage lines have eroded to the bedrock layer. **B:** Hygrophilous sedge and grass dominated foot-slope seepage wetlands occur adjacent to the drainage lines inflows into the Mtwalume River. Extesnive siltation and sedimentation occurs below the inflows on the drainage lines. **C:** Uncontrolled livestock drinking, grazing and trampling occurs along the drainage lines. Heavy infestations of alien invasive vegetation occurs along the disturbed drainage lines.

The proposed Ntashana access road bisects the upper degraded sections of the hillslope seeps and trampled and heavily overgrazed footslope seepage wetlands. It is imperative that construction activities are restricted to the road servitude within these sensitive habitats and that the road reserve is appropriately rehabilitated/re-vegetated to prevent further erosion. No threatened plants were recorded within the moist hillslope seepage wetlands as well as seasonally inundated foot-slope seepage wetlands.

3.5 RIPARIAN ZONES OF DRAINAGE LINES AS WELL AS MTWALUME RIVER

Vegetation Type	Kwazulu-Natal Coastal Belt	**Tree cover**	70-80%
Soil	Sandy-Clay-Loams	**Shrub cover**	20-50%
Topography	Fire protected kloofs and Valleys	**Herb cover**	80-90%
Land use	Rural-Agricultural homesteads and extensive livestock grazing activities. Wood harvesting and illegal hunting and poaching activities	**Grass cover**	5-10%
Dominant spp.	*Acacia natalitia, Acacia nilotica, Albizia adianthifolia, Cussonia spicata, Celtis africana, Ehretia rigida, Ecebergia capensis, Vepris lanceolata, Protorhus longifolia, Searsia chiridensis, Dalbergia armata, Chaetachme aristata, Zanthoxylum capense, Trema orientalis, Harpephylum caffrum, Grewia occidentalis, Ziziphus mucronata, Nuxia floribunda, Halleria lucida, Ficus sur, Ficus natalensis, Bridelia micrantha, Croton sylvaticus, Aganthisanthernum bojeri, Gnidia anthylloides, Syzigium cordatum, Trichilia emetica, Panicum maximum, Eragrostis curvula, Lantana camara*, Tithonia diversifolia*, Acacia mearnsii*, Senna didymobotrya*, Solanum mauritianum*, Rubus fruticosus*, Rubus cuneifolius*, Ipomoea purpurea*, Eucalyptus grandis*.*		

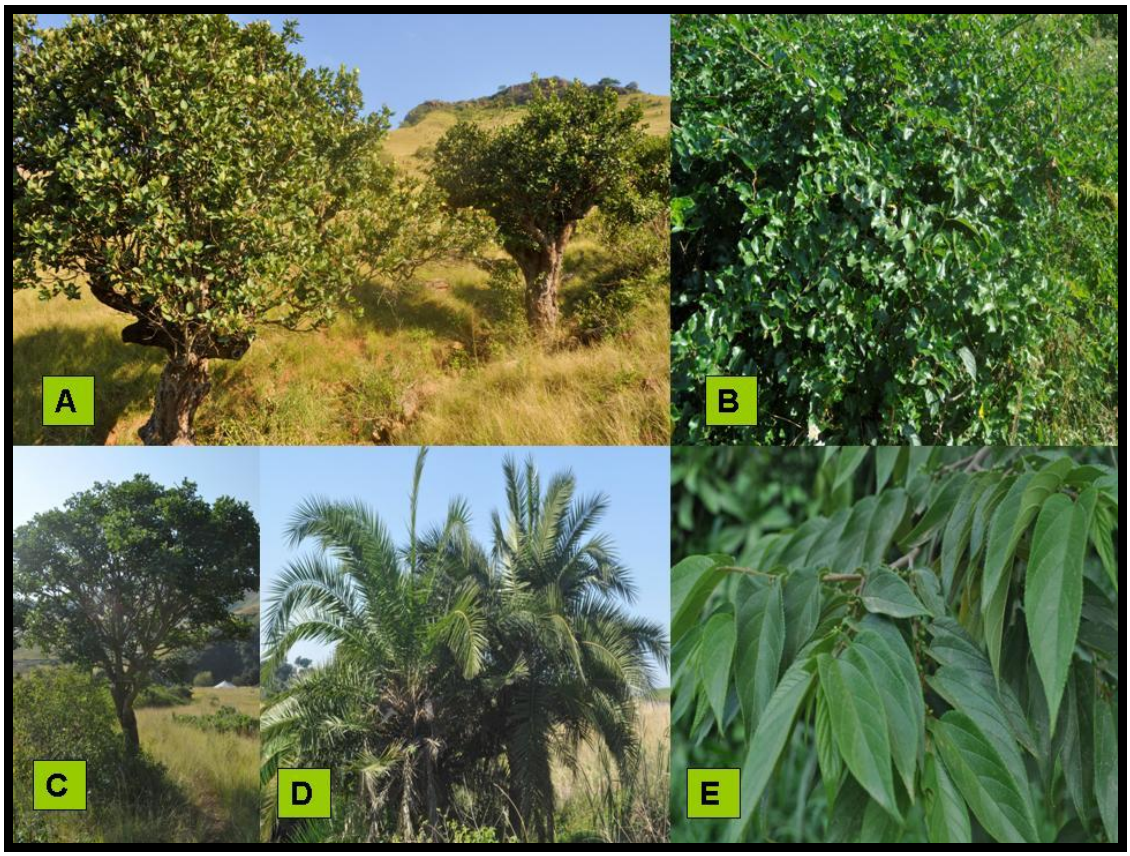

Figure12. Dominant riparian species observed along the stretch of the Mtwalume River as well as adjacent drainage lines. A: The proposed road bisects a non-perennial drainage line including two large Umdoni (*Syzigium cordatum*). The road should be re-aligned to avoid these two trees. **B:** Buffalo-Thorn (*Ziziphus mucronata*); **C:** Coral Tree (*Erythrina lysistemon*); **D:** Wild Date Palm (Phoenix reclinata) and **E:** Pigeon Wood (*Trema orientalis*).

The vegetation of the Mtwalume River and adjacent footslope seepage wetlands comprises grasses and sedges with a few scattered trees such as Umdoni Waterberry (*Syzigium cordatum*), Wild Date Palms (*Phoenix reclinata*) and Flat-Crown Albizia (*Albizia adianthifolia*) and no shrubs present. Heavy infestations of alien invasive species were observed along the perennial (high infestations) and non-perennial drainage lines (medium-low infestations). Dominant alien invasive species observed included Peanut Butter Cassia (*Senna didymobotya**), Leucena (*Leucaena leucocephala**), Lebbeck Tree (*Albizia lebbeck**). Mexican Sunflower (*Tithonia diversifolia**), Mauritius Thorn (*Ceasalpinia decapetala**), Black Wattle (*Acacia mearnsii**), Red River Gum *Eucalyptus camaldulensis**, Saligna Gum *Eucalyptus grandis**, Brazilian Peppercorn *Schinus terebinthifolius** and Syringa *Melia azedarach**. Vegetation covers 0-95 % of the total land cover with bare soil comprising ~5% of the total cover.

The predominant soil form is a deep, well weathered, light-brown/grey coloured alluvium. The soils on the hillslope seeps surrounding the site are as shallow top soil situated on a shallow (0-30 cm) Orthic A layer with an underlying hard lithocutanic B horizon typical of the Glenrosa Form. The shallow soil layer is prone to erosion especially along the perennial and non-perennial drainage lines. Soils are sandy to organic rich clays within the lower lying footslope seepage wetlands. The hillslopes are between 5~40° with conditions becoming moister towards the lower lying Mtwalume River. Rocks are generally absent within the hillslopes except for scattered low-lying extrusions or outcrops of the Natal Group Sandstone occurring adjacent to the non-perennial drainage lines which feed into the Mtwalume River. The non-perennial drainage lines active channels are incised and have eroded to the bedrock base in certain areas.

Situated within the fire protected valleys and kloofs usually within the south and east facing slopes adjacent to the Mtwalume River is a closed woodland unit. Dense understory vegetation as well as abundant climbers occurs within the closed canopy. These areas have been heavily impacted on by wood harvesting activities as well as alien vegetation invasion. The current Ntashana road alignment bisects a small patch of degraded woodland (wood harvesting) adjacent to the Mtwalume River. Ideally the road should be situated away from any densely vegetated areas or alternatively restricted to the existing livestock and human pathways. This will result in minimal vegetation clearance and disturbance.

Indigenous species recorded within the riparian zones of the Mtwalume River and fire-protected wooded pockets on the south facing slopes included Umdoni Waterberry (*Syzigium cordatum*, River Bushwillow (*Combretum erythrophyllum*), Sycamore Fig (*Ficus sycamorus*), Red Currant (*Searsia chiridensis*), Coast Currant (*Searsia nebulosa*), Common Wild Currant (*Searsia pyroides*), Wild Plum (*Harpephylum caffrum*), White Stinkwood (*Celtis africana*), Weeping Brides-bush (*Pavetta lanceolata*), Broad-pod Robust Thorn (Acacia *robusta* subsp. *robusta*), Coral Tree (*Erythrina lysistemon*) and Black Bird-berry (*Psychotria capensis*). A few Blood Flowers (*Scadoxus multiflorus* subsp. *katharinae*) as well as Natal Lily (*Crinum mooreii*) were observed.

No red data plant species were observed during the brief field survey although suitable habitat remains within these protected pockets for certain red listed plant and tree species. More intensive surveys are required in order to ascertain the current conservation status of threatened plant and tree species in the area.

Exotic and invasive plant species were categorised according to the framework laid out by The Conservation of Agricultural Resources Act (CARA) (Act 43 of 1983). CARA defines weeds as alien plants, with no known useful economic purpose that should be eradicated. Invader plants, also considered by the Act, can also be of alien origin but may serve useful purposes as ornamentals, as sources of timber, or may have other benefits (Henderson, 2001). These plants need to be managed and prevented from spreading.

Alien and invasive plant species can be grouped three categories:

- Category 1 plants are weeds that serve no useful economic purpose and possess characteristics that are harmful to humans, animals or the environment. These plants need to be eradicated using the control methods stipulated in Regulation 15.D of the CARA.
- Category 2 plants are plants that are useful for commercial plant production purposes but are proven plant invaders under uncontrolled conditions outside demarcated areas.
- Category 3 plants are mainly used for ornamental purposes in demarcated areas but are proven plant invaders under uncontrolled conditions outside demarcated areas.

Figure13: Alien invasive vegetation observed adjacent to the proposed Natashana road mainly within the riparian zone of the Mtwalume River and adjacent drainage lines A: Durban Guava (*Psidium X durbabanensis**) Category 1 Weed; **B:** Mauritius Thorn (*Caesalpinia decpetala**) Category 1 Weed; **C:** Lantana (*Lantana camara**) Category 1 weed; **D:** Mexican Sunflower (*Tithonia diversifolia**) Category 1 Weed; **E:** Yellow-flowered Mexican Poppy (*Argemone mexicana**) Category 1 Weed**; F:** Castor-Oil Plant (*Ricinnus communis**) Category 2 Invader; **G:** Peanut Butter Cassia (*Senna didymobotrya**) Category 1 Invader; **H:** Ageratum (*Ageratum conyzoides**) Category 1 Weed; **I:** Giant Sensitive Tree (*Mimosa pigra**) Category 3 Invader; **J:** Sisal Hemp (*Agave sisalana**) Category 2 Invader and **K:** Giant Reed (*Arundo donax*[*]*) Category 1 Weed.

[*] alien invasive vegetation

4. PRELIMINARY FAUNAL SURVEY

The preliminary faunal survey focused mainly on mammals, birds, reptiles and amphibians of the study area. The survey focused on the current status of threatened animal species occurring, or likely to occur within the study area, describing the available and sensitive habitats, identifying potential impacts resulting from the development and providing mitigation measures for the identified impacts. Faunal data was obtained during a single site visit of the proposed development site carried out on foot on the 30th of April 2013.

All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. Previous surveys, literature investigations; personal records and historic data supplemented the initial survey. The literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description. *The Mammals of the Southern African Subregion* (Skinner & Chimiba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) for mammals. *Roberts-Birds of Southern Africa VIIth ed.* (Hockey, Dean and Ryan (editors); 2005) and *The Escom Red Data Book of Birds of South Africa* (Barnes,2000) for avifauna (birds). A Complete Gudie to the Frogs of Southern Africa (du Preez & Carruthers 2009) and the *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter et al. 2004) for amphibians. *The Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book- Reptiles and Amphibians* (Branch 1988) for reptiles.

The majority of vegetation adjacent to the proposed upgraded Ntashana access road comprises of secondary succession *Aristida junciformis* grasslands with disturbed areas dominated by extensive thickets of alien invasive vegetation. The adjacent hillslope grasslands suffer from extensive overgrazing, mostly from goats and cattle. Cattle were observed grazing within the hillslope as well as foot-slope seepage wetlands. Their grazing and trampling can encourage thicket growth by several alien invasive species including Mauritius Thorn (*Caesalpinia decpetala**), Mexican Sunflower (*Tithonia diversifolia**) as well as *Dichrostachys cinerea* by reducing grass cover. However, the opportunistic feeding patterns of goats can have a severe impact on both the composition and productivity of this ecoregion. In addition, goats are known to be more destructive than cattle at higher stocking densities (Skead 1988).

High livestock densities also pose considerable threat to wildlife, since high numbers of domesticated animals generally cause a displacement of game, as there is less suitable habitat available. Furthermore, wild predators and scavengers such as the Black-backed Jackal, Caracal, Leopard and the Cape vulture have been eradicated by livestock farmers who see these animals as a threat to their livelihoods. Poisoned carcasses are often used for this purpose; this method is indiscriminate and therefore poses considerable threat to all predators and scavengers; especially the threatened Cape Vulture. Poaching and illegal hunting (dogs) are further reducing the remnant faunal populations.

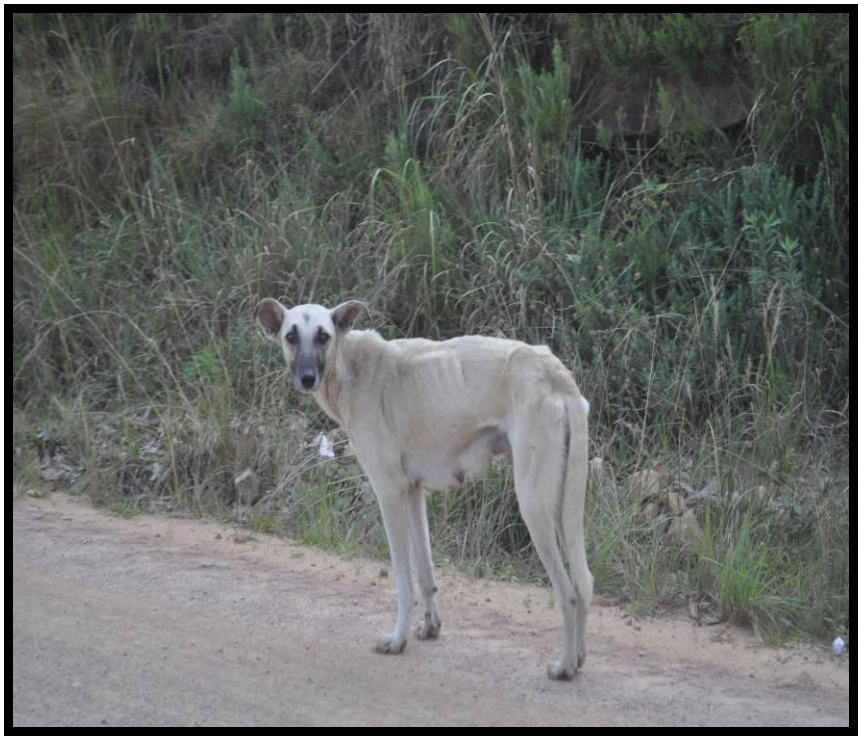

Figure14. Several dogs were observed around the rural homesteads and are used for hunting.

Existing Impacts on the fauna on and surrounding the site included:

- The proposed upgraded Ntashana access road is situated mainly within the reserves of an existing road which are dominated by completely transformed vegetation dominated by alien invasive thickets with limited habitat diversity or impoverished habitats.
- High levels of human disturbances associated with the existing homesteads and habitat degradation and transformation due to historic and present agricultural activities as well as wood harvesting. This has resulted in impoverished habitats with limited faunal diversity.
- Existing villages, agricultural as well as informal access roads and pedestrian and livestock pathways occur around the site.
- Previous terraced agricultural activities (oldlands) have transformed the majority of grassland habitat on the hillslopes.
- Extensive overgrazing by livestock (especially cattle and goats) result in limited vegetative or grass cover or refuge habitat for remaining faunal species.
- Limited vegetative layer leads to accelerated erosion especially along the livestock pathways as well as along the drainage lines
- Frequent burning of remaining patches of grasslands severely restricts vegetative cover and potential refuge habitat for remaining faunal species.
- Hunting with dogs as well as feral cats around the villages. Dogs and cats have a high impact on remaining faunal species.
- Introduction of extensive stands of exotic and alien invasive vegetation especially along current road, bulk water servitudes as well as degraded drainage lines.

4.1 AMPHIBIANS

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Amphibians have declined dramatically in many areas of the world. These declines seem to have worsened over the past 25 years and amphibians are now more threatened than either mammals or birds, though comparisons with other taxa are confounded by a shortage of reliable data. Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment.

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in the Kwazulu-Natal Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles. As the survey was undertaken for only 1 day during the late summer months (April), only a small proportion of species are present. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (November-Mach). It is only during this period that accurate frog species lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records; data from the South African Frog Atlas Project (SAFAP)(1999-2003) and published data, and the list provided below is therefore regarded as likely to be fairly comprehensive. Nineteen (19) frog species have been recorded from the 3030 BB quarter degree grid square according to Frogmap (http://sarca.adu.org.za/safap/index.php)

The current road alignment bisects a narrow poorly defined non-perennial drainage line. No evidence of the seasonal ponding of water due to the steep topography. The affected stretch of the riparian zone of the Mtwalume River has become degraded with limited habitat diversity. Deterioration of water quality is expected in the stream due to the surrounding activities including increase in deposition of silt and sedimentation as well as increased nutrients (faecal contamination from humans as well as livestock) which results in increased aquatic macrophytes (reeds). Three frog species were recorded during the brief field survey namely Striped Stream Frog (*Strongylopus fasciatus*), Common River Frog (*Amietia angolensis*) and Clicking Stream Frog (*Strongylopus grayii*).

Table1. Frog species recorded on the actual site or are likely to occur on the site.

Common Name	Scientific Name	Status and Distribution	Habitat
Guttural Toad	*Amitophrynus* (*Bufo*) *gutturalis*	Common in southern Africa north of Gariep.	Permanent and semi-permanent ponds and backwaters in open grassland.
Natal Tree Frog	*Leptopelis natalensis*	Common in Kwazulu-Natal	Permanent and Seasonal ponds situated in coastal forest, sand forest or coastal bushveld and occasionally grassland
Painted Reed Frog	*Hyperloius marmoratus marmoratus*	Common in Kwazulu-Natal	Permanent or semi-permanent bodies of water, natural or man-made.
Common Platanna	*Xenopus laevis*	Common throughout southern Africa.	Permanent or semi-permanent bodies of water, natural or man-made.
*Common River Frog	*Amietia* (*Afrana*) *angolensis*	Common in central and southern Africa.	Permanent standing water and streams in grassland and open woodland.
Snoring Puddle Frog	*Phrynobatrchus natalensis*	Widely distributed along the eastern sections of Southern Africa	Shallow to fairly deep water in temporary pans and pools, vleis, dams and even slow-flowing streams
Bubbling Kassina	*Kassina senegalensis*	Common throughout Southern Africa	Grassy margins of seasonally inundated pans as well as dams
Striped Stream Frog	*Strongylopus fasciatus*	Common throughout Southern Africa	Grassy margins of seasonally inundated pans as well as rivers.
Clicking Stream Frog	*Strongylopus grayii*	Common throughout Southern Africa	Grassy margins of seasonally inundated pans as well as rivers.

Figure15. **Frog species recorded or likely to occur around the proposed road alignment include**: **A:** Natal Tree Frog (*Leptopelis natalensis*) occur within the wooded gorges; **B:** Painted Reed Frog (*Hyperolius marmoratus marmoratus*) along the Mtwalume River; **C:** Common River Frog (*Amietia angolensis*) along the Mtwalume River and perennial drainage lines **D**: Bublling Kassina (*Kassina senegalensis*) foot-slope seepage areas adjacent to Mtwalume River. Photographs are not of individuals observed during site visit.

THREATENED SPECIES

Three red listed frog species are known from the 3030 BB Quarter Degree Grid Cell (QDGC) in which the Ntashana Road is situated in. These included the Critically Endangered Pickersgill's Reed Frog (*Hyperolius pickersgilli*); the Endangered Natal Kloof Frog (*Natalobatrachus bonebergi*) and the near-threatened Natal Leaf-Folding Frog (*Afrixalus spinifrons*).

Pickersgill's Reed Frog *Hyperolius pickersgilli*

Geographic Range:

This species is endemic to the coast of KwaZulu- Natal, ranging from Warner Beach in the south to St. Lucia village in the north. It is found within 20 km of the coast up to 380 m a.s.l. Although the extent of occurrence (EOO) is 2 303 km^2, the area of occupation (AOO) has been calculated to be only 9 km^2.

Population:

The spatial distribution of this species is considered to be severely fragmented as >50% of individuals are in small and isolated patches and >50% of subpopulations are considered nonviable. It is secretive and so is under-recorded, but appears to be a rare species.

Habitat and Ecology:

It is a species of coastal mosaic bushland and grassland, breeding in stagnant, usually temporary to semi-permanent water, rarely exceeding 50 cm in depth, surrounded by dense sedges. It is seldom found at the same breeding sites as the abundant *Hyperolius marmoratus*.

Major Threats:

It is confined to a small area subject to urbanisation, habitat fragmentation, afforestation, and drainage for agricultural and urban development. Some breeding sites are being polluted by DDT, which is used for controlling malarial mosquitoes. The spread of alien vegetation, in particular Eucalyptus species, is responsible for the drying out of some breeding sites.

Conservation Actions:

Obtaining accurate information on threats was given the highest priority on conservation research for this species. Determining the status of all sites and estimating population size also receive high research priorities. Research is still required to determine population sizes, life history and ecology (in particular dispersal potential), followed by appropriate monitoring of both population and habitat. In addition, land owner agreements need to be drawn up for protection and management of all sites for conservation management. This species occurs in the iSimangaliso Wetland Park, the Umlalazi Nature Reserve, and the Twinstreams-Mtunzini Natural Heritage Site.

Listed as **Critically Endangered** B2ab (ii,iii) in view of its small AOO of 9 km2, with its distribution being severely fragmented, and a continuing decline in the quality of its habitat and AOO (Measey *et al.* 2011).

Natal Kloof Frog: *Natalobatrachus bonebergi* Hewitt & Methuen, 1912

Geographic Range:

South Africa (Eastern Cape, KwaZulu-Natal). This species is restricted to south-eastern South Africa, where it ranges from Dwesa Nature Reserve in the Eastern Cape east to southern and central KwaZulu-Natal. Its EOO has been estimated as 15 000 km^2, with an AOO of approximately 1% of the EOO (150 km2 and declining). It occurs in nine locations, all between 50 and 900 m asl.

Population:

Little population information is available for this species. It is considered to be severely fragmented as >50% of individuals are in isolated patches and the distances between subpopulations are considered to be too great for dispersal within one generation.

Habitat and Ecology:

It lives in coastal forests and gallery forests, where it is usually found along streams and does not survive in open areas. It breeds in streams, hanging its eggs above water on branches, and sometimes on rock faces. The larvae fall into the water where they develop.

Major Threats:

Much of the forest habitat of this species has been lost to sugar cane cultivation and other agriculture, woodcutting, afforestation and urbanisation. It is also threatened by pollution and siltation of streams.

Conservation Actions:

A priority for conservation research is to estimate the population size of adults in subpopulations, as well as determining the cause of direct threats. Obtaining a memorandum of understanding with land owners is also of high priority. It occurs in several protected areas, including Umtamvuna Nature Reserve and Oribi Gorge Nature Reserve. However, additional habitat and waterway protection is required.

NATAL LEAF-FOLDING FROG (*AFRIXALUS SPINIFRONS*)

Geographic Range:
This species, which is endemic to South Africa, occurs as two subspecies: *A. s. spinifrons* occurs in the KwaZulu-Natal lowlands, and the Eastern Cape coast of South Africa at low to intermediate altitudes; *A. s. intermedius* occurs at altitudes above 1 000 to around 1 500 m a.s.l. in western KwaZulu-Natal between the midlands and foothills of the Drakensberg. The extent of occurrence (EOO) is around 19 000 km², and the area of occupation (AOO) is estimated to be 10% of this (Measey *et al.* 2011).

Population:
This species is hard to detect but it is known to be doing well at some sites where it appears abundant. Regional declines have been observed within the Kwazulu-Natal South Coast especially in the Port-Edward to Palm Beach area (pers. obs.)

Habitat and Ecology:
It is associated with low vegetation in shrubland and dry forest. It breeds in vleis (including dams) and temporary pools and pans (including roadside pools) and uses emergent vegetation to create egg nests. Species in this genus deposit between 20 and 50 eggs on vegetation above the water. Tadpoles emerge, drop into the water and remain there until metamorphosis (Measey *et al.* 2011).

Major Threats:
Certain subpopulations are affected by loss of wetlands through urban and recreational development, afforestation, agricultural expansion, pesticides, and overgrazing by livestock. Coastal populations (i.e. *A. s. spinifrons*) may be at higher risk than those inland due to heavier development pressure along the KwaZulu-Natal coastline (Measey *et al.* 2011).

Conservation Actions:
Determining whether the two subspecies are separate species is a high conservation research priority for this species, and the entire genus in South Africa is in need of taxonomic attention. Insufficient information exists on life history of the subspecies, and monitoring of breeding sites is recommended at the extremes of the distribution. Although there are many threats to individual sites, the species as a whole is not considered to require conservation effort at this time. *Afrixalus s. intermedius* occurs in the uKhahlamba-Drakensberg National Park. *Afrixalus s. spinifrons* occurs in a number of coastal protected areas.

Listed as **Near Threatened** as although its EOO is 19 000 km², its AOO is less than 1 900 km², and there is continuing decline in the quality of its habitat, there are 11 locations and the spatial distribution of this species is not considered to be severely fragmented. However, certain sites where this species occurs do have a large

number of different threats which may seriously impact on population viability in future. Loss of certain sites could easily result in less than 10 locations triggering the criteria for Vulnerable status (Measey *et al.* 2011).

No suitable habitat occurs for both Pickersgill's Reed Frog (*Hyperolius pickersgilli*) and Kloof Frog (*Notalobtarchus bonebergi*) within and around the proposed Ntashana access road. Marginally suitable habitat remains to the north of the site for Natal Leaf-folding Frog (*Afrixalus spinifrons*) in the dense sedge beds and inundated grassy valley bottom wetlands with abundant surface vegetation. At higher altitudes it inhabits marshes, dams, floodplains and riverbanks (Lambiris 1989; Pickersgill 1996). During the day Leaf-folding frogs are often found in the leaf axils of grasses, rushes and arum lilies; particularly those standing in or immediately adjacent to water. No suitable habitat remains within the proposed bridge crossing site for Natal Leaf-Folding Frog.

4.2 REPTILES

All reptile species are sensitive to major habitat alteration and fragmentation. As a result of human presence in the area as well as on the site; coupled with habitat destruction and high levels of disturbances, alterations to the original reptilian fauna are expected to have already occurred. Removal of large riparian tree species from the Mtwalume riparian zone as well as adjacent drainage lines and dead trunks for firewood collection destroys numerous habitats for many arboreal reptile species. Clearing of rock material for terraced agricultural lands destroys vital habitat for numerous rupicolous reptile species including the Agamids, Cordylids, Geckonids and Skinks. The majority of snake species hibernate in old tree trunks, termite mounds or under suitable rocks. No major rupicolous outcrops or rock sheets were observed around the proposed road alignment although the road does bisect a small low-lying rocky extrusion adjacent to the drainage line. Rocky cliffs and outcrops were observed around the proposed road. No major termite mounds were observed along the proposed alignment.

Indiscriminate killing of snake species occur all around human settlements. The indiscriminate killing of all snake species results in the alteration of species composition, with the disappearance of the larger and the more sluggish snake species. Five reptile species were recorded during the survey, namely a Spotted Bush Snake (*Philothamnus semivariegatus*), Flap-necked Chameleon (*Chamaeleo dilepis*), Wahlberg's Snake-eyed Skink (*Panaspis wahlbergii*), Yellow-throated Plated Lizard (*Gerrhosaurus flavigularis*), Striped Skink *Trachylepis* (*Mabuya*) *punctatissima* and a Variable Skink *Trachylepis* (*Mabuya*) *varia*. Low reptile diversity is expected from the actual Ntashana road alignment and immediate adjacent areas.

The adjacent wooded gorges and ravines offer favourable habitat for several arboreal reptiles species including chameleons, Southern Tree Agamids etc. A probable species list is provided in Table2 below.

Table2: Reptile species that occur or are likely to occur in the study area due to suitable habitat, and may therefore be present. Actual species lists will most likely contain far fewer species due to high levels of habitat transformation.

COMMON NAME	**SCIENTIFIC NAME**
Cape Skink	*Trachylepis* (*Mabuya*) *capensis*
*Striped Skink	*Trachylepis* (*Mabuya*) *punctatissima*
*Variable Skink	*Trachylepis* (*Mabuya*) *varia*
Marsh or Helmeted Terrapin	*Pelomedusa subrufa*
*Yellow-throated Plated Lizard	*Gerrhosaurus flavigularis*
Flap-Necked Chameleon	*Chamaeleo dilepis*
Nile Monitor	*Varanus niloticus*
Southern Rock Agama	*Agama atra atra*
Herald or Red-lipped Snake	*Crotaphopeltis hotamboeia*
Rinkhals	*Haemachatus haemachatus*
Common or Rhombic Night Adder	*Causus rhombeatus*
Boomslang	*Dispholidus typus*
Puff Adder	*Bitis arietans*
Common or Rhombic Egg Eater	*Dasypeltis scabra*
Dusky-Bellied Water Snake	*Lycodonomorphus laevissimus*

Brown Water Snake	*Lycodonomorphus rufulus*
Brown House Snake	*Lamprophis fuliginosus*
Spotted House Snake	*Lamprophis guttatus*
Aurora House Snake	*Lamprophis aurora*
Cape Wolf Snake	*Lycophidion capense*
Spotted or Rhombic Skaapsteker	*Psammophylax rhombeatus*
Striped Skaapsteker	*Psammophylax tritaeniatus*
Cape Centipede Eater	*Aparallactus capensis*
Spotted Bush Snake	*Philothamnus semivariegatus*
Spotted Harlequin Snake	*Homoroselaps lacteus*
Sundevall's Shovel-snout	*Prosymna sundevalli*
Green Water Snake	*Philothamnus hoplogaster*
Sundevalls' Garter Snake	*Elapsoidea sunderwalli*
Common Slug-eater	*Duberria lutrix*
Bibron's Blind Snake	*Typhlops bibronii*
Cape and Eastern Thread Snake	*Leptotyphlops conjunctus*
Peters' Thread Snake	*Leptotyphlops scutifrons*

*** recorded during brief field survey**

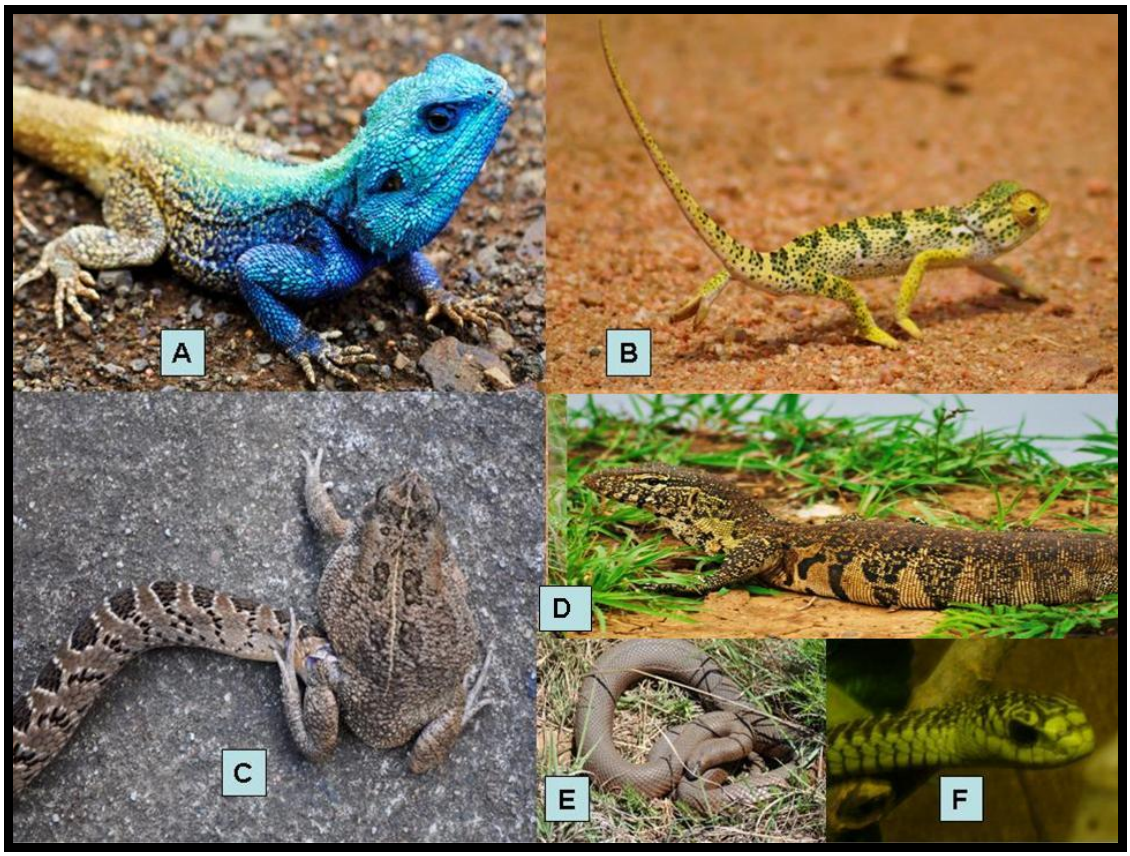

Figure16. A conglomerate of photographs displaying the reptile species likely to occur in suitable habitat around the proposed Ntashana Road. A: Southern Tree Agama (*Acanthocercus atricolis*), **B:** Flap-necked Chameleon (*Chamaeleo dilepis*), **C:** Rhombic Night Adder (*Causus rhombeatus*) feeding on a Guttural Toad (*Amietophrynus gutturalis*), **D:** Female Rainbow or Five-Lined Skink (*Trachylepis margaritifer*), **E:** Mole Snake (*Pseudaspis cana*) and **F:** Boomslang (*Dispholidus typus*)

Threatened Species

Table3. Red data reptile species which have been recorded or suitable habitat exists on the site and immediate adjacent areas.

Common Name	Scientific Name	SA Red Data Status	IUCN STATUS
Southern African Python	*Python natalensis*	Vulnerable	*Vulnerable

*It is unlikely that pythons will retain this threat classification when reassessed using the latest IUCN criteria, since it appears to be relatively common in certain areas and has a widespread distribution (Alexander and Marais 2007).

Southern African Python *(Python natalensis)*

The Southern African Python (*Python natalensis*) is protected in South Africa (SA RDB, Vulnerable) and their numbers have declined due to habitat destruction, killed for their skins (fashion), 'muti', illegally collected for pets and the pet industry. The majority of pythons are indiscriminately killed due to fear and ignorance or due to road fatalities.

Habitat and Ecology: Pythons live in a wide variety of habitats, but are most common in moist, rocky, well-wooded valleys. They are frequently found in and around water, in which they bask and ambush food. They are also excellent climbers. They hunt mainly at night or in the twilight, but can also be found basking, and occasionally even hunting during the day. The diet of juveniles consists mainly of small rodents and ground living birds, although they will also take fish and water or nile monitors (leguaans). The adults feed mainly on medium-sized mammals, including dassies, hares, cane rats, duikers, etc. The larger specimens will take larger mammals, and there are accurate, and often graphically illustrated, reports of Southern African Pythons killing and swallowing very large prey items. The largest recorded prey item for any large constrictor is that of a 59 kg impala swallowed by a 4.88 m African python (Rose, 1955). Other records include, among many others, a 6 m python consuming 6 goats (Taylor, 1981), a 5 m python that ate a pointer watchdog and two of her puppies (Jensen, 1980), and a 4.28 m python devouring a six-month old female impala (illustrated in Branch, 1984). F. W. Fitz Simons (1930) even records pythons killing leopards, and a python constricting a crocodile is illustrated in Halliday and Adler (1986).

The python is the only African snake large enough to consider humans edible, albeit very rarely. There are a number of anecdotal reports of human predation by pythons. In addition to the dangers of constriction, pythons have a mouthful of large, recurved and needle-sharp teeth that can deliver a powerful and lacerating bite. Adults are also irascible, and rarely settle well into captivity.

Man is now the python's main predator, killing them for food, 'muti', skins and, short-sightedly, to rid himself of a 'pest'. Other enemies include crocodiles, honey badgers or ratels, mongoose and meerkats, etc. Pienaar, *et al.* (1983) record a young python (825 mm) in the stomach of a Cape File snake. Pythons are often killed crossing roads, and when engorged with food they are especially vulnerable to attacks by packs of wild dogs and hyaenas.

Many African tribes prize python fat and skin for use in tribal medicines and witchdoctor's 'muti', whilst a large python represents a tasty and substantial food item (see photograph in Patterson and Bannister, 1987). All pythons, but particularly juveniles, are desired by the pet trade, and would find a ready market if not protected by law. Pythons are frequently electrocuted on the lower wires of electric fences which are erected around the increasing number of game farms.

No Southern African Pythons or evidence of pythons was observed during the brief field survey. Remaining Python populations would have been impacted on during the previous agricultural activities as well as adjacent rural/agricultural activities and associated high levels of disturbance. The Mtwalume River and associated riparian zone as well as drainage lines could potentially act as an important dispersal or biological corridors as well as foraging areas for remaining pythons; especially dispersing juvenile pythons. If any pythons are discovered on the site the relevant conservation authorities should be informed and the python relocated in suitable habitat away from the site. It is regarded as unlikely that study area comprises critical habitat for Southern African Pythons, at a global or provincial scale, or that the proposed upgrading and new 2km section of the Ntashana road, will have an impact of more than **low significance** on the conservation status of this specie should it indeed occur.

No threatened reptile species are likely to occur on the site or the immediate open areas surrounding the site due to extensive habitat transformation and degradation. Low reptile diversity is expected around the majority of the proposed upgraded Ntashana access road alignment due to extensive habitat destruction and low diversity within the degraded *Aristida junciformis* hillslopes.

4.3 AVIFAUNA/BIRDS

Thirty-four (34) bird species were recorded during the brief field survey (total 8 hours). Species recorded during the field survey are common, widespread and typical of a grassland/woodland environment. The majority of bird species were recorded along the wooded gorges. High levels of human disturbance as well as habitat transformation and degradation on the site and surrounding the wooded pockets as well as grassland hillslopes results in the disappearance of the more secretive or sensitive bird species.

Table 3: Bird species recorded during brief field survey (8 hrs).

Roberts' Number	Common name	Scientific Name
94	Hadedah Ibis	*Bostrychia hagedash*
169	African Harrier-Hawk	*Polyboroides typus*
196	Natal Spurfowl	*Pternistis natalensis*
203	Helmeted Gunieafowl	*Numida meleagris*
297	Spotted Thick-Knee	*Burhinus capensis*
352	Red-Eyed Dove	*Stretopelia semitorquata*
354	Cape Turtle Dove	*Streptopelia capicola*
355	Laughing Dove	*Streptopelia senegalensis*
361	African Green-Pigeon	*Treron calvus*
371	Purple-Crested Turaco	*Gallirex porphyreolophus*
386	Diederick Cuckoo	*Chrysoccocyx caprius*
391	Burchell's Coucal	*Centropus burchellii*
411	Common Swift	*Apus apus*
417	Little Swift	*Apus affinis*
424	Speckled Mousebird	*Colius striatus*
435	Brown-Hooded Kingfisher	*Halycon albiventris*
455	Trumpeter Hornbill	*Bycanistes bucinator*
464	Blackcollared Barbet	*Lybius torquatus*
470	Yellow-Fronted Tinkerbird	*Pogoniulus chrysoconus*
473	Crested Barbet	*Tracchyphonus vailantii*
541	Fork-Tailed Drongo	*Dicrurus ludwigii*
545	Black-Headed Oriole	*Oriolus larvatus*
548	Pied Crow	*Corvus albus*
568	Dark-capped (Black-eyed) Bulbul	*Pycnonotus barbatus*
577	Olive Thrush	*Turdus olivaceus*
736	Southern Boubou	*Laniarius ferrugineus*
750	Olive Bush-Shrike	*Telophorus olivaceus*
758	*Common Myna	*Acridothermes tristis*
796	Cape White-Eye	*Zosterops pallidus*
801	*House Sparrow	*Passer domesticus*
814	Masked Weaver	*Ploceus velatus*
815	Lesser Masked Weaver	*Ploceus intermedius*
824	Red Bishop	*Euplectes orix*
846	Common Waxbill	*Estrilda astrild*

Threatened species

Several threatened bird species have been recorded in the grid square within which the study area is situated including Crowned Eagle, Half-collared Kingfisher, Spotted Ground Thrush and Grey Crowned Crane. One red listed bird species has been recorded from the 3020_3020 pentad in which the proposed road is situated namely a single sighting of a Grey Crowned Crane. No threatened bird species were recorded during the brief survey or are likely to occur around the proposed upgraded Ntashana access road alignment due to high levels of habitat transformation and degradation as well as human disturbances.

4.4 MAMMALS

No small mammal trapping was conducted. Fieldwork was augmented with previous surveys in similar habitats as well as published data. The area was initially traversed on foot to ascertain the presence of available refuges. Limited suitable refuges such as burrows, artificially created rock piles, stumps were observed. The majority of mammal species likely to occur around the homesteads are urban exploiters such as the House Rat and House Mouse as well as feral cats. Several mounds of the African Molerat as well as burrows on the Natal Multimammate Mouse were observed in the sandier sections adjacent to the current soccer field. Evidence of Water Mongoose (Latrine) was observed upstream from the proposed bridge crossing site as well as Common Duiker, Cape Procupine and Bush Buck within the wooded pockets adjacent to the Mtwalume River. Vervet Monkeys were observed foraging adjacent to the perennial drainage line or stream. Several slender Mongooses were observed crossing the Ntashana access road. Mammal species recorded within the study area as well as those that may occur within the study area, on the basis of available distribution records and known habitat requirement, are included in the Table 4 below.

Table 4: Mammal species recorded during field survey. Species in bold were recorded during the brief survey Identification was determined by visual observations and animal tracks (footprints and droppings).

COMMON NAME	*SCIENTIFIC NAME*
Common Molerat	***Cryptomys hottentotus***
Natal Multimammate Mouse	***Mastomys natalensis***
Scrub Hare	*Lepus saxtalis*

Striped Mouse	*Rhabdomys pumilio*
Grey Climbing Mouse	*Dendromus melanotis*
Brant's Climbing Mouse	*Dendromus mesomelas*
Highveld Gerbil	*Tatera brantsii*
***House mouse**	***Mus musculus***
***House Rat**	***Rattus rattus***
***Domestic Dog**	***Canis familiaris***
***Feral Cat**	***Felis catus***
Common Duiker	***Sylvicapra grimmia***
Bushbuck	***Tragelaphus scriptus***
Vervet Monkey	***Cercopithecus aethiops pygerythrus***
Water Mongoose	***Atilax paludinosus***
Cape Clawless Otter	*Aonyx capensis*
Slender Mongoose	***Galarella sanguinea***
Striped Polecat	*Ictonyx striatus*
Large-spotted Genet	*Genetta tigrina*
Porcupine	***Hystrix africaeaustralis***

* introduced species

THREATENED SPECIES

No sensitive or endangered mammals were recorded within the study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area during the previous commercial developments. This is mainly a result of increased development pressure and human disturbances such as hunting and poaching (wire snares), as well as habitat alteration and degradation by vegetation clearance and frequent fires. Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats. It is highly unlikely that the proposed Ntashana road alignment constitutes significant habitat for any species of threatened mammal species.

CONCLUSION

The present Ntashana access road and proposed 2km new alignment are dominated by completely transformed habitats and surrounded by historic terraced agricultural lands dominated by *Aristida junciformis* secondary succession grasslands. The drainage lines are heavily degraded and dominated by anthropogenic grasses and pioneer weedy plant species and invaded by alien invasive plant species. The secondary succession grasslands adjacent to the alignment provides limited suitable habitat for certain rodent species such as the Highveld Gerbil, House Rats (villages) as well as Multimammate Mouse. Rodents construct burrows in the sandy soils and attract other predators such as the Slender Mongoose. Bird species around the alignment are restricted to granivorous or seed eating birds such as Laughing Dove, Cape Turtle Dove. The majority of bird species recorded during the site visit were observed in the remnant pockets of indigenous woodland patches away from the road alignment as well as along the Mtwalume River. Reptile species are extremely sensitive to habitat destruction and transformation. Low reptile diversity is expected within the existing Ntashana road reserve and proposed alignment. Species recorded during the brief field assessment included Striped Skink (*Trachylepis punctassissima*), Variable Skink (*Trachylepis varia*) and Yellow-throated Plated Lizard (*Gerrhosaurus flavigularis*). Low amphibian diversity is expected along the drainage lines due to extremely limited habitat diversity (no seasonal pools) as well as habitat degradation. Limited suitable breeding habitat occurs within the affected section of the Mtwalume River bridge crossing site. The Mtwalume River and perennial drainage lines or streams offers suitable habitat for certain frog species including Common River Frogs (*Amietia angolensis*). A comprehensive rehabilitation programme for the gully erosions adjacent to the access road as well as alien invasive plant removal programme along the current Ntashana road reserve needs to be implemented immediately.

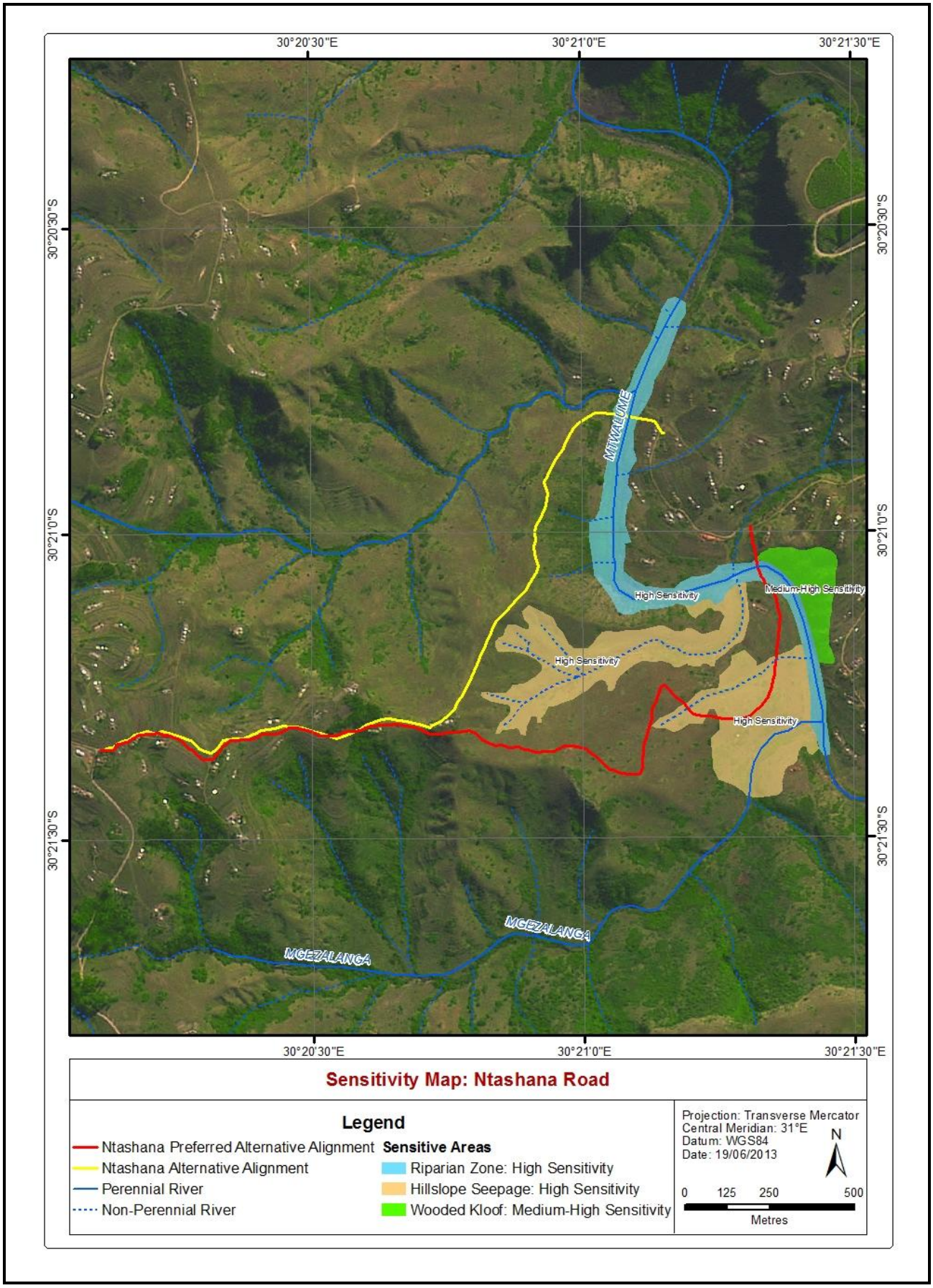

Figure17. Preliminary sensitivity map for the proposed Ntashana access road.

5. SENSITIVE HABITATS

5.1 MTWALUME RIVER AND DRAINAGE LINES

The perennial Mtwalume River and adjacent drainage lines/streams are considered to be of conservation importance for the following reasons:

- The indigenous vegetation of riverine wetlands within Kwazulu-Natal, and wetlands in general throughout the Grassland Biome, is in danger of being completely replaced by alien invasive species (Henderson & Musil 1997, Rutherford & Westfall 1994). Any remaining areas of indigenous riparian vegetation or marshland vegetation within Kwazulu-Natal must therefore be regarded as of high conservation importance.
- Rivers and drainage lines are longitudinal ecosystems, and their condition at any point is a reflection of not only upstream activities, but also of those within adjacent and upstream parts of the catchment (O'Keefe 1986). Any impact on the riverine area within the study area is therefore also likely to impact on upstream and downstream areas.
- Riparian zones have the capacity to act as biological corridors connecting areas of suitable habitat in birds (Whitaker & Metevecchi, 1997), mammals (Cockle & Richardson 2003) reptiles and amphibians (Maritz & Alexander 2007). Riparian zones may act as potential refugia for certain fauna and could allow for possible re-colonisation of rehabilitated habitats. The riparian vegetation plays a vital role in the re-colonisation of aquatic macro-invertebrates as well as reptiles and amphibians (Maritz & Alexander 2007). The riparian vegetation provides vital

refuge, foraging and migratory passages for species migrating to and away from the rivers. The riparian zone comprises plant communities contiguous to and affected by surface and subsurface hydrological features of perennial or intermittent water bodies (rivers and streams).

- The riparian vegetation is dependant on the river for a number of functions including growth, temperature control, seed dispersal, germination and nutrient enrichment. Riparian vegetation comprises a distinct composition of species, often different from that of the surrounding terrestrial vegetation. Tree species are positioned according to their dependence or affinity for water, with the more mesic species (water-loving) being located closest to the river channel, often with their roots in the water, and the less water-loving terrestrial species further away from the river.

The riparian zone, of which vegetation is a major component, has a number of important functions including:

- enhancing water quality in the river by the interception and breakdown of pollutants;
- interception and deposition of nutrients and sediments;
- stabilisation of riverbanks and macro-channel floor;
- flood attenuation;
- provision of habitat and migration routes for fauna and flora;
- provision of fuels, building materials and medicines for communities (if done on a sustainable basis); and
- recreational areas (fishing - rod and line not shade or gill nets; bird watching; picnic areas etc.).

Table5. Proposed drainage line and Mtwalume River Crossings

Ntashana Road Crossings	GPS Co-ordinates of Crossing	
Syzigium cordatum crossing	30°21’17.49” S	30°21’11.73”E
Tributary 1 crossing	30°21’13.67” S	30°21’113.66”E
Tributary 2 crossing	30°21’17.49” S	30°21’11.73”E
Mtwalume River Crossing	30°21’03.79” S	30°21’19.61”E

Figure18. The proposed Ntashana road bisects a poorly defined narrow non-perennial drainage line (red line indicates proposed crossing).

Figure19. The current Ntashana road alignment (30°21'17.49" S 30°21'11.73" E) will result in the destruction of two large Umdoni or Waterberries (*Syzigium cordatum*) which occur along a narrow, poorly defined non-perennial drainage line. The road alignment should be re-aligned approximately 10m to the west in order to conserve these two trees.

5.2 HILLSLOPE AND FOOTSLOPE SEEPAGE WETLANDS

- Wetlands are characterized by hydric soils and slow flowing water and tall emergent vegetation, and provide habitat for many plant and animal species. The conservation status of many of the threatened plant and animal species that are dependant on wetlands reflects the critical status of wetland nationally, with many having already been destroyed.
- Indigenous marshland vegetation such as that found within the valley bottom wetlands in the study area comprises a habitat which is restricted in extent, highly productive and which contains a high diversity of plants and animals, many of which are restricted or heavily dependant on such habitat.
- The conservation status of many of the faunal species that are dependant on wetlands reflects the critical status of wetland nationally, with many having already been destroyed. In this study area wetlands, including seasonal seepage wetlands are important habitats for several faunal species. All remaining wetlands (permanent and seasonal) and their associated indigenous grassland and sedge dominated vegetation must be considered as sensitive habitats.

The proposed Ntashana road bisects temporary inundated or moist *Aristida junciformis* hillslope seepage wetlands adjacent to the southern non-perennial drainage line. The Ntashana road bisects a narrow poorly defined non-perennial drainage line (see Table 7) as well as degraded footslope seepage wetlands. These areas have been heavily impacted on by surrounding anthropogenic activities including sand harvesting, ploughing of soils for small scale terraced agricultural lands as well as extensive rill erosion from livestock pathways and alien vegetation invasion.

MANAGEMENT RECOMMENDATIONS

The following mitigation measures for the proposed Mtwalume Bridge crossing are provided as guidelines:

- Ideally the proposed bridge should span the entire active channel of the Mtwalume River and the bridge supports should be situated outside the macrochannel banks.
- Construction activities of the Mtwalume bridge should be scheduled to take place during low flow periods when as little of the construction site and exposed sediment is in contact with the flow as possible.
- The original geometry, topography and geomorpholgy in both cross-sectional and longitudinal profile should be reinstated at, above and below the Mtwalume bridge crossing.
- Appropriate mitigatory measures for controlling sediment input into the Mtwalume River will be required during the construction phase. The use of hay bales packed in rows across diversions and active flow areas during construction may be one way of limiting sediment inputs. They also help to buffer the pH. The bales will need to be removed and disposed of after construction. Other alternative methods of controlling sediment should also be considered such as sediment fences etc.
- All coffer dams, causeway and construction materials should be removed from the Mtwalume River and riparian zone immediately after construction of the bridge is completed.
- All building material must be removed from the site.
- Where necessary and according to risks in terms of bank erosion, gabions or storm water control structures should be used to disperse storm water flows and prevent further macro-channel bank erosion. Appropriate gabion structures or gabion mattresses should be installed to prevent further macro-channel bank erosion. This is especially pertinent to the heavily eroded and unstable left hand macro-channel bank (looking upstream).
- Where necessary and according to slope and risks in terms of bank erosion, disturbed areas of the macro-channel/riparian zone should be re-vegetated using either a specified seed mix and/or appropriate indigenous trees (see attached list).
- Where appropriate, large individual indigenous riparian trees should be avoided during construction and should be marked on site. This includes the two large Waterberry (*Syzigium cordatum*) adjacent to the proposed southern non-perennial drainage line crossing. No large riparian tree species will be removed from the proposed Mtwalume River crossing site.
- The existing environmental management plan, should be audited during construction, and monitored for a period thereafter, until full rehabilitation is assured and stability demonstrated.

6: ENVIRONMENTAL MANAGEMENT RECOMMENDATIONS

6.1 HABITAT DESTRUCTION AND ASSOCIATED DISTURBANCES TO REMAINING FAUNAL SPECIES

During the construction phase of the proposed Ntashana road upgrading, some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of the road servitudes. As the majority of the preferred alignment occurs within existing road servitudes as well as in transformed habitats (old and current agricultural lands) extremely limited vegetation clearance will be required during the construction and operational phase of the project. Vegetation clearance will be restricted to the alien invaded and secondary grassland road reserve. These activities will have an impact on the associated fauna especially ground living and fossorial species occurring along or in close proximity of the servitude, both through modification of habitat and disturbance caused by human activity. The proposed impact will be of **medium to low; short-long term impact** on remaining (albeit) limited faunal species.

MITIGATION AND RECOMMENDATIONS

The following general recommendations are made to minimise the impacts of proposed road construction on the immediate environment and remaining fauna:

- Prior to construction and vegetation clearance a suitably qualified ecologist/botanist should conduct a final walk down of the entire alignment and adopt a rescue and recovery programmes for any remaining geophytes, Aloes etc. These can be planted in suitable habitat away from the proposed road alignment.
- Prior to construction and vegetation clearance a suitably qualified ecologist/zoologist should closely examine the proposed construction areas (road alignment) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, logs, stumps and other debris and relocate any affected animals to appropriate habitat away from the road.
- If the road alignment does not follow existing tracks and pathways within the wooded gorges as well as stream a suitably qualified botanist/ecologist must closely examine the proposed road alignment through these sensitive areas as well as provide site specific environmental management measures for potential impacts (beyond the scope of this report).
- Close site supervision must be maintained during construction.
- During the **CONSTRUCTION** phase workers must be limited to areas under construction within the road servitude and access to the undeveloped areas, especially the surrounding hills and woodlands, Mtwalume River and valley

bottom wetlands must be strictly regulated ("no-go" areas during construction as well as operational activities).

- Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) and surface water in the area. Mobile toilets must be provided in order to minimize un-authorised traffic of construction workers outside of the designated areas. No toilet must be placed within 50m of the Mtwalume River as well as adjacent drainage lines.
- All temporary stockpile areas including litter and dumped material and rubble must be removed on completion of construction. All alien invasive plant should be removed from the road servitude to prevent further invasion.
- Firearms or any other hunting weapons must be prohibited on site.
- Contract employees must be educated about the value of wild animals and the importance of their conservation.
- Severe contractual fines must be imposed and immediate dismissal on any contract employee who is found attempting to snare or otherwise harm remaining faunal species.
- No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.

The following mitigation measures for the southern non-perennial drainage line crossings and Mtwalume River crossing are provided as guidelines:

- Construction activities of the Mtwalume bridge as well as southern non-perennial drainage line should be scheduled to take place during low flow periods of the stream (winter months); when as little of the construction area and exposed sediment is in contact with the flow as possible.
- The non-perennial or seasonal stream is poorly defined and narrow. Adequate culverts or concrete pipes must be installed in order to maintain the current hydrological patterns.
- The original geometry, topography and geomorpholgy in both cross-sectional and longitudinal profile should be reinstated, above and below the stream and river crossing.
- Appropriate mitigatory measures for controlling sediment input into the stream and drainage areas will be required during the construction phase. The use of hay bales packed in rows across diversions and active flow areas during construction may be one way of limiting sediment inputs. They also help to buffer the pH. The bales will need to be removed and disposed of after construction. Other alternative methods of controlling sediment should also be considered such as sediment fences etc.
- All coffer dams, causeway and construction materials should be removed from the stream immediately after construction at the site is completed.
- Where necessary and according to risks in terms of bank erosion, gabions or storm water control structures should be used to disperse storm water flows

and prevent further bank erosion. Appropriate gabion structures or gabion mattresses should be installed to prevent further bank erosion.

- Where necessary and according to slope and risks in terms of bank erosion, disturbed areas should be re-vegetated using either a specified seed mix and/or appropriate indigenous trees (see attached list).
- Where appropriate, large individual indigenous trees (*Syzigium cordatum*) should be avoided during construction and should be marked on site.
- The existing environmental management plan, should be audited during construction, and monitored for a period thereafter, until full rehabilitation is assured and stability demonstrated.

6.2 CONSTRUCTION PHASE

General

- All construction activities should be strictly limited to the construction servitude area. Vegetation clearance should be restricted to the actual road servitude especially within the drainage line and Mtwalume River crossings.
- Sufficient chemical toilets and waste bins must be provided in all areas where construction is taking place. These toilets and bins must furthermore be emptied regularly.
- Sanitation facilities shall be located within 100m from any point of work, but not closer than 50 m from the Mtwalume River and drainage lines/streams.
- It is recommended that the construction programme preferably commence during the dry winter months, when the Mtwalume River's base flow is lower and the risk of soil and bank erosion is lowest. All earthworks shall be undertaken in such a manner so as to minimize the extent of any impacts.
- Construction activities are to be restricted to business hours in order to limit disturbance of surrounding land owners in terms of *inter alia* noise.
- All vehicles associated with the construction activities should be in a serviced condition to prevent oil leaks etc and the possible contamination of the Mtwalume River and drainage lines.

6.3 SOILS

- Soil removed from the new road reserve is to be appropriately stored for later use in back-filling. Sub-soil and topsoil (the top +/- 30-50 cm of the soil) should be stored separately.
- Soil stockpiles are to be protected from possible erosion, e.g. through covering of the stockpiles with tarpaulin, and limiting the height and angle of the stockpile. Soil stockpiles should not exceed 1 m in height.
- Soil stockpiling areas must be sufficiently situated away from the drainage areas towards the lower lying Mtwalume River and drainage areas.
- Any erosion channels developed during the construction period or during the vegetation establishment period should be backfilled and compacted, and the areas restored to a proper condition. The Contractor should ensure that cleared areas are effectively stabilised to prevent and control erosion. This is especially pertinent within steep hillslopes which are situated on a shallow soil layer. Extensive gully erosion is evident around the entire area.

6.4. REHABILITATION

The traditional definition of rehabilitation aims at returning the land in a given area to some degree of its former state after a particular process has resulted in its damage. The rehabilitation of the gully erosion within the upper sections of the northern drainage line is beyond the scope of this project. Without improved livestock grazing practices on-going rill and gully erosion is going to occur within the steep hillslopes around the road. It is imperative that the entire Ntashana road reserve is appropriately re-vegetated in order to prevent further erosion as well as alien vegetation invasion. Rehabilitation methods are detailed in Table 6 below.

Table6: Recommended rehabilitation measures.

Step	1.1.1 Method	1.1.2 Equipment
1	Remove all construction material from the area where construction has been completed.	To be undertaken by hand.
2	Topsoil that has been stockpiled during construction must be applied to the area to undergo rehabilitation. The depth of the topsoil layer to be applied depends on the natural depth of topsoil in the area, and the amount of topsoil that may have been lost during construction.	Topsoil must be applied from the topsoil stockpiled during construction.
3	The naked ground should be seeded with a stabilising grass mix, suited to the conditions. The quantity of seed used will depend on the slope, with a steeper slope requiring a heavier application of seed. For slopes: • >15º: 25-50 kg/ha • <15º: 15-25 kg/ha The natural seed bank in the topsoil will supplement the seed mix applied	The seed mix should consist of pioneer grass species of the area, and will also depend on what species are commercially available during the season required. A standard seed mix would consist of the following species (in decreasing order of proportion constituting the seed mix)*: • *Andropogon chinensis* • *Aristida congesta* • *Cynodon dactylon* • *Cymbopogon plurinodes* • *Eragrostis curvula* • *Eragrostis gummiflua* • *Themeda triandra* • *Setaria spp.* • *Imperata cylindrica* • *Sporobolus fimbriatus* and sedges such as *Schoenoplectus* spp. and *Juncus spp.* should be used
4	The areas which have been seeded must be regularly watered directly after seeding until the grass cover becomes established. Watering is to be done in a manner that ensures that no erosion of the topsoil and seed mix takes place.	A hosepipe must be available on site.
5	If the grasses have not established after a period of two months after seeding, the areas should be reseeded. If necessary, another	As above.

* see attached species list

	dressing of topsoil should be applied prior to seeding.	
6	Slope stabilisation measures may be necessary in places where grass has not been able to establish and there is an erosion risk. The measures implemented depend on the situation, and can be varied as necessary.	Various slope stabilisation measures are available and vary in effectiveness according to the situation including • Logs/bark held in place with pegs • Rows of *Cynodon dactylon*, *Panicum maximum*, *Imperata cylindrica*, *Hyparrhenia filipendula* held in place with pegs.
7	All alien vegetation is to be appropriately removed and disposed of. Alien species that have been encountered along the proposed route include Syringa *Melia azedarach,* Brazilian Glory Pea *or* Red Sesbania *Sesbania punicea*, Castor-Oil Plant (*Ricinus communis*), Lantana (*Lantana camara*), Giant Reed (*Arundo donax*), Bugweed (*Solanum mauritianum*), Peanut Butter Cassia (*Senna diymobotrya*), Jacaranda *Jacaranda mimosifolia**, Morning Glory (*Ipomoea purpurea*), Paraffin Bush (*Chromolaena odorata*), Yellow Oleander (*Thevetia peruviana*), Oleander (*Nerium oleander*), Montanoa (*Montanoa hibiscifolia*), Indian Shot (*Canna indica*), *Ageratum conyzoides*, *Caesalpinia decapetala*, *Campuloclinium macrocephalum*, *Chromolaena odorata*, *Ipomoea indica*, *Leucaena leucocephala*, *Psidium guajava*, *Melia azedarach, Mimosa pigra, Tithonia diversifolia*.	Removal will to a large extent be done by hand. Saws may be necessary in certain cases and specific herbicides may be required (if used, the use of these must be strictly controlled)
8	The upgraded Ntashana road servitude must be regularly inspected during the operational phase and alien vegetation that had re-emerged, must be removed / follow-up treatment applied.	On-going alien vegetation removal programme (beyond the scope of the project)

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8. APPENDIX

Table7. Grass species list (ideally grass species endemic to the area should be used for the re-vegetation of cut slopes and road embankments/servitude).

Botanical name	Common name	Growth	Drought	Frost	Soils	Description	Miscellaneous
Acroceras macrum	Nile Grass		*	*		Creeping perennial	Badly affected by cold
Andropogon appendiculatus		*					
Andropogon eucomus	Snowflake grass				Heavy clay (ouklip)	Densely tufted, upright, stemmy perennial	Indicator of poorly drained soils
Bothriochloa glabra	Purple-blumed grass					Robust perennial forming large tufts	Occurs where water accumulates
Brachiara serrata	Velvet signal grass		**			Loosely tufted perennial	
Bromus wildenowii	Rescue grass			*	Well drained soils	Winter growing perennial	
Chloris gayana	Rhodes grass				Loam	Tufted, stoloniferous perennial	Lacks persistence
Cymbopogon validus	Giant turpentine grass					Robust, tufted perennial	
Cynodon dactylon	Couch grass		*	**	Sandy	Variable, creeping perennial	
Digitaria eriantha	Smuts finger grass		**			Robust, tufted perennial	
Digitaria swazilandensis	Richmond finger-grass		**	**	All soils	Perennial with creeping rhizomes	Easily affected by drought and cold
Echinochloa crusgalli	Barnyard millet		**		Moist, well-drained	Tufted annual	Fully grown in 6 - 8 weeks
Eragrostis capensis	Heartseed love grass		**		Shallow	Loosely tufted perennial	
Eragrostis lappula	Phakwane				Moist, sandy soils	Tufted, variable perennial	
Eragrostis plana	Fan love grass				Compact soils	Densely tufted perennial	Occurs on abandoned, arable lands
Hemarthria altissima	Red swamp grass				Wet soils	Perennial, underground rhizomes	Good soil binder, hardy
Imperata cylindrica	Cottonwool grass					Perennial, underground	

						runners	
Ishaemum arcuatum	Hippo grass				All soils	Perennial with creeping rhizomes	
Leersia hexandra	Wild rice grass					Perennial, long underground stems	
Miscanthidium capense	Eastcoast broom grass		**			Robust perennial	Good firebreak
Monocymbium ceresiiforme	Wild oat grass				Leached soils	Loosely tufted perennial	Indicator of acid soils
Paspalum dilatatum	Common paspalum				Moist soils	Tufted perennial	Lack of consistently good seed
Paspalum notatum	Lawn paspalum			**	Moist, fertile soil	Sod-forming perennial	Aggressive invader
Paspalum urvillei	Giant paspalum			*	Wet soils	Tall, tufted, upright perennial	Invades naturally
Poa annua	Annual bluegrass		**		Waterlogged soils	Small, bright green annual	
Setaria megaphylla	Broadleaf actaria				Waterlogged soils	Robust perennial	Found in shade
Stenotaphrum dimidiotum	St Augustive grass	*					
Stenotaphrum accundtum	Coastal buffalo grass				Sandy	Creeping perennial, extensive runner	Persisting under hard conditions

* Good Characteristic
** Bad Characteristic

Table8. Suggested indigenous trees for rehabilitation (species indigenous to the area are indicated with an ☺. It is strongly recommended that only these are planted as far as possible)

Botanical Name	**Common Name**
Acacia karroo	Sweet Thorn
Acacia caffra	Common Hook Thorn
Acacia tortilis	Umbrella Thorn
☺*Acacia sieberiana* var. *woodii*	Paper Bark
Apodytes dimidiate	White Pear
Calodendron capense	Cape Chestnut
Cassia abbreviate	Long-tailed cassia
☺*Celtis Africana*	White stinkwood
☺*Combretum erythrophylum*	River Bushwillow
☺*Cussonia paniculata*	Highveld cabbage
☺*Diospyros lycoides*	Blue bush
☺*Dombeya rotundifolia*	Wild pear
Ekenbergia capensis	Cape ash
☺*Erythrina lysistemon*	Corral Tree
☺ *Ficus natalensis*	Natal Fig
☺*Ficus sycomorus*	Sycamore fig
Grewia occidentalis	Cross berry
☺ *Gymnosporia buxifolia*	Common Spikw-Thorn
☺*Halleria lucida*	Tree fuschia
☺*Harpephyllum caffrum*	Wild plum
Kiggelaria Africana	Wild peach
☺*Leucosidea serricea*	Ouhout
Olea europaea subsp. africana	Wild olive
Pappea capenis	Jacket plum
☺*Pittosporum viridiflorum*	Cheesewood
Podocarpus henkelli	Henkell's yellowwood
Pterocarpus rotundifolius	Round leaved kiaat
Searsia/Rhus chiridensis	Red Currant
Searsia/Rhus prinoides	Dogwood
☺*Searsia/Rhus leptodictya*	Mountain karee
☺ *Searsia/Rhus lancea*	Karee
☺ *Searsia/Rhus pyroides*	Common wild currant
Salix mucronata	Safsaf willow
Scotia brachypetala	Weeping boer-bean
Syzigium cordata	Water berry
☺*Trichilia emetica*	Natal mahogany
Vepris lanceolata	White ironwood

Ziziphus mucronata	Buffalo thorn

Table9. Indigenous shrub species marked with ☺ should be used for re-vegetation along the Ntashana access road.

Botanical Name	**Common Name**
☺*Aloe arborescens* (gabions)	
Aloe greatheadii	
Aloe marlothii	
Bauhinia species	Pride-of de-Kaap
Buddleja salinga	False olive
☺*Buddleja salvifolia*	Sagewood
Burchellia bubaline	Wild pomegranate
☺*Carissa macrocarpa*	Bird num-num
☺*Dietes species*	Wild iris
☺*Dovyalis caffra*	Kei apple
☺*Ehretia rigida*	Puzzle bush
Erica species	Heaths
Euryops species	Golden daisies
Felicia species	Wild daisy
☺*Grewia flava*	Wild currant
☺*Helichrysum kraussii*	Everlastings
☺*Leonotis leonorus*	Wild dagga
Leucospernum species	Pincushions
☺*Mackaya bella*	Forest bell bush
Pavetta lanceolata	Forest's pride bush
☺*Plectranthus species*	Spur flowers
☺*Plumbago auriculata*	Cape leadwort
Protea caffra	Sugarbush
Psychotria capensis	Black birdberry
☺*Rhamnus prinoides*	Dogwood
☺*Strelitzia nicolai*	
Strilitzea reginae	Crane flower
☺*Tecoma capensis*	Cape honeysuckle
☺*Thunbergia natalensis*	Natal bluebell

APPENDIX B

Table10. Frog species recorded during the Southern African Frog Atlas Project (SAFAP) for locus = 3030BB, Species in bold are Red Listed (Minter *et al.* 2004)

Family	Genus	Species	Common name	Red list category	Atlas region endemic
Arthroleptidae	*Arthroleptis*	*wahlbergi*	Bush Squeaker	Least Concern	0
Arthroleptidae	*Leptopelis*	*natalensis*	Natal Tree Frog	Least Concern	0
Brevicepitidae	*Breviceps*	*mossambicus*	Mozambique Rain Frog	Least Concern	0
Bufonidae	*Amietophrynus*	*gutturalis*	Guttural Toad	Least Concern	0
Bufonidae	*Amietophrynus*	*rangeri*	Raucous Toad	Least Concern	0
Bufonidae	*Schismaderma*	*carens*	Red Toad	Least Concern	0
Hyperoliidae	*Afrixalus*	*fornasinii*	Greater Leaf-Folding Frog	Least Concern	0
Hyperoliidae	***Afrixalus***	***spinifrons***	**Natal leaf-folding frog**	**Near Threatened**	0
Hyperoliidae	*Hyperolius*	*marmoratus*	Painted Reed Frog	Least Concern	0
Hyperoliidae	***Hyperolius***	***pickersgilli***	**Pickersgill's Reed Frog**	**Critically Endangered**	1
Hyperoliidae	*Hyperolius*	*pusillus*	Water Lily Frog	Least Concern	0
Hyperoliidae	*Hyperolius*	*tuberilinguis*	Tinker Reed Frog	Least Concern	0
Hyperoliidae	*Kassina*	*senegalensis*	Bubbling Kassina	Least Concern	0
Phrynobatrachidae	*Phrynobatrachus*	*mababiensis*	Dwarf Puddle Frog	Least Concern	0
Ptychadenidae	*Ptychadena*	*oxyrhynchus*	Sharp-nosed Grass Frog	Least Concern	0
Pyxicephalidae	*Amietia*	*angolensis*	Common or Angola River Frog	Least Concern	0
Pyxicephalidae	*Cacosternum*	*nanum*	Boettger's Caco	Least Concern	0
Pyxicephalidae	***Natalobatrachus***	***bonebergi***	**Natal Kloof Frog**	**Endangered**	1
Pyxicephalidae	*Tomopterna*	*natalensis*	Natal Sand Frog	Least Concern	0

Red listing source: Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

Table11. Reptile species recorded during the Southern Africa Reptile Atlas within locus 3030BB. **Red listing source:** 1996 IUCN global listing

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Agamidae	*Acanthocercus*	*atricollis*	*atricollis*	Southern Tree Agama	Not Evaluated	0
Agamidae	*Agama*	*aculeata*	*distanti*	Distant's Ground Agama	Not Evaluated	1
Atractaspididae	*Amblyodipsas*	*concolor*		Natal Purple-glossed Snake	Not Evaluated	1
Atractaspididae	*Aparallactus*	*capensis*		Black-headed Centipede-eater	Not Evaluated	0
Atractaspididae	*Atractaspis*	*bibronii*		Bibron's Stiletto Snake	Not Evaluated	0
Atractaspididae	*Macrelaps*	*microlepidotus*		Natal Black Snake	Not Evaluated	1
Boidae	***Python***	***natalensis***		**Southern* African Python**	Not Evaluated	0
Chamaeleonidae	*Bradypodion*	*melanocephalum*		KwaZulu Dwarf Chameleon	Not Evaluated	1
Chamaeleonidae	*Chamaeleo*	*dilepis*	*dilepis*	Common Flap-neck Chameleon	Not Evaluated	0
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Not Evaluated	0
Colubridae	*Crotaphopeltis*	*hotamboeia*		Red-lipped Snake	Not Evaluated	0
Colubridae	*Dasypeltis*	*inornata*		Southern Brown Egg-eater	Not Evaluated	1
Colubridae	*Dispholidus*	*typus*	*typus*	Boomslang	Not Evaluated	0
Colubridae	*Duberria*	*lutrix*	*lutrix*	South African Slug-eater	Not Evaluated	1
Colubridae	*Lycodonomorphus*	*inornatus*		Olive House Snake	Not Evaluated	1
Colubridae	*Lycodonomorphus*	*laevissimus*		Dusky-bellied Water Snake	Not Evaluated	1
Colubridae	*Lycodonomorphus*	*rufulus*		Brown Water Snake	Not Evaluated	0
Colubridae	*Lycophidion*	*capense*	*capense*	Cape Wolf Snake	Not Evaluated	0

* Listed as “Vulnerable” (Branch 1988).

Colubridae	*Philothamnus*	*hoplogaster*		South Eastern Green Snake	Not Evaluated	0
Colubridae	*Philothamnus*	*natalensis*	*natalensis*	Eastern Natal Green Snake	Not Evaluated	0
Colubridae	*Philothamnus*	*natalensis*	*occidentalis*	Western Natal Green Snake	Not Evaluated	1
Colubridae	*Philothamnus*	*semivariegatus*		Spotted Bush Snake	Not Evaluated	0
Colubridae	*Psammophis*	*brevirostris*		Short-snouted Grass Snake	Not Evaluated	0
Colubridae	*Pseudaspis*	*cana*		Mole Snake	Not Evaluated	0
Colubridae	*Thelotornis*	*capensis*	*capensis*	Southern Twig Snake	Not Evaluated	0
Cordylidae	*Chamaesaura*	*anguina*	*anguina*	Cape Grass Lizard	Not Evaluated	1
Cordylidae	*Chamaesaura*	*macrolepis*		Large-scaled Grass Lizard	Not Evaluated	0
Elapidae	*Dendroaspis*	*angusticeps*		Green Mamba	Not Evaluated	0
Elapidae	*Dendroaspis*	*polylepis*		Black Mamba	Not Evaluated	0
Gekkonidae	*Afroedura*	*pondolia*		Pondo Flat Gecko	Not Evaluated	1
Gekkonidae	*Hemidactylus*	*mabouia*		Common Tropical House Gecko	Not Evaluated	0
Gekkonidae	*Lygodactylus*	*capensis*	*capensis*	Common Dwarf Gecko	Not Evaluated	0
Gerrhosauridae	*Tetradactylus*	*africanus*		Eastern Long-tailed Seps	Not Evaluated	1
Leptotyphlopidae	*Leptotyphlops*	*scutifrons*	*conjunctus*	Eastern Thread Snake	Not listed	0
Leptotyphlopidae	*Leptotyphlops*	*scutifrons*	*scutifrons*	Peters' Thread Snake	Not listed	0
Scincidae	*Afroablepharus*	*wahlbergii*		Wahlberg's Snake-eyed Skink	Not Evaluated	0
Scincidae	*Scelotes*	*inornatus*		Durban Dwarf Burrowing Skink	Not Evaluated	1
Scincidae	*Trachylepis*	*striata*		Striped Skink	Not Evaluated	0
Scincidae	*Trachylepis*	*varia*		Variable Skink	Not Evaluated	0
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Not Evaluated	0
Varanidae	*Varanus*	*niloticus*		Water Monitor	Not Evaluated	0
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Not	0

					Evaluated	
Viperidae	*Causus*	*rhombeatus*		Rhombic Night Adder	Not Evaluated	0

Table12. Bird species recorded from the 3020_3020 pentad during the South African Bird Atlas Project (SABAP2). Species in bold are threatened according to Barnes *et al.* (2000).

Pentad summary : 3020_3020							
	Ref No	**English Name**	***Scientific Name***	**Rarity regions**	**Full protocol**		**Incidental**
					Sightings	**Reporting rate**	**Reports**
1	622	Apalis, Bar-throated (Bandkeelkleinjantjie)	*Apalis thoracica*		2	100.0%	
2	625	Apalis, Yellow-breasted (Geelborskleinjantjie)	*Apalis flavida*	NW	1	50.0%	
3	672	Batis, Cape (Kaapse Bosbontrokkie)	*Batis capensis*	NW	2	100.0%	
4	709	Boubou, Southern (Suidelike Waterfiskaal)	*Laniarius ferrugineus*		1	50.0%	
5	545	Bulbul, Dark-capped (Swartoogtiptol)	*Pycnonotus tricolor*		2	100.0%	
6	152	Buzzard, Jackal (Rooiborsjakkalsvoel)	*Buteo rufofuscus*		2	100.0%	
7	857	Canary, Cape (Kaapse Kanarie)	*Serinus canicollis*	NW	1	50.0%	
8	859	Canary, Yellow-fronted (Geeloogkanarie)	*Crithagra mozambicus*		1	50.0%	
9	570	Chat, Familiar (Gewone Spekvreter)	*Cercomela familiaris*		2	100.0%	
10	648	Cisticola, Lazy (Luitinktinkie)	*Cisticola aberrans*	WC	1	50.0%	
11	573	Cliff-Chat, Mocking (Dassievoel)	*Thamnolaea cinnamomeiventris*		2	100.0%	
12	212	Coot, Red-knobbed (Bleshoender)	*Fulica cristata*		1	50.0%	
13	50	Cormorant, Reed (Rietduiker)	*Phalacrocorax africanus*		1	50.0%	
14	214	**Crane, Grey Crowned (Mahem)**	***Balearica regulorum***	NC,WC,GP,NW	1	50.0%	
15	680	Crested-Flycatcher, Blue-mantled (Bloukuifvlieevanger)	*Trochocercus cyanomelas*		1	50.0%	
16	523	Crow, Cape (Swartkraai)	*Corvus capensis*		2	100.0%	
17	322	Dove, Lemon (Kaneelduifie)	*Aplopelia larvata*		1	50.0%	
18	314	Dove, Red-eyed (Grootringduif)	*Streptopelia semitorquata*		2	100.0%	
19	517	Drongo, Fork-tailed (Mikstertbyvanger)	*Dicrurus adsimilis*		2	100.0%	
20	833	Firefinch, African (Kaapse Vuurvinkie)	*Lagonosticta rubricata*	WC	1	50.0%	
21	707	Fiscal, Common	*Lanius collaris*		2	100.0%	

		(Fiskaallaksman)					
22	655	Flycatcher, African Dusky (Donkervlieevanger)	*Muscicapa adusta*		1	50.0%	
23	664	Flycatcher, Southern Black (Swartvlieevanger)	*Melaenornis pammelaina*		1	50.0%	
24	89	Goose, Egyptian (Kolgans)	*Alopochen aegyptiacus*		2	100.0%	
25	6	Grebe, Little (Kleindobbertjie)	*Tachybaptus ruficollis*		1	50.0%	
26	551	Greenbul, Sombre (Gewone Willie)	*Andropadus importunus*		1	50.0%	
27	441	Honeyguide, Scaly-throated (Gevlekte Heuningwyser)	*Indicator variegatus*		1	50.0%	
28	427	Hornbill, Crowned (Gekroonde Neushoringvoel)	*Tockus alboterminatus*	WC,MP	1	50.0%	
29	422	Hornbill, Trumpeter (Gewone Boskraai)	*Bycanistes bucinator*		1	50.0%	
30	84	Ibis, Hadeda (Hadeda)	*Bostrychia hagedash*		2	100.0%	
31	823	Mannikin, Bronze (Gewone Fret)	*Spermestes cucullatus*		1	50.0%	
32	506	Martin, Rock (Kransswael)	*Hirundo fuligula*		2	100.0%	
33	210	Moorhen, Common (Grootwaterhoender)	*Gallinula chloropus*		1	50.0%	
34	521	Oriole, Black-headed (Swartkopwielewaal)	*Oriolus larvatus*		2	100.0%	
35	311	Pigeon, Speckled (Kransduif)	*Columba guinea*		1	50.0%	
36	524	Raven, White-necked (Withalskraai)	*Corvus albicollis*	NW	1	50.0%	
37	581	Robin-Chat, Cape (Gewone Janfrederik)	*Cossypha caffra*		2	100.0%	
38	559	Rock-Thrush, Cape (Kaapse Kliplyster)	*Monticola rupestris*		1	50.0%	
39	584	Scrub-Robin, Brown (Bruinwipstert)	*Cercotrichas signata*		1	50.0%	
40	588	Scrub-Robin, White-browed (Gestreepte Wipstert)	*Cercotrichas leucophrys*		1	50.0%	
41	4142	Sparrow, Southern Grey-headed (Gryskopmossie)	*Passer diffusus*		1	50.0%	
42	183	Spurfowl, Natal (Natalse Fisant)	*Pternistis natalensis*	NC	1	50.0%	
43	737	Starling, Cape Glossy (Kleinglansspreeu)	*Lamprotornis nitens*	WC	1	50.0%	
44	745	Starling, Red-winged (Rooivlerkspreeu)	*Onychognathus morio*		2	100.0%	
45	576	Stonechat, African (Gewone Bontrokkie)	*Saxicola torquatus*		1	50.0%	
46	772	Sunbird, Amethyst (Swartsuikerbekkie)	*Chalcomitra amethystina*	FS	2	100.0%	
47	758	Sunbird, Greater Double-collared (Groot-rooibandsuikerbekkie)	*Cinnyris afer*		1	50.0%	
48	766	Sunbird, Olive (Olyfsuikerbekkie)	*Cyanomitra olivacea*	MP	1	50.0%	
49	760	Sunbird, Southern	*Cinnyris*	FS	1	50.0%	

		Double-collared (Klein-rooibandsuikerbekkie)	*chalybeus*				
50	1105	Thrush, Olive (Olyflyster)	*Turdus olivaceus*	GP,NW	1	50.0%	
51	436	Tinkerbird, Red-fronted (Rooiblestinker)	*Pogoniulus pusillus*		2	100.0%	
52	4133	Turaco, Knysna Turaco (Knysnaloerie)	*Tauraco corythaix*		1	50.0%	
53	316	Turtle-Dove, Cape (Gewone Tortelduif)	*Streptopelia capicola*		2	100.0%	
54	686	Wagtail, Cape (Gewone Kwikkie)	*Motacilla capensis*		2	100.0%	
55	666	Warbler, Dark-capped Yellow (Geelsanger)	*Chloropeta natalensis*	NW	1	50.0%	
56	843	Waxbill, Common (Rooibeksysie)	*Estrilda astrild*		1	50.0%	
57	790	Weaver, Dark-backed (Bosmusikant)	*Ploceus bicolor*	WC,MP	1	50.0%	
58	791	Weaver, Spectacled (Brilwewer)	*Ploceus ocularis*	WC,GP,NW	1	50.0%	
59	797	Weaver, Village (Bontrugwewer)	*Ploceus cucullatus*		1	50.0%	
60	1172	White-eye, Cape (Kaapse Glasogie)	*Zosterops virens*		2	100.0%	
61	453	Wryneck, Red-throated (Draaihals)	*Jynx ruficollis*	WC	1	50.0%	