Project Title:	Eskom Northern Kwa-Zulu Natal Strengthening Project	**Date:**	2016/09/23
Compiler:	Rudi Greffrath	**Project Code:**	ILI3864
Report:	**Fauna and Flora - Specialist Baseline Input**		

1 Project Overview

Eskom Holdings SOC Ltd (hereinafter Eskom) proposes to undertake a process of strengthening electricity supply in northern KwaZulu-Natal (KZN). Presently, northern KZN is supplied by a 132 kilovolt (kV) network fed from the Normandie and Impala substations. With an increase in demand for electricity, this network often experiences unacceptable levels of voltage, thermal overloading and high voltage drops.

Eskom proposes to establish the Iphiva 400/132 kV substation to “de-load” the primary sub-transmission network and improve voltage regulation to alleviate existing and future network constraints in northern KZN.

To achieve this strategic objective, Eskom plans to construct the new Iphiva 400/132 kV substation near the town of Mkuze, which will be integrated into the 400 kV network by two 400 kV lines. These will comprise the following:

- The 120 km Normandie – Iphiva corridor; and
- The 130 km Duma – Iphiva corridor.

To accommodate the towers and overhead lines of the 400 kV transmission lines, a 55 m servitude (27.5 m on either side of the centre line) is required. The servitude is required to ensure safe construction, maintenance and operation of the line and Eskom will be entitled to unrestricted access. Where 400 kV power lines are constructed in parallel, a minimum separation distance of 55 m between centre points is required.

In addition to the two 400 kV lines, 65 km of 132 kV distribution power lines will also link into the Iphiva substation.

For this project to be realised, Eskom is required to undertake an Environmental Authorisation (EA) process in terms of Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

2 Baseline Environment

2.1 Locality

The proposed project is located predominately in KZN with a small portion of the project in Mpumalanga. The Umkhanyakude, Zululand and Gert Sibande District Municipalities are affected by the project with Pongola and Mkuze being the main towns in the study area. Land use varies across the study area with dispersed rural settlements, sugar cane farming, areas formally protected for conservation, private game farms and linear peri-urban development adjacent to the National Route 2 (N2). The Pongola River divides the area north and south and one of the lines will have to cross it (Figure 2-1). Also indicated on this map is the names used to refer to different route options, these different options form the basis for the sensitivity assessment.

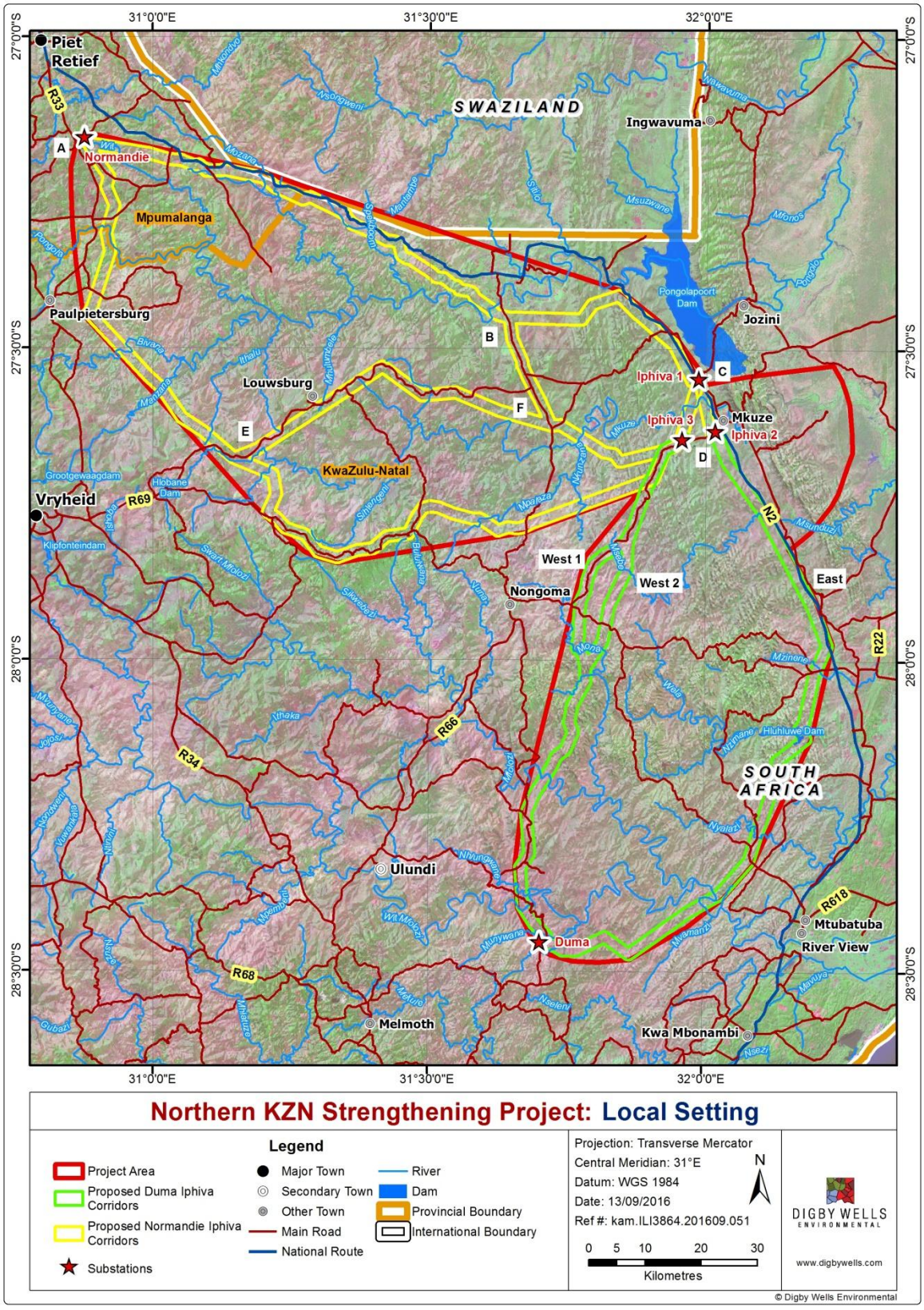

Figure 2-1: Project Area Local Setting

2.2 Regional Vegetation

The KZN Vegetation Type map has undergone several changes since the publication of the Mucina and Rutherford (2006) national Vegetation Types. Ezemvelo KZN Wildlife (Ezemvelo) has, in collaboration with various government departments, NGOs, Working Groups and Forums e.g. KZN Wetland Forum, IAIA (members of the International Association for Impact Assessment), municipalities and parastatals, refined the KZN Vegetation Types to develop an accurate representation of the pre-transformation extent of the vegetation types present. As a result of the finer scale mapping and classification, KZN vegetation types map has in some cases identified new vegetation types and or subtypes within the vegetation types identified at national level. The sub types in some instances have different red data statuses from the main vegetation type, and are indicated as such. During the field survey phase of the project the high conservation status vegetation types will be focussed on.

Table 2-1: Vegetation types Descriptions

Vegetation Type Status (Scott-Shaw & Escott, 2011)	**Conservation Status Mucina & Rutherford Vegetation (2012)**	**Description (Scott-Shaw & Escott, 2011)**
(SVl 4) Delagoa Lowveld	CR	Dense tree or tall shrub layer dominated by *Acacia welwitschia,* often forming thickets. Herb layer has an addition to grass species a wide variety of forbs. Areas are often heavily grazed which sometimes drastically reduces the grass cover.
(SVl 3) Granite Lowveld	EN	Tall shrubland with few trees to moderately dense low woodland on the deep sandy uplands with *Terminalia sericea, Combretum zeyheri* and *C. apiculatum* and ground layer including *Pogonarthria squarrose, Tricholaena monachne* and *Eragrostis rigidior.* Dense thicket top open savanna in the bottomlands with *Acacia nigrescens, Dichrostachys cinerea, Grewia bicolour* in the woody layer. The dense herbaceous layer contains the dominant *Digitaria eriantha, Panicum maximum* and *Aristida congesta* on fine-textured soils, while brackish bottomlands support *Sporobolus nitens,*

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
		Urochloa masambicensis and *Chloris virgata.* At seep lines, where convex topography changes to concave, a dense fringe of *Terminalia sericea* occurs, with *Eragrostis gummiflua* in the undergrowth.
(Gs2) Ithala Quartzite Sourveld		Low mountain ranges and undulating hills with rocky lowlands. The general pattern is a mosaic of woody shrubs and small trees in rocky areas, interspersed in the grass layer. Vegetation structure varies according to altitude and rockiness, but the basal density of the grass sward is relatively low. This unit occurs in the zone between Grassland and Savanna where the dominant grassland gives way to woodland as elevation decreases. The grasslands are species-rich covering a variety of altitudes but sharing a common species unique to the dystrophic quartzite geology.
(Gm 16) KaNgwane Montane Grassland (VU)	EN	Largely comprised of undulating hills and plains that occur on the eastern edge of the Escarpment. This unit is transitional between the Highveld and Escarpment that contains elements of both. The vegetation structure is comprised of a short closed grassland layer with many forbs, and a few scattered shrubs on the rocky outcrops.
(Gs6) KwaZulu-Natal Highland Thornveld		Hilly, undulating landscapes and broad valleys supporting tall tussock grassland usually dominated by *Hyparrhenia hirta,* with occasional savannoid woodlands with scattered *Acacia sieberiana* var *woodii* and in small pockets with *A. karroo* and *A. nilotica.*

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
(SVl 17) Lebombo Summit Sourveld (VU)	EN	Ridge plateaus and adjacent slightly sloping flanks covered with open, tall, sour, wiry grasslands, often dotted with low bushes and solitary savanna trees.
(FOa 1) Lowveld Riverine Forest (VU)	CR	Tall forests fringing larger rivers (gallery forests) and water pans. When dominated by *Ficus sycomorus* or *Diospyros mespiliformis* (alluvial sediments along major rivers), these forests are dense and tall, structured into several tree layers and with a well-developed dense shrub layer.
(SVl 21) Makatini Clay Thicket		Comprises a mixed, but mainly simple-leaved short bushland and thicket with emergent trees up to 10 m and generally dense dominant shrub layer 1 – 4m tall. It occurs on the lower slopes and bottomland areas of gently undulating terrain. Small clay-bottom, endorheic pans occur commonly at low points in the terrain.
(Gs1) Northern Zululand Mistbelt Grassland	VU	Gentle to steep upper slopes of mountains formed by hard dolerite dykes dominated by relatively forb-rich, tall sour *Themeda triandra* grasslands.
(SVl 22) Northern Zululand Sourveld		The dominant structural vegetation type is wooded grassland, in places pure sour grasslands and rarely also dense bushveld thickets. Terrain is mainly low, undulating mountains, sometimes highly dissected, and also some moderately undulating plains and hills.
(Gm 15) Paulpietersburg Moist Grassland (VU)	VU	Mainly undulating with moderately steep slopes, but valley basins are wide and flat and mountainous areas occur mostly along the northern and eastern boundary. Tall closed

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
		grassland rich in forbs and dominated by *Tristachya leucothrix, Themeda triandra* and *Hyparrhebia hirta*. Evergreen woody vegetation is characteristic on rocky outcrops.
(FOz 8) Sand Forest		Dense thickets of 5-6 m ('short forest' of Matthews *et al.* (2001)) up to tall forests with the canopy reaching 15 m ('tall forest' of Matthews *et al.* (2001)), with well-developed shrub layer and very poorly developed ground layer. The dominant trees are *Cleistanthus schlechteri, Dialium schlechteri* and emergent *Newtonia hildebrandtii* in Maputaland, whereas *Baphia massaiensis* subsp. *obovata, Cleistanthus schlechteri* and *Guibourtia conjugata* are most conspicuous in the tree layer in the Nwanbyia and Pumbe regions. The shrub layer is dominated by *Croton pseudopulchellus, Cola greenwayi, Pteleopsis myrtifolia, Psydrax locuples, Drypetes arguta* and the woody climber *Uvaria lucida.* The most conspicuous graminoid in the herb layer is *Eragrostis moggii.* Epiphytic orchids and lichens festoon the tall trees.
(FOz 5) Scarp Forest Eastern Scarp Forests: Ngome-Nkandla Scarp Forest (CR)		Tall (15 – 25 m), species-rich and structurally diverse, multi-layered forests, with well-developed canopy and understory tree layers, but a poorly developed herb layer. Buttressed stems are common in the Scarp Forest. The most conspicuous trees are *Buxus macowanii, B. natalensis, Drypetes gerrardii, Englerophytum natalense, Harpephyllum caffrum, Heywoodia lucens, Memecylon natalense, Millettia grandis, Oricia bachmannii, Philenoptera sutherlandii, Rinorea angustifolia, Rothmannia globosa* and

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
		Umtiza listeriana.
(SVl 16) Southern Lebombo Bushveld		Open Bushveld with dominant *Acacia* and *Combretum* species. *Themeda triandra* is the dominant grass on undisturbed sites. On very shallow soils (e.g. slopes of deep gorges or exposed ridges) with *Aloe marlothii, Euphorbia confinalis* and thickets of *Olea europea* subsp. *Africana* and *Combretum woodii. Combretum woodii.* Dry slopes may be dominated by *Androstachys johnsonii* in the northern parts.
(AZa7) Subtropical Alluvial Vegetation Can be subdivided into: Alluvial Wetlands: Subtropical Alluvial Vegetation (EN) Alluvial Wetlands: Subtropical Alluvial Vegetation: Lowveld Floodplain Grasslands (CR) Alluvial Wetlands: Subtropical Alluvial Vegetation: Lowveld Floodplain Grasslands:		Flat alluvial riverine terraces supporting an intricate complex of macrophytic vegetation (channel of flowing rivers and river-fed pans), marginal reed belts (in sheltered ox-bows and along very slow-flowing water courses) as well as extensive flooded grasslands, ephemeral herblands and riverine thickets.

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
Tall Reed Wetlands (VU) Alluvial Wetlands: Subtropical Alluvial Vegetation: Lowveld Floodplain Grasslands: Short Grass/ SedgeWetland (EN)		
Subtropical Freshwater Wetlands (AZf 6) Divided into: FreshwaterWetlands: Subtropical Freshwater Wetlands (VU) FreshwaterWetlands: Subtropical FreshwaterWetlands: Short Grass/ SedgeWetlands: Dune Slack (VU)		Flat topography supporting low beds dominated by reeds, sedges and rushes, water logged meadows dominated by grasses. Found typically along edges of often seasonal pools in Aeolian depressions as well as fringing alluvial backwater pans or artificial dams.
(SVl 14) Swaziland Sour Bushveld		Open to closed, medium to tall tree layer with closed well-developed grass layer. Very hilly with

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
		moderate to steep slopes, positioned at higher altitudes than the adjacent SVI 3 Granite Lowveld to the east.
(SVl 20) Western Maputaland Clay Bushveld	VU	Comprises a mixed but mainly compound leaved short (5 – 10 m) woodlands and wooded grasslands. It occurs on the crests, upper and mid-slopes of gently undulating terrain. This vegetation unit is dissected by two large alluvial floodplains associated with the Mkuze and Phongolo Rivers. FOa 1 Lowveld Riverine Forest and woodland dominate these alluvial soils and numerous small floodplains associated with smaller streams.
(SVl 19) Western Maputaland Sandy Bushveld		Comprised of mixed, but mainly simple-leaved, short (5 – 10 m) bushlands, woodlands and wooded grasslands. Occurring on the mid- and lower midslopes of ancient coastal dune cordons on gently undulating terrain. Extreme variations include open canopy *Terminalia sericea* sandvelds on deeper yellow to orange sands, through to *Combretum molle*- dominated woodlands on the deep red mesotrophic sands.
(SVl 23) Zululand Lowveld	VU	Extensive flat or only slightly undulating landscapes supporting complex of various bushveld units ranging from dense thickets of *Dichrostachys cinerea* and *Acacia* species, through parklike savanna with flat-topped *A. tortilis* to tree dominated woodland with broadleaved open bushveld with *Sclerocarya birrea* subsp. *caffra* and *A. nigrescens.* Tall grassveld types with sparsely scattered solitary trees and shrubs form a mosaic with the typical savanna thornveld, bushveld and thicket

Vegetation Type Status (Scott-Shaw & Escott, 2011)	Conservation Status Mucina & Rutherford Vegetation (2012)	Description (Scott-Shaw & Escott, 2011)
		patches.

VU = Vulnerable EN = Endangered CR =Critically Endangered

The regional vegetation types that are present in the transmission line corridors and the substation locations are indicated in Figure 2-2.

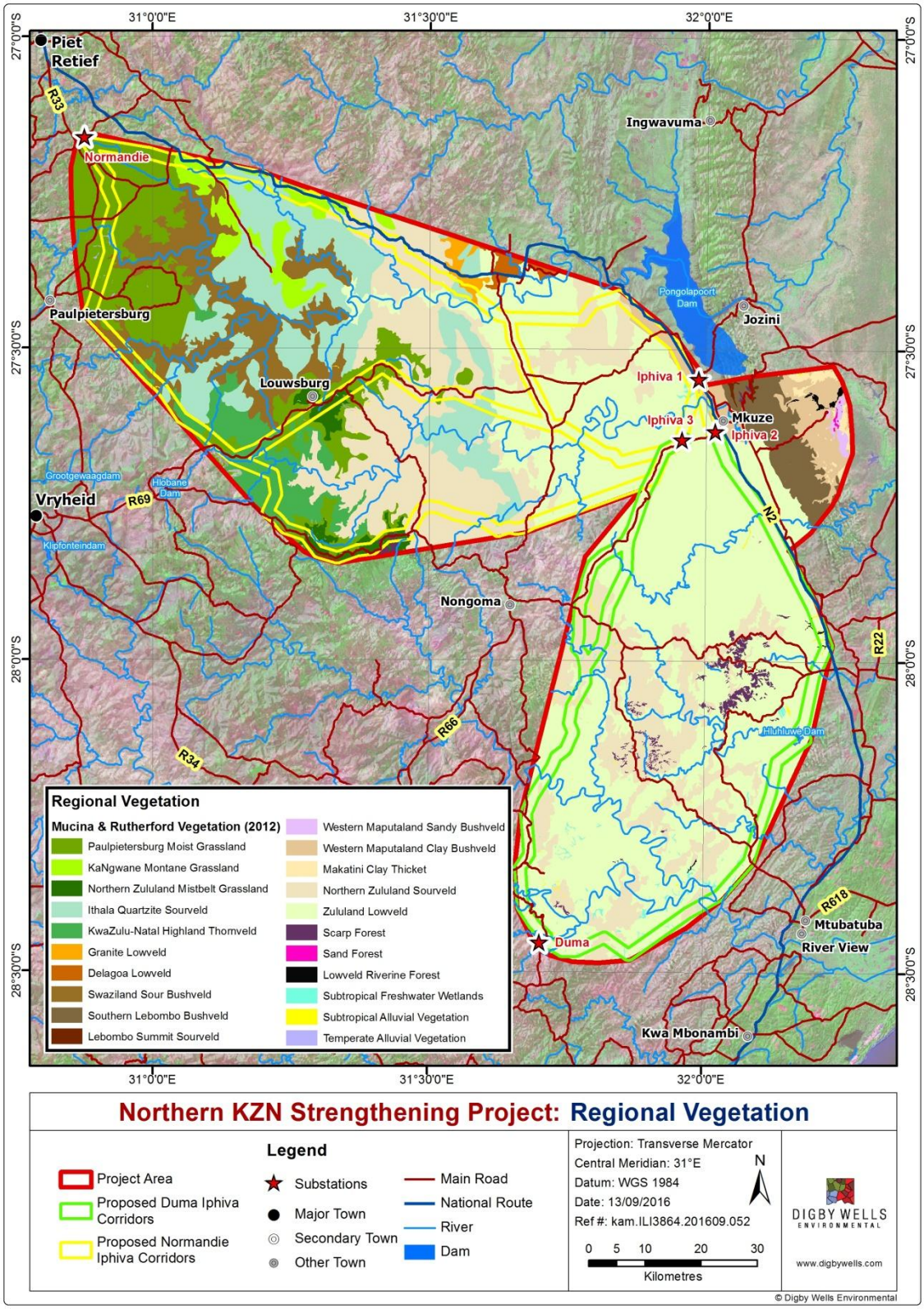

Figure 2-2: Regional Vegetation Types (Mucina and Rutherford 2012)

2.3 Flora

2.3.1 Species of Special Concern

The Red Data listed species that have been recorded previously in relevant 26 QDS grids are listed in Table 2-2. Of this list one species is designated as Critically Endangered, 15 species as Declining, seven species as Endangered, 11 species as Near Threatened, five species as Rare, one species as Threatened and 12 species as Vulnerable. Of this list multiple species occur in more than one QDS grids and is therefore listed in both in the table below. No champion trees occur within the route alignments. (DAFF 2012) The table is arranged so that species within a QDS grid is grouped together to illustrate that QDS grids relative abundance of protected species. Detailed habitat analysis will be conducted and the presence of such species along the routes will be thoroughly investigated and mapped to avoid/minimize and impacts on such species, where possible it must be avoided.

Table 2-2: Plant SSC according to POSA

Species	POSA Threat status	QDS
Elaeodendron transvaalense (Burtt Davy) R.H.Archer	NT	2831BB
Albizia suluensis Gerstner	EN	2831BB
Gunnera perpensa L.	Declining	2831BB
Rapanea melanophloeos (L.) Mez	Declining	2831BB
Crinum moorei Hook.f.	VU	2831BA
Aloe cooperi Baker subsp. cooperi	Declining	2732CA
Begonia dregei Otto & A.Dietr.	EN	2732CA
Elaeodendron transvaalense (Burtt Davy) R.H.Archer	NT	2732CA
Combretum mkuzense J.D.Carr & Retief	NT	2732CA
Gasteria batesiana G.D.Rowley var. batesiana	NT	2732CC
Albizia suluensis Gerstner	EN	2732CC
Mystacidium aliceae Bolus	VU	2732CC
Stangeria eriopus (Kunze) Baill.	VU	2732CC
Salpinctium natalense (C.B.Clarke) T.J.Edwards	Rare	2832AA
Boophone disticha (L.f.) Herb.	Declining	2832AA
Gasteria batesiana G.D.Rowley var. batesiana	NT	2832AA
Crinum acaule Baker	NT	2832AC
Crinum stuhlmannii Baker	Declining	2832AC
Pachycarpus concolor E.Mey. subsp. arenicola Goyder	VU	2832AC
Kniphofia littoralis Codd	NT	2832AC
Salpinctium natalense (C.B.Clarke) T.J.Edwards	Rare	2831BD
Elaeodendron transvaalense (Burtt Davy) R.H.Archer	NT	2831BD
Melhania polygama I.Verd.	Rare	2831BD
Crinum macowanii Baker	Declining	2731BD
Gasteria batesiana G.D.Rowley var. batesiana	NT	2731BD

Species	POSA Threat status	QDS
Drimia altissima (L.f.) Ker Gawl.	Declining	2731BD
Crinum macowanii Baker	Declining	2731BC
Gasteria batesiana G.D.Rowley var. batesiana	NT	2731BC
Erythrophleum lasianthum Corbishley	NT	2731BC
Gasteria batesiana G.D.Rowley var. batesiana	NT	2731AD
Boophone disticha (L.f.) Herb.	Declining	2731AB
Erythrophleum lasianthum Corbishley	NT	2731AB
Newtonia hildebrandtii (Vatke) Torre var. hildebrandtii	Declining	2731AB
Eulophia speciosa (R.Br. ex Lindl.) Bolus	Declining	2731AB
Cassipourea malosana (Baker) Alston	Declining	2731AB
Boophone disticha (L.f.) Herb.	Declining	2731AA
Crinum bulbispermum (Burm.f.) Milne-Redh. & Schweick.	Declining	2731AA
Merwilla plumbea (Lindl.) Speta	NT	2731AA
Orbea gerstneri (Letty) Bruyns subsp. gerstneri	Rare	2731DA
Warburgia salutaris (G.Bertol.) Chiov.	EN	2731DA
Encephalartos aemulans Vorster	CR	2731DA
Cyrtanthus brachysiphon Hilliard & B.L.Burtt	EN	2731CB
Callilepis leptophylla Harv.	Declining	2731CB
Wahlenbergia pinnata Compton	NT	2731CB
Newtonia hildebrandtii (Vatke) Torre var. hildebrandtii	Declining	2731CB
Gunnera perpensa L.	Declining	2731CB
Melanospermum italae Hilliard	VU	2731CB
Encephalartos aemulans Vorster	CR	2731CB
Senecio ngoyanus Hilliard	VU	2731DD
Albizia suluensis Gerstner	EN	2731DD
Encephalartos natalensis R.A.Dyer & I.Verd.	NT	2731DD
Aloe modesta Reynolds	VU	2731DC
Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.	Declining	2731DC
Clivia gardenii Hook.	VU	2731CD
Clivia miniata (Lindl.) Regel var. miniata	VU	2731CD
Crinum moorei Hook.f.	VU	2731CD
Afroligusticum wilmsianum (H.Wolff) P.J.D.Winter	VU	2731CD
Brachystelma gerrardii Harv.	EN	2731CD
Brachystelma ngomense R.A.Dyer	EN	2731CD
Schizoglossum ingomense N.E.Br.	Threatened	2731CD
Ilex mitis (L.) Radlk. var. mitis	Declining	2731CD
Aloe cooperi Baker subsp. cooperi	Declining	2731CD
Aloe dominella Reynolds	NT	2731CD
Kniphofia triangularis Kunth subsp. obtusiloba (A.Berger)	Rare	2731CD

Species	POSA Threat status	QDS
Codd		
Kalanchoe longiflora Schltr. ex J.M.Wood	VU	2731CC
Drimia altissima (L.f.) Ker Gawl.	Declining	2731CC
Gerbera aurantiaca Sch.Bip.	EN	2730CB
Callilepis leptophylla Harv.	Declining	2730BD
Gerbera aurantiaca Sch.Bip.	EN	2730BD
Sandersonia aurantiaca Hook.	Declining	2730BD
Lotononis amajubica (Burtt Davy) B.-E.van Wyk	Rare	2730BD
Disa maculomarronina McMurtry	NT	2730BD
Crinum bulbispermum (Burm.f.) Milne-Redh. & Schweick.	Declining	2730BB
Aloe kniphofioides Baker	VU	2730BB
Eucomis montana Compton	Declining	2730BB
Merwilla plumbea (Lindl.) Speta	NT	2730BB

2.4 Fauna

2.4.1 Mammals

A database search for mammal species that have been recorded in the 26 QDS grids, on the virtual museum of the Animal Demography Unit (http://www.adu.org.za) was performed. This database forms part of the Department of Biological Science at the University of Cape Town Mammal species that have been recorded in the Kwa-Zulu Natal province, and could possibly occur in the area of interest are discussed below.

Mammal species expected to occur in the area of interest include eight Vulnerable species, two Near Threatened, one Critically Endangered species and two Endangered, as indicated in Table 2-3, as per ADU database searches. The variety of vegetation types occurring in the area of interest ensures an ecologically diverse assemblage of plant species which in turn could support a variety of mammal species, therefore the current expected species list could be more extensive than is currently.

Table 2-3: Protected Mammal species of the Kwa-Zulu Natal Province

Scientific Name	Common Name	KZN	NEMBA TOPS	IUCN
Acinonyx jubatus	Cheetah		VU	VU
Alcelaphus buselaphus	Hartebeest	Protected		
Aonyx capensis	Clawless Otter		Protected	
Cephalophus natalensis	Red duiker	Protected	Rare	LC
Ceratotherium simum	White Rhino	Protected	Protected	NT

Chrysospalax villosus	Rough-haired Golden Mole			VU
Civettictis civetta	Civet		Rare	
Damaliscus lunatis	Tsessebe	Specially Protected	EN	
Diceros bicornis	Black Rhino	Protected	EN	CR
Eidolon helvum	Strawcoloured Fruit Bat			NT
Equus zebra zebra	Cape Mountain Zebra		VU	
Felis nigripes	Small Spotted Cat			VU
Felis serval	Serval	Protected	Rare	
Giraffidae - Giraffa camelopardalis	Giraffe	Protected		
Hippopotamus amphibius	Hippopotamus	Protected	Rare	
Hippotragus equinus	Roan Antelope	Protected	EN	
Hippotragus niger	Sable Antelope	Protected	VU	
Hyaena brunnea	Brown Hyaena		Rare	
Kobus ellipsiprymnus	Waterbuck	Protected		
Loxodonta africana	Elephant	Protected	Protected	VU
Lutra maculicollis	Spottednecked Otter			NT
Lycaon pictus	African Wild Dog	Protected	EN	EN
Manis temminckii	Pangolin	Protected	VU	VU
Mellivora capensis	Honey Badger	Protected		LC
Mystromys albicaudatus	Whitetailed Mouse			EN
Neotragus moschatus	Suni	Protected	Protected	
Oreotragus oreotragus	Klipspringer	Protected		
Ourebia ourebi	Oribi	Protected	EN	LC
Panthera leo	Lion		VU	VU
Panthera pardus	Leopard			VU
Pelea capreolus	Grey Rhebuck	Protected		
Philantomba monticola	Blue Duiker	Protected	VU	
Raphicerus campestris-	Steenbok	Protected		
Redunca arundinum	Reedbuck	Protected		
Tragelaphus strepsiceros	Kudu	Protected		
Vulpes chama	Cape Fox	Protected		

The bat species of special concern are listed below in Table 2-4, from this we can see that 21 bat species of conservation concern can possibly be present in the area of interest.

Table 2-4: Protected Bat Species

Common Name	Scientific Name	NEMBA	IUCN	Habitat preference
Sundevall's roundleaf bat	*Hipposideros caffer*	DD	LC	-
Anchieta's pipistrelle	*Hypsugo anchietae*	**NT**	LC	Afromontane forest, coastal forest or bushveld
Damara woolly bat	*Kerivoula argentata*	**EN**	LC	Moist savanna habitats (including bushveld) (Taylor 2000). Roosting sites include deserted weaver bird nests, among clusters of leaves, on the bark of trees, and on traditional houses (rondavels).
Lesser woolly bat	*Kerivoula lanosa*	**NT**	LC	Variety of habitats, ranging from lowland tropical moist forest, to dry woodland, and both dry and moist savanna. Animals have often been encountered roosting in abandoned bird nests
Botswana long-eared bat (Near Endeminc)	*Laephotis botswanae*	**V**	LC	Dry and moist savanna, and heathland habitats. It is often found in the vicinity of rivers. This species is prefers habitats at higher elevations (Happold and Happold 1997). It is reported to occur under the bark of trees, usually in pairs
De Winton's long-eared bat	*Laephotis wintoni*	**V**	LC	Dry savanna, mediterranean like shrubby vegetation, and high altitude grassland, and bushveld
Lesser long-fingered bat (Endemic)	*Miniopterus fraterculus*	**NT**	LC	Distribution in KwaZulu-Natal indicates a wide range of habitats from drier Valley bushveld and Lowveld to moister Mistbelt (including forest habitats), where suitable cover is present in the form of caves, overhangs, and unused mine and railway tunnels. Roosts in caves, overhangs, disused mines, railway tunnels and similar habitats (Skinner and Chimimba 2005). In

				KwaZulu-Natal it has been found in damp sandstone caves, a solution cave of poorly consolidated glacio-fluvial boulder clay, a rocky overhang over a forest stream, a rock fissure, a railway tunnel as well as from unused mine adits.
Greater long-fingered bat	*Miniopterus natalensis*	**NT**	NT	Dry and moist savanna, and Mediterranean-type shrubby vegetation. It is generally a cave roosting species also found in similar habitats such as disused mines.
Rufous mouse-eared bat	*Myotis bocagii*	DD	LC	-
Temminck's hairy bat	*Myotis tricolor*	**NT**	LC	Dry and moist savanna, and Mediterranean-type shrubby vegetation. The species roosts in caves and abandoned mines. It appears to prefer larger caves that are relatively undisturbed, usually ones that contain large pools of water
	Myotis welwitschii	**NT**	LC	Tropical dry forest, montane tropical moist forest, both dry and moist savanna, shrublands, and high altitude grassland. Animals have been encountered roosting in buildings, caves and dense vegetation (including rolled banana leaves).
-	*Neoramicia nana*	LC	LC	-
Cape serotine bat	*Neoromicia capensis*	LC	LC	
Rendall's serotine bat	*Neoromicia rendalli*	**CR**	LC	Natural habitats are dry savanna, moist savanna, subtropical or tropical dry shrubland, and subtropical or tropical moist shrubland
Hairy slit-faced bat	*Nycteris hispida*	**NT**	LC	Moist savanna, dry savanna, papyrus swamps and marsh. Colonies roost in hollow trees, dense bushes, caves, holes in

				termite colonies and similar habitats. Colonies range in size from individual and pairs of animals to up to 20 bats
Large-eared free-tailed bat	*Otomops martiensseni*	**V**	NT	Moist forest to semi arid environments, and in some instances have been found to be common in urban and suburban areas, foraging in areas of intensive agricultural operations, roost in caves, disused tunnels, trees, hollows and on vegetation.
Blasius's horseshoe bat	*Rhinolophus blasii*	**V**	NT	Summer roosts are situated in natural and artificial underground sites, with attics also being used in the northern part of the range. In winter, it hibernates in underground sites. This species is considered to be sedentary (Hutterer et al. 2005).
Geoffroy's horseshoe bat	*Rhinolophus clivosus*	**NT**	LC	Savanna woodland, Mediterranean-type shrubland, dry (and possibly moist) savanna, open grasslands and semi-desert to even more arid environments. Roosting has been recorded in caves, rock cervices, disused mines, and various rural and urban buildings
Darling's horseshoe bat	*Rhinolophus darlingi*	**NT**	LC	Savanna and savanna-woodland type habitats. It is dependant on caves, mines, broken rocky areas, buildings and similar structures as roost sites
Swinny's horseshoe bat	*Rhinolophus swinnyi*	**EN**	NT	Moist montane rainforest, and dry and moist savanna. Populations are dependent on caves, mines and similar habitats for roosting. It appears to be sparsely distributed in parts of its range
Light-winged lesser house bat	*Scotoecus albofuscus*	**V**	DD	Occurs in dry savanna habitats

2.4.2 Reptiles

Reptiles are ectothermic (cold-blooded) meaning they are organisms that control body temperature through external means. As a result reptiles are dependent on environmental heat sources. Due to this many reptiles regulate their body temperature by basking in the sun, or in warmer areas. Substrate is an important factor determining which habitats are suitable for which species of reptile.

According the Animal demography unit's virtual museum a total of 60 species have been recorded in the relevant QDS grids in the past (http://sarca.adu.org.za/). Only three protected species are expected to occur within the transmission line corridors and sub-stations.

Table 2-5: Kwa-Zulu Natal Province Expected Reptile Species

Scientific	Common	KZN	NEMBA TOPS	IUCN
Acanthocercus atricollis atricollis	Southern Tree Agama			Not Listed
Acontias plumbeus	Giant Legless Skink			LC
Afroedura marleyi	Marley's Flat Gecko			Not Listed
Afrotyphlops bibronii	Bibron's Blind Snake			Not Listed
Afrotyphlops schlegelii	Schlegel's Beaked Blind Snake			Not Listed
Agama aculeata distanti	Distant's Ground Agama			Not Listed
Aparallactus capensis	Black-headed Centipede-eater			LC
Atractaspis bibronii	Bibron's Stiletto Snake			Not Listed
Bitis arietans arietans	Puff Adder			Not Listed
Bitis gabonica	Gaboon Adder		Protected	Not Listed
Boaedon capensis	Brown House Snake			Not Listed
Bradypodion setaroi	Setaro's Dwarf Chameleon			LC
Causus defilippii	Snouted Night Adder			Not Listed
Causus rhombeatus	Rhombic Night Adder			Not Listed
Chamaeleo dilepis dilepis	Common Flap-neck Chameleon			Not Listed
Chondrodactylus turneri	Turner's Gecko			Not Listed
Cordylus vittifer	Common Girdled Lizard			Not

Scientific	Common	KZN	NEMBA TOPS	IUCN
				Listed
Crocodylus niloticus	Nile Crocodile		VU	Lower Risk/least concern
Dasypeltis scabra	Rhombic Egg-eater			LC
Dispholidus typus typus	Boomslang			Not Listed
Dispholidus typus viridis	Northern Boomslang			Not Listed
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard			Not Listed
Hemidactylus mabouia	Common Tropical House Gecko			Not Listed
Homopholis wahlbergii	Wahlberg's Velvet Gecko			Not Listed
Kinixys zombensis	Eastern Hinged Tortoise			Not Listed
Lamprophis guttatus	Spotted House Snake			Not Listed
Lycophidion capense capense	Cape Wolf Snake			Not Listed
Lygodactylus capensis capensis	Common Dwarf Gecko			Not Listed
Matobosaurus validus	Common Giant Plated Lizard			Not Listed
Naja melanoleuca	Forest Cobra			Not Listed
Naja mossambica	Mozambique Spitting Cobra			Not Listed
Nucras intertexta	Spotted Sandveld Lizard			Not Listed
Nucras ornata	Ornate Sandveld Lizard			Not Listed
Pachydactylus maculatus	Spotted Gecko			LC
Pachydactylus vansoni	Van Son's Gecko			LC
Panaspis wahlbergi	Wahlberg's Snake-eyed Skink			Not Listed
Pelomedusa galeata	South African Marsh Terrapin			Not Listed
Pelusios castanoides	Yellow-bellied Hinged Terrapin			Lower Risk/least concern
Pelusios sinuatus	Serrated Hinged Terrapin			Not Listed
Philothamnus hoplogaster	South Eastern Green Snake			Not Listed
Philothamnus natalensis	Western Natal Green			Not

Scientific	Common	KZN	NEMBA TOPS	IUCN
occidentalis	Snake			Listed
Platysaurus intermedius natalensis	Natal Flat Lizard			Not Listed
Prosymna stuhlmannii	East African Shovel-snout			Not Listed
Psammophis brevirostris	Short-snouted Grass Snake			Not Listed
Pseudocordylus melanotus melanotus	Common Crag Lizard			Not Listed
Python natalensis	Southern African Python		Protected	Not Listed
Rhoptropus boultoni boultoni	Boulton's Namib Day Gecko			Not Listed
Scelotes mirus	Montane Dwarf Burrowing Skink			Not Listed
Smaug barbertonensis	Baberton Girdled Lizard			Not Listed
Smaug warreni	Warren's Girdled Lizard			Not Listed
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake			Not Listed
Tetradactylus africanus	Eastern Long-tailed Seps			LC
Thelotornis capensis capensis	Southern Twig Snake			Not Listed
Trachylepis margaritifera	Rainbow Skink			Not Listed
Trachylepis punctatissima	Speckled Rock Skink			LC
Trachylepis striata	Striped Skink			Not Listed
Trachylepis varia	Variable Skink			Not Listed
Varanus albigularis albigularis	Rock Monitor			Not Listed
Varanus niloticus	Water Monitor			Not Listed
Zygaspis vandami arenicol	Maputoland Dwarf Worm Lizard			Not Listed

2.4.3 Amphibians

Amphibians are viewed be good indicators of changes to the whole ecosystem because they are sensitive to changes in the aquatic and terrestrial environments (Waddle, 2006). Most species of amphibians are dependent on the aquatic environment for reproduction (Duellman and Trueb 1986). Additionally, amphibians are sensitive to water quality and ultra violet radiation because of their permeable skin (Gerlanc and Kaufman 2005). Activities such

as feeding and dispersal are spent in terrestrial environments (Waddle, 2006). According to Carruthers (2009), a number of factors influence the distribution of amphibians, but because amphibians have porous skin they generally prosper in warm and damp habitats. The presence of suitable habitat within the study area should provide a number of different species of amphibians.

According to Carruthers (2009), frogs occur throughout southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore a collection of amphibians associated with the Grassland and Bushveld biome will all choose to breed under the prevailing biotic and abiotic features present. Further niche differentiation is encountered by means of geographic location within the biome, this differentiation includes, banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the area of interest. Amphibians expected to occur on site are listed in the Table 2-6 below (http://sarca.adu.org.za/). No protected amphibian species are expected to occur on site as per this information, no NEMBA protected species are expected to occur.

Table 2-6: Expected Amphibian Species

Scientific Name	Common Name	KZN	NEMBA	IUCN
Afrixalus delicatus	Delicate Leaf-folding Frog			LC
Afrixalus fornasinii	Greater Leaf-folding Fro			Not Listed
Amietia quecketti	Queckett's River Frog			Not Listed
Arthroleptis wahlbergi	Bush Squeaker			Not Listed
Breviceps adspersus	Bushveld Rain Frog			LC
Breviceps sopranus	Whistling Rain Frog			LC
Cacosternum nanum	Bronze Caco			LC
Chiromantis xerampelina	Southern Foam Nest Frog			LC
Hemisus marmoratus	Spotted Shovel-nosed Frog			LC
Hyperolius argus	Argus Reed Frog			LC
Hyperolius marmoratus	Painted Reed Frog			LC
Hyperolius semidiscus	Yellowstriped Reed Frog			LC
Hyperolius tuberilinguis	Tinker Reed Frog			LC
Kassina maculata	Redlegged Kassina			LC
Kassina senegalensis	Bubbling Kassina			LC
Leptopelis mossambicus	Brownbacked Tree Frog			LC
Phrynobatrachus mababiensis	Dwarf Puddle Frog			LC
Phrynobatrachus natalensis	Snoring Puddle Frog			LC
Ptychadena anchietae	Plain Grass Frog			LC
Ptychadena mascareniensis	Mascarene Grass Frog			LC
Ptychadena mossambica	Broadbanded Grass Frog			LC

Ptychadena oxyrhynchus	Sharpnosed Grass Frog			LC
Pyxicephalus edulis	African Bull Frog			LC, Decreasing
Schismaderma carens	Red Toad			LC
Sclerophrys garmani	Olive Toad			Not Listed
Sclerophrys gutturalis	Guttural Toad			Not Listed
Sclerophrys maculata	Flatbacked Toad			Not Listed
Strongylopus wageri	Plain Stream Frog			LC
Tomopterna cryptotis	Tremelo Sand Frog			LC
Tomopterna natalensis	Natal Sand Frog			LC
Xenopus laevis	Common Platanna			LC
Xenopus muelleri	Tropical Platanna			LC

2.4.4 Invertebrates

Butterflies are a good indication of the habitats available in a specific area (Woodhall 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope (specific habitat requirements with populations concentrated in a small area) species which may be very specialised (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and to identify.

2.5 Identification of Environmental Sensitivities

In terms of ecological sensitivity, the following features are assessed to determine how sensitive the habitat identified within the transmission line corridors is:

- Presence or absence of Red Data or protected plant and animal species;
- Presence or absence of exceptional species diversity;
- Extent of intact habitat in good ecological condition in the absence of disturbance; and
- Presence or absence of important ecosystems such as Protected Areas, areas demarcated for future protected area status (NPAES) and wetlands.

Terrestrial conservation priorities highlighted in the Terrestrial Systematic Conservation Plan (CPLAN) for the Province (EKZNW, 2010) are shown in Figure 2-3. According to this plan, the majority of the project site and proposed corridors fall within areas known as Biodiversity areas, all the alternatives cross Critical Biodiversity areas 1 Mandotory, or Critical Biodiversity areas Optimal. The existing protected area network is not affected by the corridors or sub stations.

Biodiversity Priority Areas (BPAs) refer to natural areas that are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. The

importance of the biodiversity features in Biodiversity Priority Areas and the associated ecosystem services is sufficiently high that, if their existence and condition are confirmed, the likelihood of a fatal flaw for new development projects is high (i.e. development projects are likely to be significantly constrained or may not receive necessary environmental authorizations).

Table 2-7: KZN C-Plan Sensitivity

Corridor	Route option	Level of interaction	Sensitivity
Normandie - Iphiva	Iphiva 1 - Iphiva 3	Major	High
	Iphiva 2 - C	Major	High
	C - B	Major	High
	B - F	Major	High
	B - A	Minimal	Moderate
	A - E	None	Low
	E - F	Intermediate	Moderate
	E - D	Major	High
Duma - Iphiva	West 1	Major	High
	West 2	Major	High
	East	Major	High

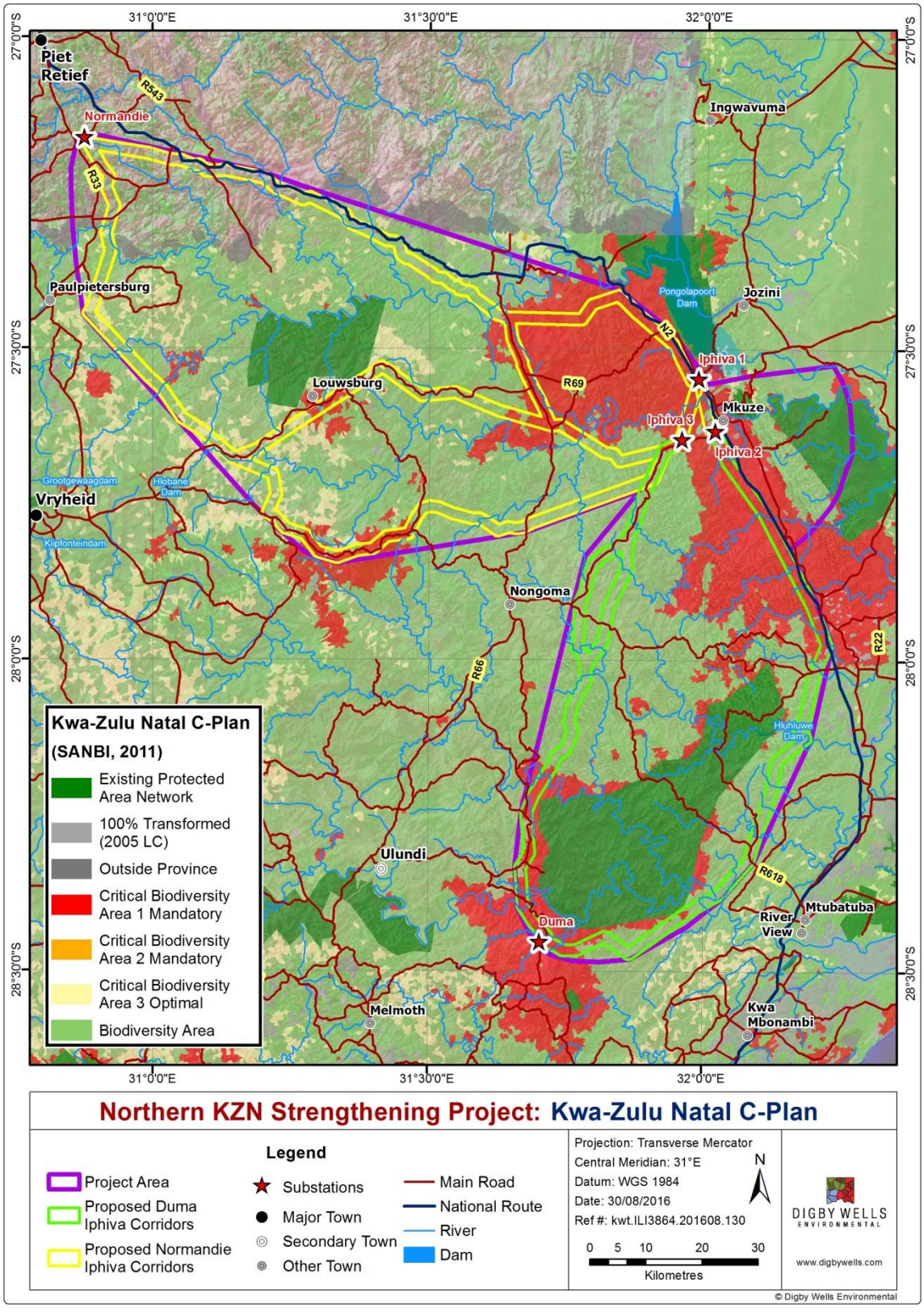

Figure 2-3: Kwa-Zulu Natal C-Plan (SANBI 2011)

2.5.1 Critical Biodiversity Areas including Centres of Endemism (adapted from conservation.org)

The transmission line corridors and substations falls within the Maputaland-Pondoland Centre of Endemism, this is a biodiversity hotspot. Stretching along the east coast of southern Africa, from southern Mozambique through KwaZulu-Natal and the Eastern Cape in South Africa, the recently recognized Maputaland-Pondoland-Albany Hotspot is an exceptionally diverse area (Figure 2-4).

The hotspot is the meeting point of six of South Africa's eight major vegetation types. The region boasts an unusually high number of unique species and ecosystems, with one type of forest (sand forest), six types of bushveld and five types of grassland restricted to the hotspot, as well as an entire vegetation type called "subtropical thicket."

The hotspot is a refuge for the critically endangered Black Rhino. It is estimated that only 3,600 Black Rhino remaining in the wild (compared with 65,000 animals recorded in the 1970s), most of which are restricted to this hotspot.

The hotspot is also home to most of South Africa's natural forests, and with nearly 600 tree species it has the highest tree diversity of any temperate forest in the world. The region is home to the 'Big Five' game animals (elephant, lion, rhino, leopard and Cape buffalo).

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan (Figure 2-4), these are discussed in the C-Plan write up.

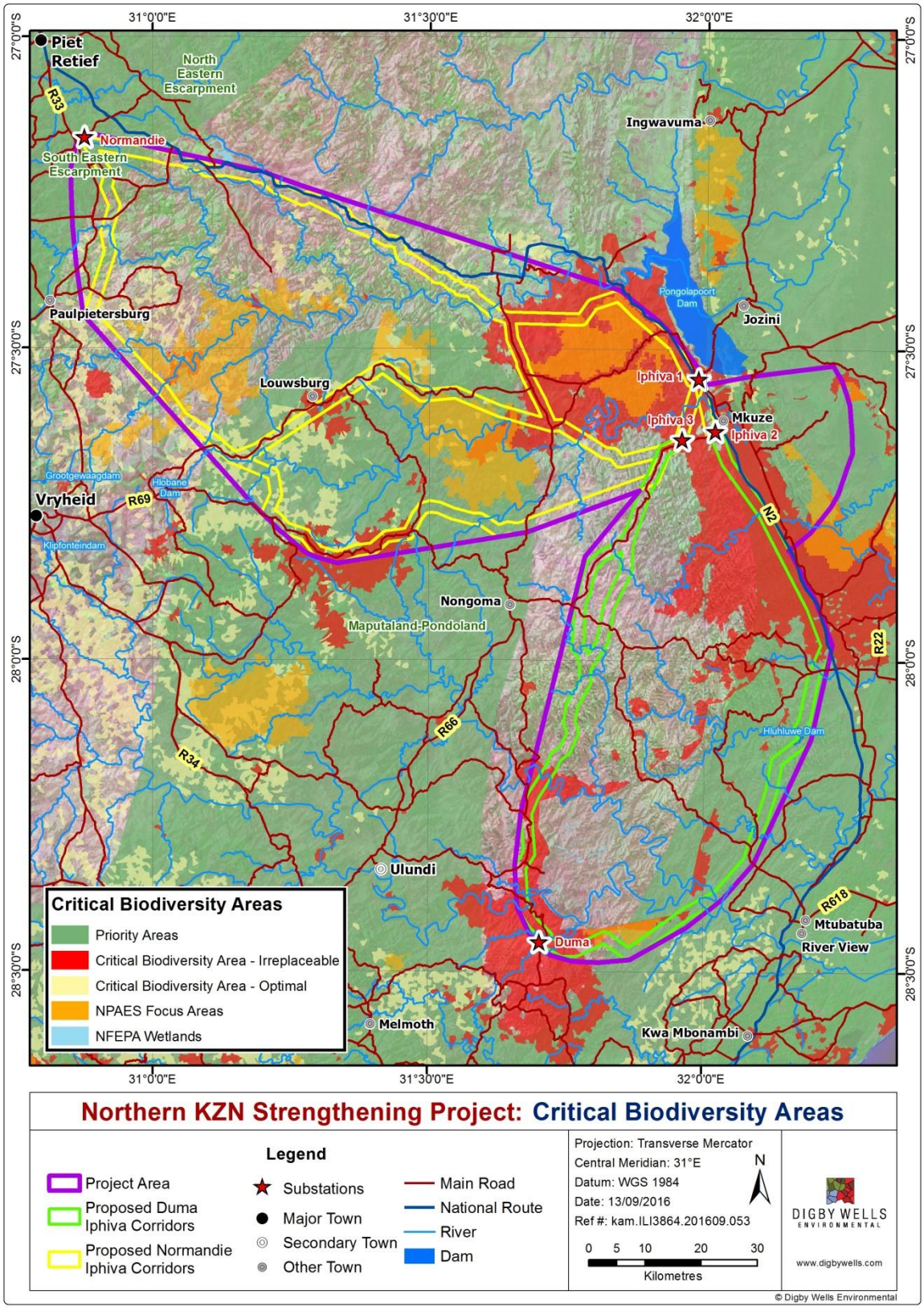

Figure 2-4: Critical Biodiversity Areas, including Centres of Plant Endemism

2.5.2 Sensitivity and Conservation Planning Tools

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as meeting biodiversity targets for the country's variety of ecosystems. These guides are essential to consult for development projects, and will form an important part of the sensitivity analysis. Areas earmarked for conservation in the future, or that are essential to meet biodiversity and conservation targets should not be developed, and have a high sensitivity as they are necessary for overall functioning. In addition, sensitivity analysis in the field based in much finer scale data can be used to ground truth the larger scale assessments and put it into a more localised context, once field work is complete.

2.5.2.1 Protected areas

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impact on these areas are concerned. The interaction between the corridors and protected areas network is evaluated from a sensitivity point of view in Table 2-8.

Table 2-8: Protected Areas Interaction

Corridor	Route option	Level of interaction	Sensitivity
Normandie - Iphiva	Iphiva 1 - Iphiva 3	None	Low
	Iphiva 2 - C	None	Low
	C - B	None	Low
	B - F	None	Low
	B - A	None	Low
	A - E	None	Low
	E - F	Minor	Moderate
	E - D	Minor	Moderate
Duma - Iphiva	West 1	Minor	Moderate
	West 2	Minor	Moderate
	East	Major	High

Protected areas that occur within the broader study are, but not directly affected by infrastructure placement are (South African Protected Areas Database (2016):

- Bendor Private Nature Reserve;
- Corridor Game Reserve;
- Hluhluwe Game Reserve;
- iSimangaliso Wetland Park;
- Itala Nature Reserve;
- Mandlakazi Community Nature Reserve;

- Mduna Royal Game Reserve;
- Mkuzi Game Reserve;
- Ntendeka Wilderness Area;
- Obuka Community Nature Reserve;
- Skaapkraal Private Nature Reserve;
- Somkhanda Game Reserve;
- Somopho Community Nature Reserve;
- Thanda Private Game Reserve;
- Ubombo Mountain Nature Reserve;
- Umfolozi Game Reserve;
- Umkoonyan No1 Private Nature Reserve;
- Umkoonyan No2 Private Nature Reserve;
- Welkom Private Nature Reserve;
- Witbad Nature Reserve; and
- Zululand Rhino Reserve.

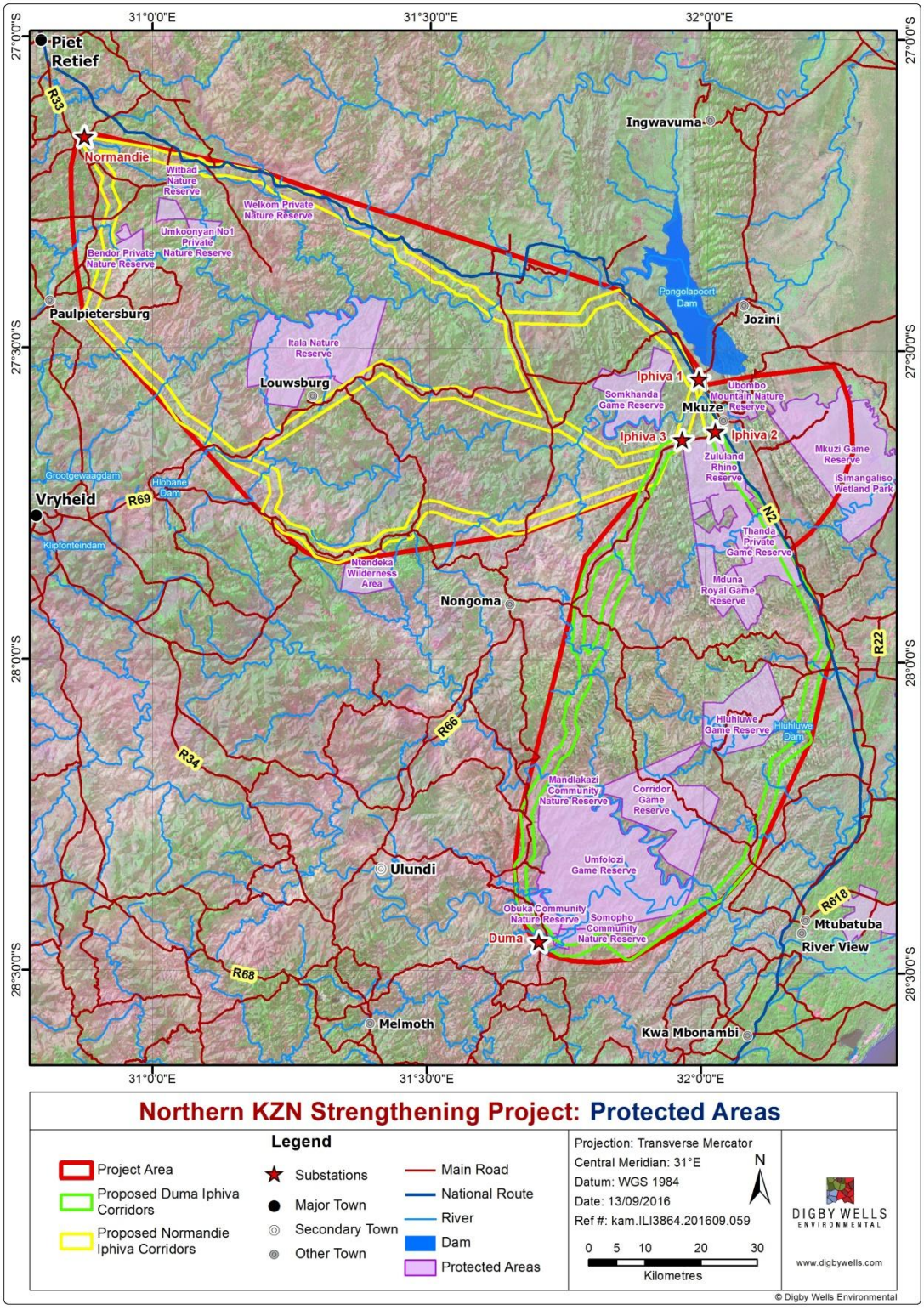

Figure 2-5: Protected area in relation to the study site

2.5.2.2 Nationally Threatened Ecosystems

The list of national Threatened Ecosystems has been gazetted (NEM:BA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion; and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments, namely:

- The South African Vegetation Map (Mucina and Rutherford 2012);
- National forest types recognised by the Department of Water Affairs and Sanitation (DWS);
- Priority areas identified in a provincial systematic biodiversity plan (Terrestrial Systematic Conservation Plan (CPLAN) for the Province (EKZNW, 2010)); and
- High irreplaceability forest patches or clusters identified by DWS.

The criteria for identifying threatened terrestrial ecosystems include six criteria overall, two of which are dormant due to lack of data (criteria B and E). The criteria are presented in Table 2-9 below.

Table 2-9: Criteria for the listing of National Threatened Ecosystems

Criterion	Details
A1	Irreversible loss of natural habitat
A2	Ecosystem degradation and loss of integrity
B	Rate of loss of natural habitat
C	Limited extent and imminent threat
D1	Threatened plant species associations
D2	Threatened animal species associations
E	Fragmentation

F	Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

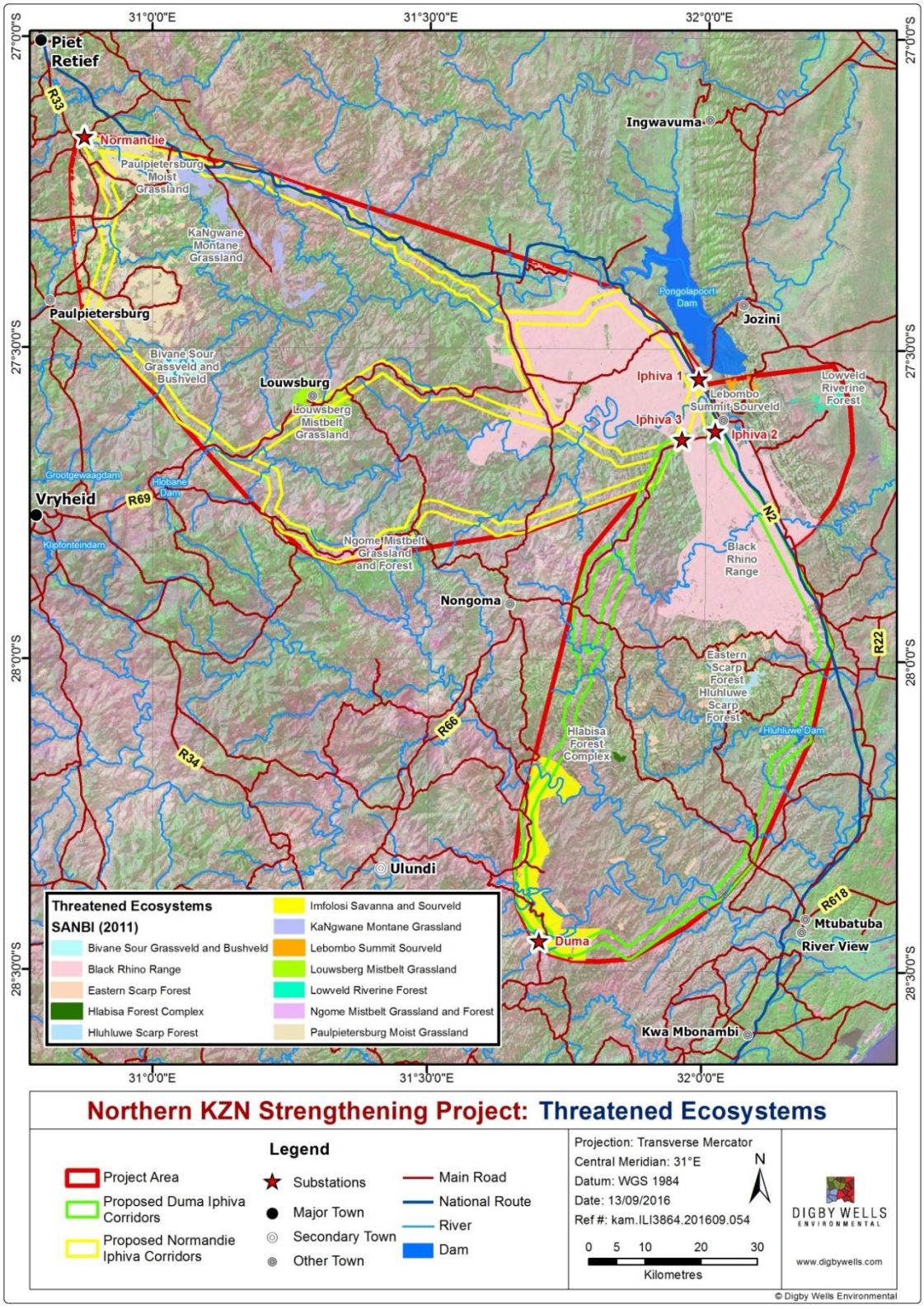

Figure 2-6: Nationally Threatened Ecosystems

Table 2-10: Nationally Threatened Ecosystems Sensitivity

Corridor	Route option	Level of interaction	Sensitivity
Normandie - Iphiva	Iphiva 1 - Iphiva 3	Major	High
	Iphiva 2 - C	Major	High
	C - B	Major	High
	B - F	Major	High
	B - A	Major	High
	A - E	Major	High
	E - F	Major	High
	E - D	Moderate	Moderate
Duma - Iphiva	West 1	Major	High
	West 2	Major	High
	East	Major	High

The Nationally Protected Ecosystems that are present in the project are:

- Bivane Sour Grassland and Bushveld (VU);
- Black Rhino Range (VU);
- Eastern Scarp Forest (VU);
- Hlabisa Forest Complex (EN);
- Hluhluwe Scarp Forest (VU);
- Imfolosi Savanna and Sourveld (VU);
- KaNgwane Montane Grassland (VU);
- Lebombo Summit Sourveld (VU);
- Louwsberg Riverine Forest (VU);
- Ngome Mistbelt Grassland and Forest (EN).

2.5.2.3 National Protected Areas Expansion Strategy (NPAES)

The NPAES are areas designated for future incorporation into existing protected areas (both National and informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning.

Table 2-11: NPAES Sensitivity

Corridor	Route option	Level of interaction	Sensitivity
Normandie - Iphiva	Iphiva 1 - Iphiva 3	None	Low
	Iphiva 2 - C	None	Low
	C - B	Major	High

	B - F	Minimal	Low
	B - A	None	Low
	A - E	Minimal	Low
	E - F	Moderate	Moderate
	E - D	None	Low
Duma - Iphiva	West 1	None	Low
	West 2	None	Low
	East	Minimal	Low

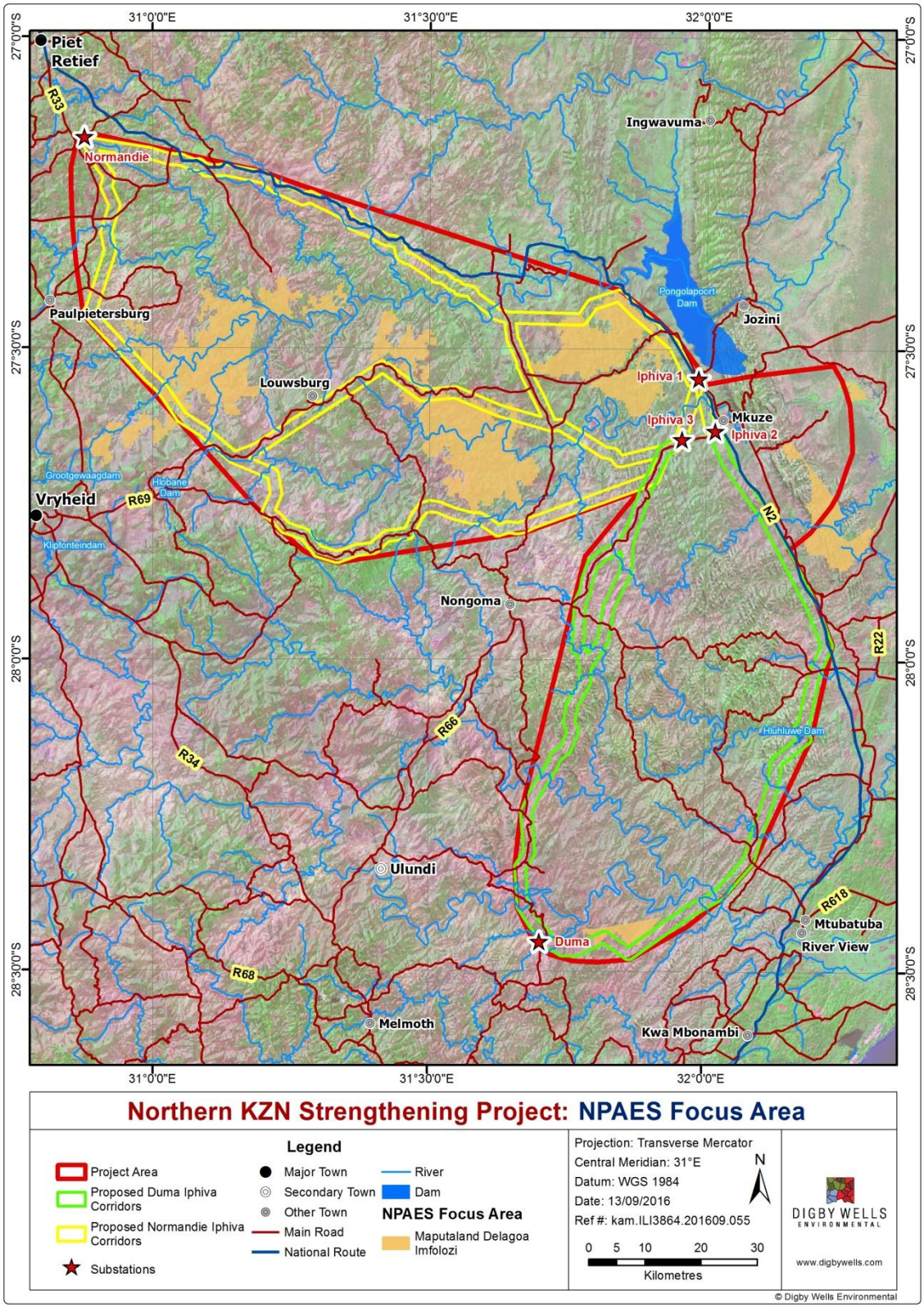

Figure 2-7: NPAES Focus Areas

3 Sensitivity Analysis

The sensitivity analysis[1] considers the fauna and flora desktop presented in Section 2 against the proposed routing alternatives for the 120 km Normandie – Iphiva and 130 km Duma – Iphiva corridor options.

The compilation of the sensitivity map involved the following steps:

- The identification of baseline desktop information comprising:
  - KZN C-Plan;
  - Formally protected areas;
  - Threatened Ecosystems and
  - National Protected Aras Expansion strategy.
- Identifying where the above intersect with the two corridors routing options;
- Assigning a rating based on a high, medium and low rating scale where sensitivity is equal to the corridors affecting the areas designated as sensitive;
- Mapping of the identified sensitive areas using the ArcGIS 10 Geographic Information System (GIS) to visually display the determined sensitivities.

Table 3-1: Sensitivity Rating

Corridor	Route option	C-Plan	Protected Areas	Threatened Ecosystems	NPAES
Normandie - Iphiva	Iphiva 1 - Iphiva 3	High	Low	High	Low
	Iphiva 2 - C	High	Low	High	Low
	C - B	High	Low	High	High
	B - F	High	Low	High	Low
	B - A	Moderate	Low	High	Low
	A - E	Low	Low	High	Low
	E - F	Moderate	Moderate	High	Moderate
	E - D	High	Moderate	Moderate	Low
Duma - Iphiva	West 1	High	Moderate	High	Low
	West 2	High	Moderate	High	Low
	East	High	High	High	Low

[1] It must be noted that the identified sensitivities are based on desktop research that will be verified during site investigations still to be completed.

From the Table 3-1 the route options and the sensitivity receptors are combined and rated as low, moderate and high sensitivity. High sensitivity areas are to be avoided all costs where Moderate sensitive areas can be used with mitigation measures in place, and Low sensitivity where the development can take place with mitigation measure in place.

4 Potential Impacts

4.1 Project activities

The project activities will include the following:

	GN R 983 - Listing Notice 1
19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing , dredging, excavation, removal or moving (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.
24	The development of- (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding- (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or (b) roads where the entire road falls within an urban area.
56	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 meters; excluding where widening or lengthening occur inside urban areas.
	GN R 984 - Listing Notice 2
9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex. The development of facilities or infrastructure for marine telecommunication.

15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.

4.2 Potential Impacts Identified

The construction of surface infrastructure within the proposed corridor and sub-station footprint area will entail the removal/clearing of vegetation, which will affect the current vegetation types present in these areas. In addition, habitat utilised by certain mammals, amphibians, reptiles and birds species will also be lost. Open areas will facilitate the establishment of alien invasive plant species. This can be controlled with compilation and implementation and regular monitoring of an AIP management plan. Protected plant and animal species will also be affected by construction activities, this must be addressed through a species of special concern management plan. Impacts can be dressed through avoidance, mitigation, rehabilitation, compensation and offsets.

Table 4-1: Identified Potential Impacts

Environmental Aspect	Project Activity	Potential Impact	Project Phase	Proposed Mitigation Type	Potential for Residual Risk
Flora and Fauna	A 55m servitude (27.5 m on either side of the centre line) is required to accommodate the towers for the 400 kV line on which the overhead line will be strung.	During the construction phase habitat destruction takes place in certain areas such as the sub stations, footprint of the transmission lines, and access roads. Degradation of habitat occurs within the servitude where trees are kept at a certain height. Possible destruction of Red Data plant species.	Construction	Removal of vegetation during construction and operation must be minimised and strictly kept to the designated project site to reduce the risk of open areas occurring; Protected plant species encountered may not be disturbed without permits; (avoidance as far as practical possible, if not possible relocation of red data flora species Protected animal species encountered may not be disturbed without applicable permits (avoidance as far as practical possible, if not possible relocation of red data faunal species or rehabilitated areas to provided preferred habitat? The footprint of the area	Aline invasive plants spreading. Potential impacts and displacement of Red Data /protected fauna and flora species; Loss of threatened Ecosystems Erosion occurring in open areas

Environmental Aspect	Project Activity	Potential Impact	Project Phase	Proposed Mitigation Type	Potential for Residual Risk
				disturbed by the operation must have natural vegetation restored through rehabilitation.	
	Vehicular movement and access during construction and operation	Uncontrolled vehicle access can result in unnecessary loss of indigenous and riparian vegetation and preferred habitat for nesting bird species.	Construction and Operation	Adhere to designated paths and roads; and Do not drive in sensitive areas.	Impacts of sensitive areas; Poaching if access are not controlled; Veld fires;
	Site clearing for infrastructure placement including the increased traffic to complete the activity.	Creation of open areas that promote alien vegetation establishment	Construction and Operation	Alien invasive and weed species management plan must be in place;	AIP establishment in disturbed areas if not rehabilitated properly

Table 4-2: Identified Potential Project Risks

Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Project Phase
Poaching	Fauna	Construction/Operation

Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Project Phase
Plant Collection	Flora	Construction/Operation
Fires	Fauna and Flora	Construction

5 Terms of Reference and Plan of Study

5.1 Objectives of the Study

This specialist study serves to undertake a an ecological assessment of the local flora and fauna communities associated with the transmission line corridors and associated infrastructure to determine the current state of these components. Information generated from this survey will be been used to address the impacts that the construction, operational and decommissioning activities will have on this environment. To achieve this aim the following objectives were considered:

- To delineate the various vegetation/habitat types and describe their sensitivity, present within the study area;
- To determine if any flora and fauna species or assemblages will be directly impacted upon by the proposed mining activities and its associated infrastructure. This includes flora and fauna communities present, the state of these communities and the identification of possible Red Data species in accordance with the International Union for the Conservation of Nature (IUCN), National and Provincial criteria; and
- To undertake an assessment of the impacts associated with various activities on the health of the flora and fauna species or assemblages; and to recommend measures that should be included in the EMP to prevent or limit impacts to flora and fauna species or assemblages.

5.2 Methodology for Fauna and Flora Impact Assessment

The field surveys will take place after the final route alignment has been finalised, thereafter the final route will be surveyed with specific reference to high sensitive areas as described in this document.

5.2.1 Flora and Fauna Assessment

The surveys and reporting for Eskom's Northern KZN strengthening project will be completed in accordance with the following legislation and guideline documents:

- Section 24 of the Constitution – Environment, 1996 (Act No. 108 of 1996);
- Section 5 of the National Environmental Management Act, 1998 (Act No. 108 of 1998);
- National Environmental Management Biodiversity Act, 2004 (NEMBA, Act No. 10 of 2004); and
- Guidelines for Biodiversity Impact Assessments in KZN, 2003 (February 2013, Ezemvelo KZN Wildlife).

- International Union for the Conservation of Nature (IUCN) Red List (IUCNRedList.org 2016-2);
- The National Forests Act, 1998 (Act No. 84 of 1998) Protected Trees, and
- The National Environmental Biodiversity Act, 2004 (Act 10 of 2004), Threatened and Protected Species.
- The National Environmental Biodiversity Act, 2004 (Act 10 of 2004): Alien Invasive Regulations (2014)
- The National Environmental Biodiversity Act, 2004 (Act 10 of 2004): Alien and Invasive Species Lists (2016.

5.2.2 Vegetation Survey

A floristic survey will be conducted during the growing season (the rainy season when most plants are in flower or seeding, November to April) to determine the species composition of the project area. If drought conditions prevail, the survey will be completed after summer rains have arrived. This will give an indication of the actual species present within the project site (corridors and sub-stations) and these will be discussed in context of plant communities within the ecosystem of the area. The protected, endemic, exotic, alien invasive and culturally significant species will also be discussed as separate issues and related back to relevant legal requirements. Furthermore the identification of red data and protected species as listed according to the IUCN List, NEMBA and other Provincial legislation will be completed. Forest vegetation as identified in this report is present and will be surveyed during summer months, during such a survey the forest edge and ecotone will be also be included.

Depending on the vegetation and terrain the Braun-Blanquet sampling method, belt or line transect methods will be used during vegetation assessments, however should dominant vegetation types require other methods be used, then these shall be motivated. The Braun-Blanquet method allows for the following to be compiled:

- Vegetation classification regarding plant communities within the pre-determined survey points along the final route alignment project area and sub communities and variations of these;
- Species list for each plant community, including diagnostic and dominant species.
- Invasive species (if present) for each plant community;
- Exotic species (if present) for each plant community;
- Protected and/or endemic species for each plant community; and
- Culturally significant plant species within each community.

5.2.3 Faunal Survey

Field surveys will be conducted concurrently with vegetation surveys and all animals observed in the area will be noted. Detailed fauna lists will be generated and discussed and related back to the floristic component of the final transmission line route allignment. The probability of occurrence for species not observed during field surveys will be updated if applicable regarding available habitats. Protected and endemic species will be the focus of discussion. Diurnal and nocturnal surveys will be performed. The number of sample plots will vary for each component of the faunal survey.

The current status of the faunal environment will be determined and an evaluation of the extent of site-related effects in terms of certain ecological indicators, as well as identification of specific important ecological attributes such as rare and endangered species, protected species, sensitive species and endemic species will be made. The faunal environment and habitat will be characterised in relation to biota and the extent of site related effects. Presence of red data and protected species will be indicated on a map. The deliverables include:

5.2.3.1 Mammals

A list of all potential mammals will be compiled by means of desktop study and all potential red data species will be highlighted with short habitat descriptions.

The presence of mammals will be recorded using tracks, dung, ecological indicators, camera traps, non-fatal traps (Sherman traps) and visual sightings of the animals themselves, sample sites will cover all habitat available for mammals' species within the study area.

A field visit will be used to various bat habitats present within which the presence of bats will be confirmed using the EM3 bat detector. Vehicle transects will be driven to cover as much of the transmission line corridor as possible during the time available on site. The EM3 calls will be downloaded and analysed in Analook after being converted to zero crossing files. Noise files were filtered out using Wildlife Acoustics' WAC to WAV converter.

A full survey to determine species richness will be carried out. The following will be recorded during the mammal survey:

- All mammals encountered or noted during the surveys will be recorded;
- Tracks and dung of mammals encountered during the survey will be, where possible, identified and recorded (if possible);
- A list of the most prominent mammal species will be compiled;
- A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled;
- A list of protected species that occur on the potential list but not recorded during the site visits or surveys; and

- A list of exotic or introduced vertebrate species occurring on the property.

5.2.3.2 *Amphibians and Reptiles*

Reptiles and Amphibians will be sampled using both active and passive sampling techniques. Active searching will be done and as many as possible caught, identified and photographed using the rubber band technique. Sample sites will be concentrated in areas where habitat that could support reptile and amphibian species are found. Passive sampling will include drift fence arrays and pitfall traps where possible. Amphibians will be sampled using active methods such as netting during their hours of activity (night). Burrowing species will be surveyed after rains, where possible. Passive sampling methods will include pitfall traps and sound recordings where possible:

- All frogs, snakes, lizards and tortoises encountered or noted during the surveys will be recorded;
- A list of the most prominent amphibian and reptile species will be compiled;
- A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled; and
- A list of protected species that occur on the potential list but not recorded during the site visits or surveys.

5.2.3.3 *Invertebrates*

Indicator invertebrates groups will be sampled using appropriate methodology, such as sweep netting. For each sample plot the insects are identified to at least family level and where possible to genus and species level. Groups including ants, ground living beetles (Tenebrionidae and Carabidae), termites, leafhoppers, spiders and scorpions will be included if present. The methodology of how the field surveys will be conducted (pitfall traps, active search, netting, etc.) will be included.

5.2.4 Sensitive Areas

All sensitive areas, as described by the provincial and national legislation, will be identified. The locality and extent, as well as species composition of sensitive areas such as the wetlands or pans, streams, rivers and rocky outcrops will be conducted in order to identify and map all such sensitive areas present. Threatened ecosystems as listed by NEMBA (2004) and ratified by the minister in December 2011, will be identified and delineated.

5.3 Project Specialist

Rudi Greffrath is the Manager of Digby Wells' Biophysical Department's Ecology Unit and has a National Diploma and B-tech in Nature Conservation from the Nelson Mandela Metropolitan University's (NMMU) George Campus. He is also SACNASP registered and has more than 10 years' experience. Rudi has ten years' experience in the environmental

consulting field specifically in terrestrial ecology within the Highveld Grasslands and Savanna regions of Southern and Central Africa and the forest regions of Central and West Africa. He specialises in fauna and flora surveys, biodiversity surveys, environmental management plans, environmental monitoring and rehabilitation for projects in accordance with the International Finance Corporation (IFC) and World Bank. Rudi has gained experience working throughout Africa specifically the Democratic Republic of Congo, Sierra Leone, Ghana, Mali, Botswana, Namibia and Ivory Coast.

Danie Otto (Pr. Sci. Nat) is a Director and Manager of the Natural Sciences Division at Digby Wells. The division includes water, air quality, rehabilitation, fauna & flora, aquatics, wetlands and soil. He holds an M.Sc in Environmental Management with B.Sc Hons (Limnology, Geomorphology, GIS and Environmental Management) and B.Sc (Botany and Geography & Environmental Management). He is a registered Professional Natural Scientist since 2002. Danie has 20 years of consulting experience within the mining industry undertaking environmental assessments and compiling Environmental, Water & Waste Management Plans. He has wetland and geomorphology working experience across Africa including specialist environmental input into various water resource related studies. These vary from studies of swamp forests in central Africa to alpine systems in Lesotho. Danie will be responsible for reviewing of specialist studies.

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