	9	1.00	87.50
INSTREAM ECOLOGICAL CATEOGORY	**EC**		**A/B**

RIPARIAN VEGETATION	**EC %**	**EC**
RIPARIAN VEGETATION ECOLOGICAL CATEGORY	**90.8**	**A**

ECOSTATUS	**Confidence rating**	**Proportions**	**Modified weights**
Confidence rating for instream biological information	4.5	0.53	46.32
Confidence rating for riparian vegetation zone information	4	0.47	42.73
	8.5	1.00	89.05
ECOSTATUS	**EC**		**A/B**

In the case of the Donora site (Table 29), the instream ecological category (EC) is A/B (89.0%), indicating the high level of aquatic integrity. Due to the equally high riparian EC (C A=90.8%), the overall EC for the reach is a reach a high A/B (89.0%).

Therefore, even though the conservation value does not come out as high (Section 4.2.2), the Nel's River is a very important river with a high integrity, and the intact riverine vegetation plays a definite role in habitat corridors for migrating animal species. These corridors act as migration routes for fauna along the river, connecting the Drakensberg Escarpment with the Lowveld, as well as radiating from the river into the terrestrial areas, especially along drainage lines with intact vegetation.

Table 30: Generic ecological categories for EcoStatus.

ECOLOGICAL CATEGORY	DESCRIPTION	SCORE (% OF TOTAL)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-89
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions have occurred.	40-59
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions are extensive.	20-39
F	Critical/Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	0-19

4.6. Weir and abstraction – riverine (aquatic & riparian)

Raising of Donora weir

The Donora Weir will be raised 500mm where applicable, thus increasing the height of a potential migration barrier for fish. The reason why it is flagged as a potential barrier, is the fact that it is upstream of a series of major natural fish barriers, the Donora water fall (Figure 6) and a large cascade (Figure 21 & 32). These natural instream structures are considerably higher than the 1.5 m weir, while the weir will have a number of places where bedrock are incorporated in the structure, thus creating potential cross-over points (Figure 28 & 29).

The fact that all but 2 expected fish species were found upstream of the Donora water fall, indicate that there is a population of these fish upstream. However, the chances are remote that these fish scaled the falls, and must be relicts of original distribution. Despite this fact, it is recommended that the small weir will be made fish migration friendly and basic but effective fishways be established at the weir.

The water that will be channelled away will reduce the flow in the area between the weir and the hydro station outlet. This issue is discussed under 5.2.1.

Figure 24: The Donora weir and downstream area.

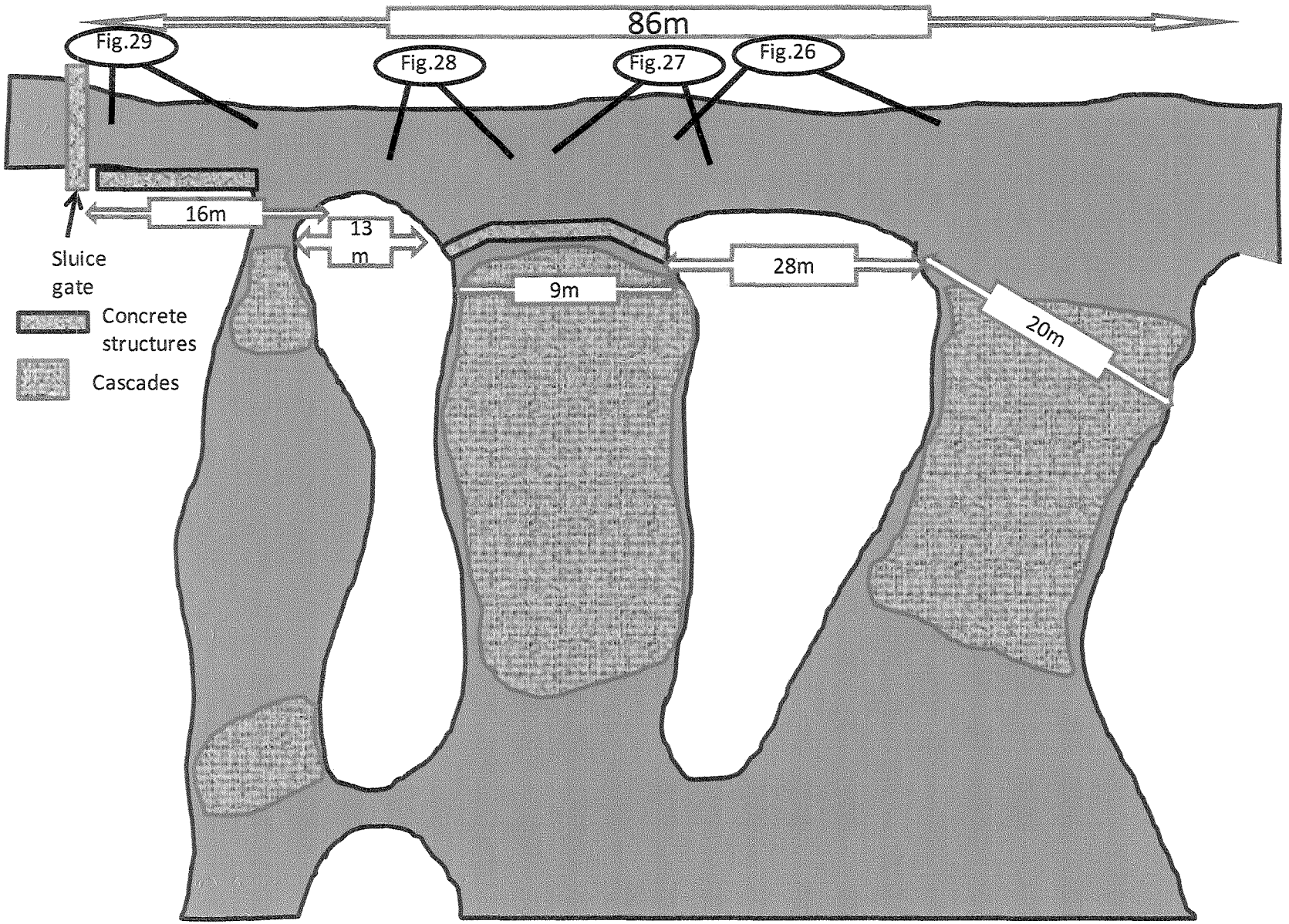


Figure 25: The Nel's River above the weir in high flow.

Figure 26: Panoramic photo of weir (see map Figure 24).

Figure 27: Panoramic photo of weir (see map Figure 24).

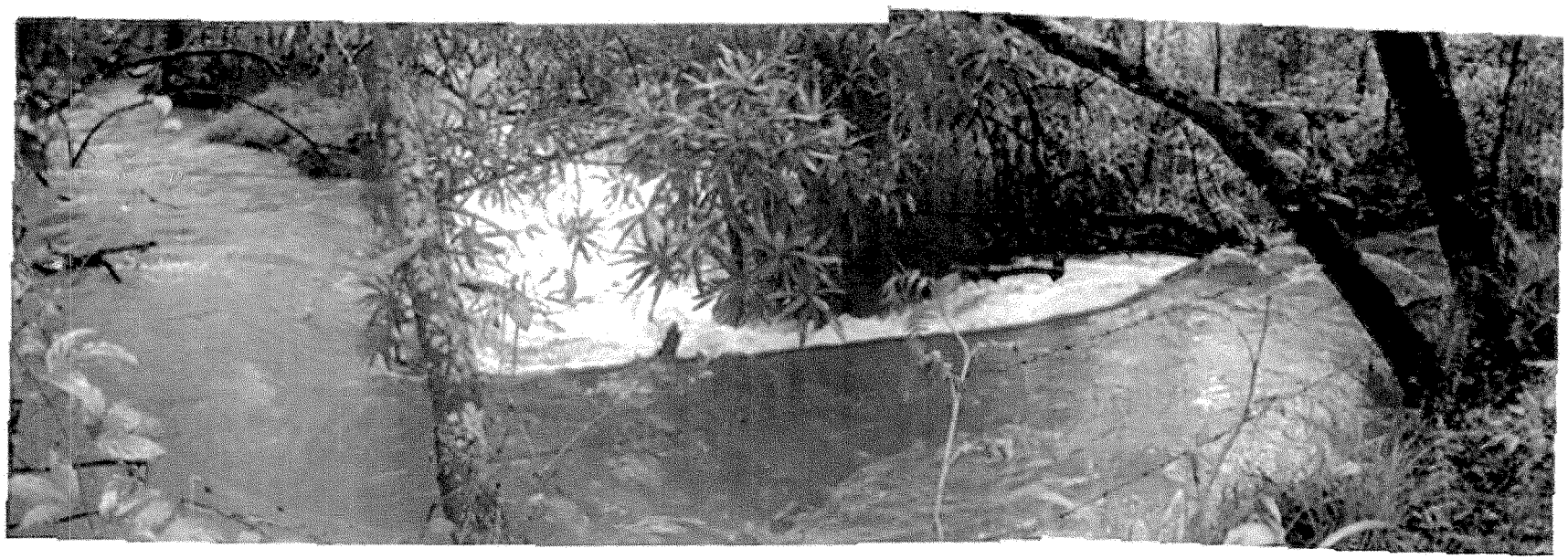


Figure 28: Panoramic photo of weir (see map Figure 24).

Figure 29: Photo of weir (see map Figure 24).

Figure 30: Photo of sluice gate(see map Figure 24).

Figure 31: Canal flowing from weir.

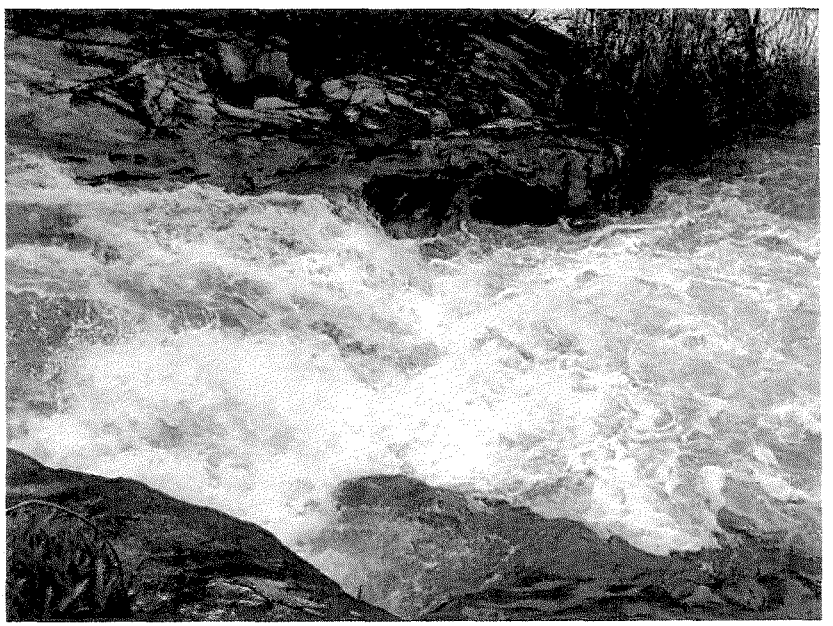


Figure 32: Cascade below weir.

4.7 Terrestrial surveys

The Legogote Sour Bushveld landscape is gentle to moderately sloping upper pediment slopes and dense woodland. This is made up of medium to large shrubs dominated by *Parinari curatellifolia* and *Bauhinia galpinii* with *Hyperthelia dissoluta* and *Panicum maximum* in the undergrowth. Short thicket dominated by *Acacia* species occurs on less rocky sites. Exposed granite outcrops have a low vegetation cover with typically occurring species being *Englerophytum magalismontanum, Aloe petricola* and *Myrothamnus flabellifolia* (Mucina & Rutherford, 2006).

In the moist sheltered kloofs small fragmented patches of Northern Mistbelt Forest are found. This vegetation unit occurs within Limpopo and Mpumalanga Provinces as well as Swaziland (Mucina & Rutherford, 2006). These tall, evergreen afrotemperate mistbelt forests occur primarily on east facing slopes and the farm Donora still have intact forests that are protected by the farmer.

According to Appendices 7-10 this area was very diverse in fauna before the region was developed, however, some of the smaller vertebrates are still expected to be found here and should be considered in all the phases of the project development.

4.7.1 Canal – woodland and grassland

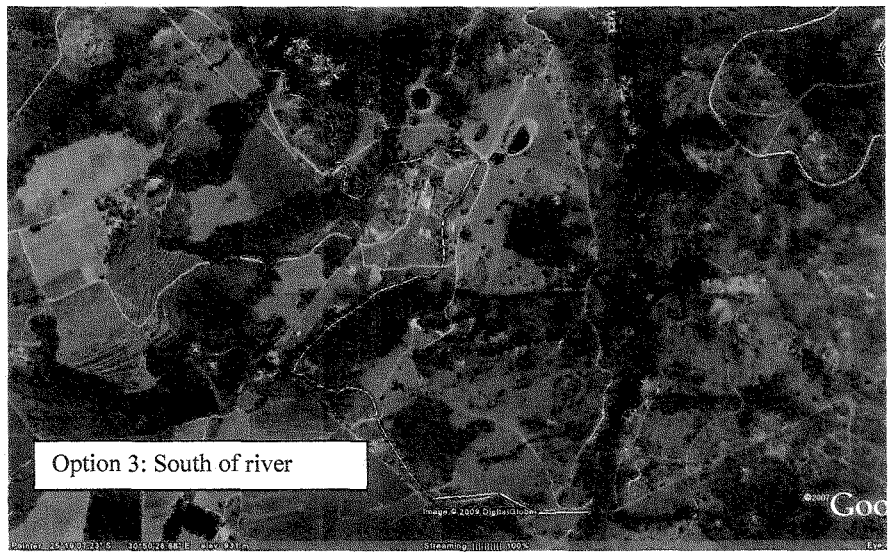
During the planning phase of the project, alternative water supply routes were considered for the hydro project. These are depicted in Figure 33. The final route will be discussed in this section.

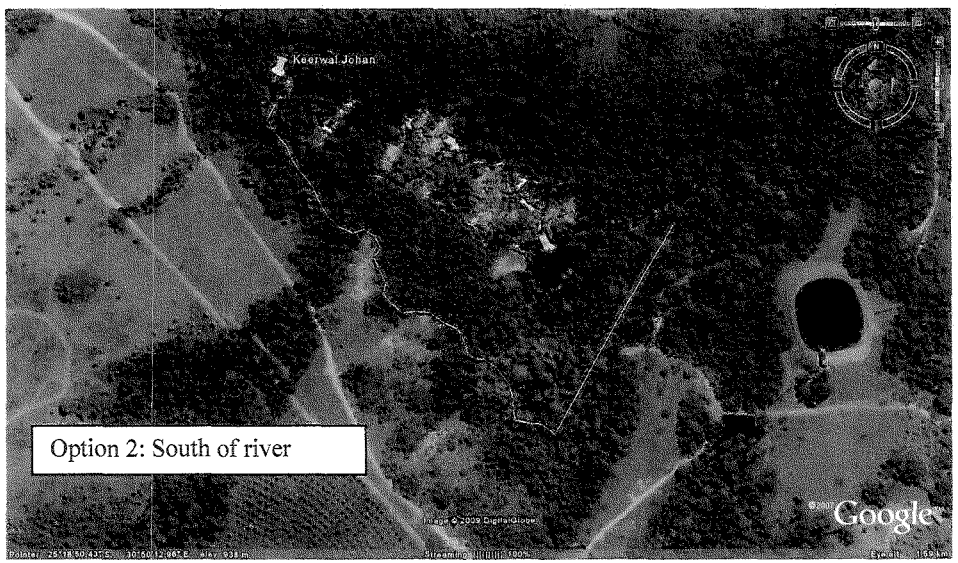
The current canal (Figure 33 to a-g) runs through valley forest (740 m), agricultural and farmstead (330 m) and some lowveld woodland (230m) (Figure 34). This canal will be enlarged, and it is envisaged that the work will mostly be done manually by hand due to the dense riparian and valley forest. Thus the clearing of forest will be restricted and digging on the pipeline limited to the current canal footprint.

According to Appendix 1, approximate 33 tree species are present adjacent to the canal, of which two are "Protected" - Transvaal teak (Kiaat) (*Pterocarpus angolensis*) and Matumi (*Breonadia salicina*) (Appendix 4). Protected species (Appendix 4) are of such high conservation value or national importance that they require national protection. No person may cut, disturb, damage or destroy any protected or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an applicant and subject to such period and conditions as may be stipulated (National Forests Act – Act No. 84 of 1998).

Appendix 5 lists 20 endemic animal species and 44 threatened species that have distribution areas covering the study area. However, due to development in the area, this list will be reduced if current circumstances are considered.

Figure 33: Aerial photos depicting the alternative water supply routes considered for the hydro project.





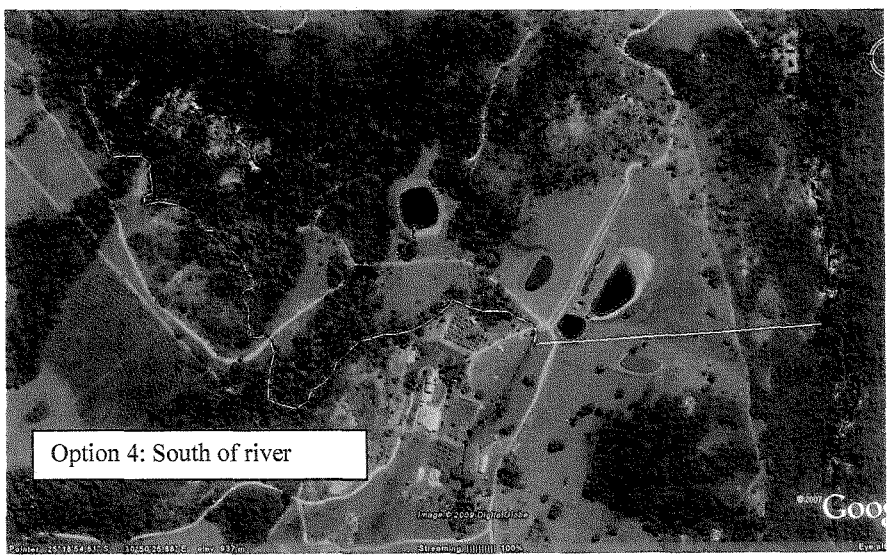


Figure 34: The position of the existing canal and the proposed pipeline (pressure pipe) providing water to the hydro station (Donora hydro).

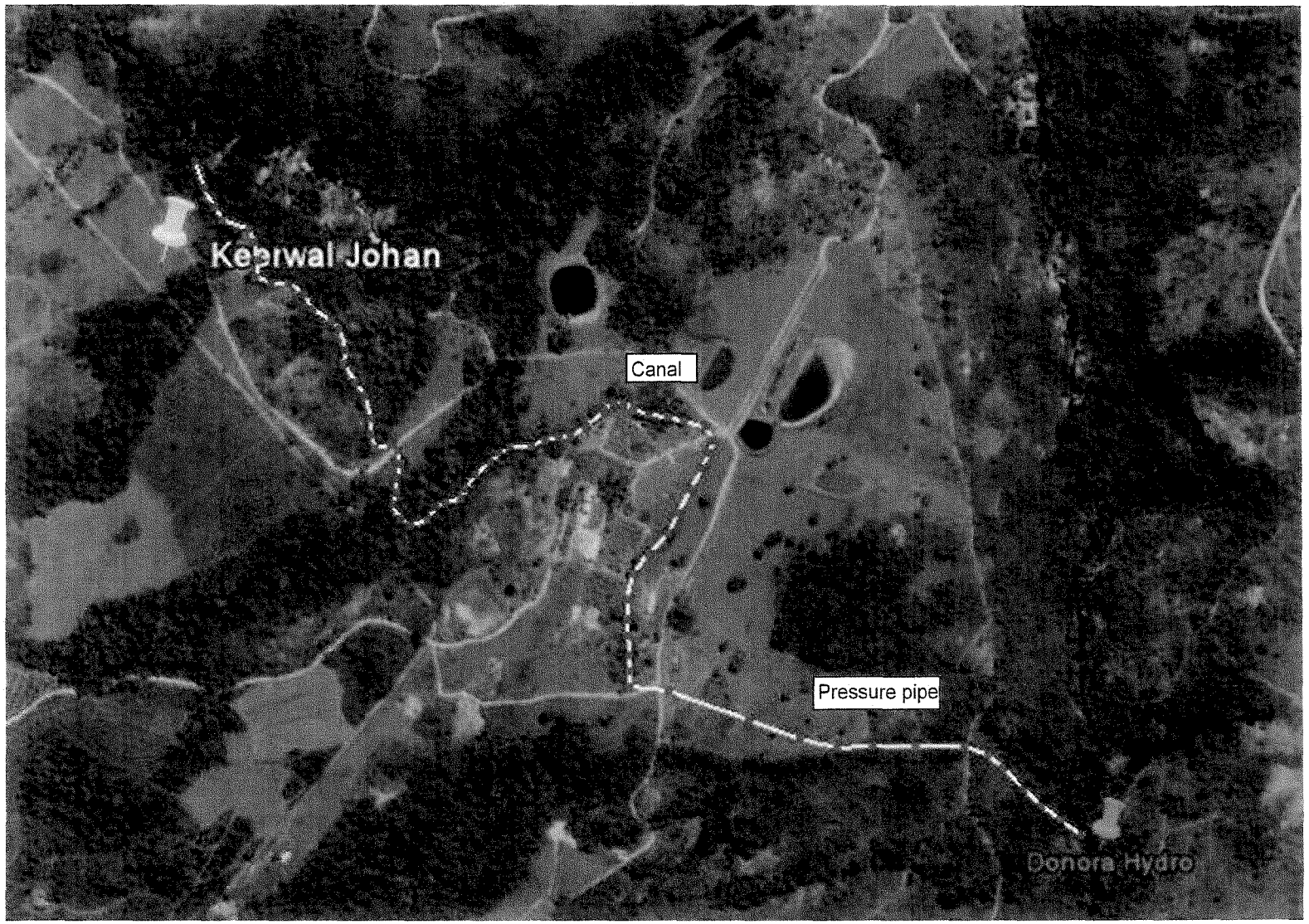


Figure 35: Views of the canal

a b c

Figure 35: Views of the canal

d

e

f

g

4.7.2 Pipeline and hydro plant – woodland

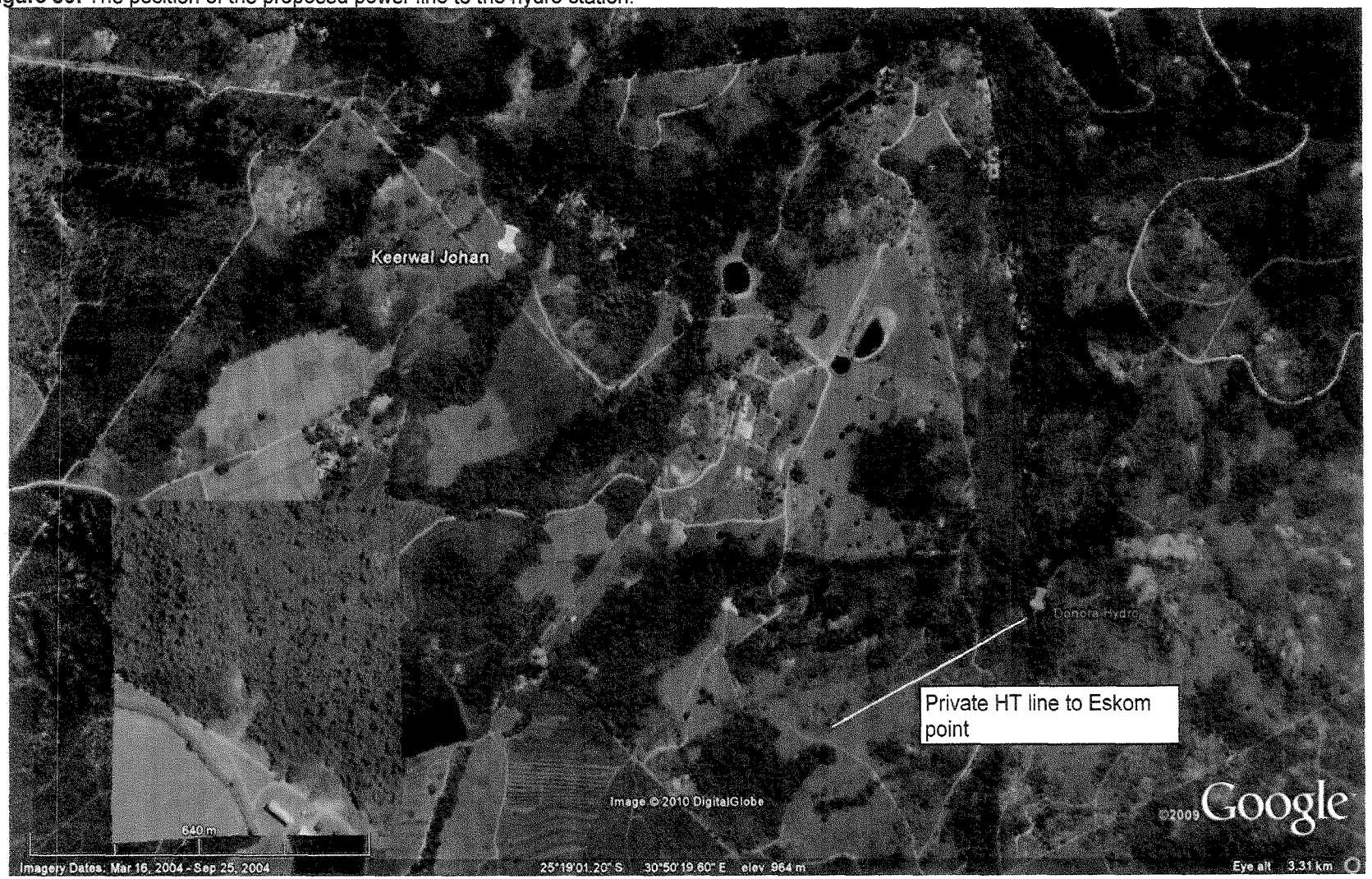
The proposed pipeline will run through lowveld woodland (550 m) (Figure 36). According to Appendix 1, approximately 35 tree species are present adjacent to the line, of which one is "Protected" - Transvaal teak (Kiaat) (*Pterocarpus angolensis*) (Appendix 4).

Appendix 5 lists 19 endemic animal species and 43 threatened species that have distribution ranges coinciding with the study area. However, due to development in the area, this list will be reduced if current circumstances are considered.

4.7.3 Power line and maintenance road – woodland and grassland

The proposed power line will run through grassland (190m) and lowveld woodland (260 m) (Figure 15, p18) and the 250m maintenance road will be constructed in lowveld woodland. Due to the similar landscapes covered by the pipeline, maintenance road and the power line, the areas to be impacted are similar regarding biological aspects.

Figure 36: The position of the proposed power line to the hydro station.



5. Impact assessment & mitigation

5.1 Impacts

Construction activities: Planned Infrastructure- and Project Specifics probable influence on ecology

A Maintenance Programme is specified and the following maintenance issues are emphasized since they might influence the immediate environment:

- Turbine, gearbox, generator: Oil levels checked, greased every week.
- Canal: Canal to be kept clean on the banks from shrubs and trees. Silt must be cleaned annually from the inside of the canal.
- Sluice Gates: Canal sluice gates and scour sluices to be checked and cleaned every month for debris and rocks.
- Over head lines: Over head lines to be cut open from interference by trees growing near the lines.

Weir: The existing weir and canal were built in the early 1900's by the grandfather of the existing owner. This was done by hand over a period of more than a year.

To raise the existing weir by 500 mm (total of 1.5 m) labour will have to do the construction on foot as it is impossible to work with machines in this area without damaging the trees and vegetation. The weir itself will be constructed by creating a gabion sandwich with concrete and steel works in the centre.

Due to the topography of the area the weir consists of **three separate weir sections**. These will be constructed separately to ensure controlled water flow during construction.

Fish ladder: A fish ladder will be constructed at a suitable site as indicated by the aquatic specialist involved in the EIA.

To maintain the reserve flow at the required/prescribed volume, a permanent opening in the bottom of the weir will ensure a constant flow. This will also constantly scour the silt out before entering the canal. This outlet will have to be cleaned out as per a daily schedule.

Canal: The existing canal must be enlarged at certain areas up to 1.5 m wide and 2 m deep. In the densely vegetated areas it will not be possible to access the site with machines and all work will be undertaken by hand.

Excavators will be used in open areas. Most of the canal will be lined with concrete to reduce friction and erosion. There is one section where additional supports will be required to form part of the foundation and to prevent the canal from sliding down the incline.

At predetermined places, designed spill over and scour sections will be created to prevent rainwater runoff flowing into the canal. At these predetermined positions the water can spill over without erosion taking place.

Sluice and Pressure Pipe: At the end of the canal, a sluice will be constructed to ensure a constant flow to the downstream users of the canal. The rest of the water will be directed into the 1.2 meter diameter pipeline via a concrete sump. This pipeline will guide the water downhill to the turbine house. This pipeline will be either a High Density Polyethylene (HDPE) or Resin – glass fibre re-in forced pipe covered by soil and vegetation.

The route of the pipeline will wind through pastures (more than 80%) and the rest of the preferred route will be determined by the Terrestrial Ecologist for the project. As the pipe crosses a dip in the landscape it will be strengthened using steel pipes or be supported by a steel structure depending on the width at the specific point of crossing.

As the pipe lowers into the valley, the pressure of the water will increase from atmospheric pressure to 760 kPa (7.6 Bar) due to changes in elevation. The pressure class of the pipe will be increased from class 4 to class 9 (4 Bar to 9 Bar).

Turbine including inlet and outlet facilities: At the end of the pressure pipe the water will enter a steel pressure chute forming the inlet to the turbine. In this chute the water will be aligned to enter the turbine over the control inlet vane. When the water passes over the inlet control vane, the velocity is increased by reducing the cross section of the inlet. The potential energy (pressure) is now converted into kinetic energy (velocity) – as in the case of a waterfall.

At this point the water enters the turbine and by deflecting the water past the turbine vanes, the water transfers its kinetic energy to the turbine by moving the vanes.

The developer will make use of a low speed turbine (120 rpm) which is designed to transfer energy at low speeds. As the water exits the turbine through the outlet chute, energy levels are low and it will gradually flow out of the chute back to the river.

The turbine shaft will turn the generator shaft which will generate the electrical power. This power will be exported to the Eskom grid by means of wire conductors.

Hydro Building: The hydro building will be constructed on solid foundations in order to mount the turbine and generator to handle the forces of the water. The remainder of the building will consist of brick, mortar and steel structures covered by a corrugated roof.

5.2 Mitigation

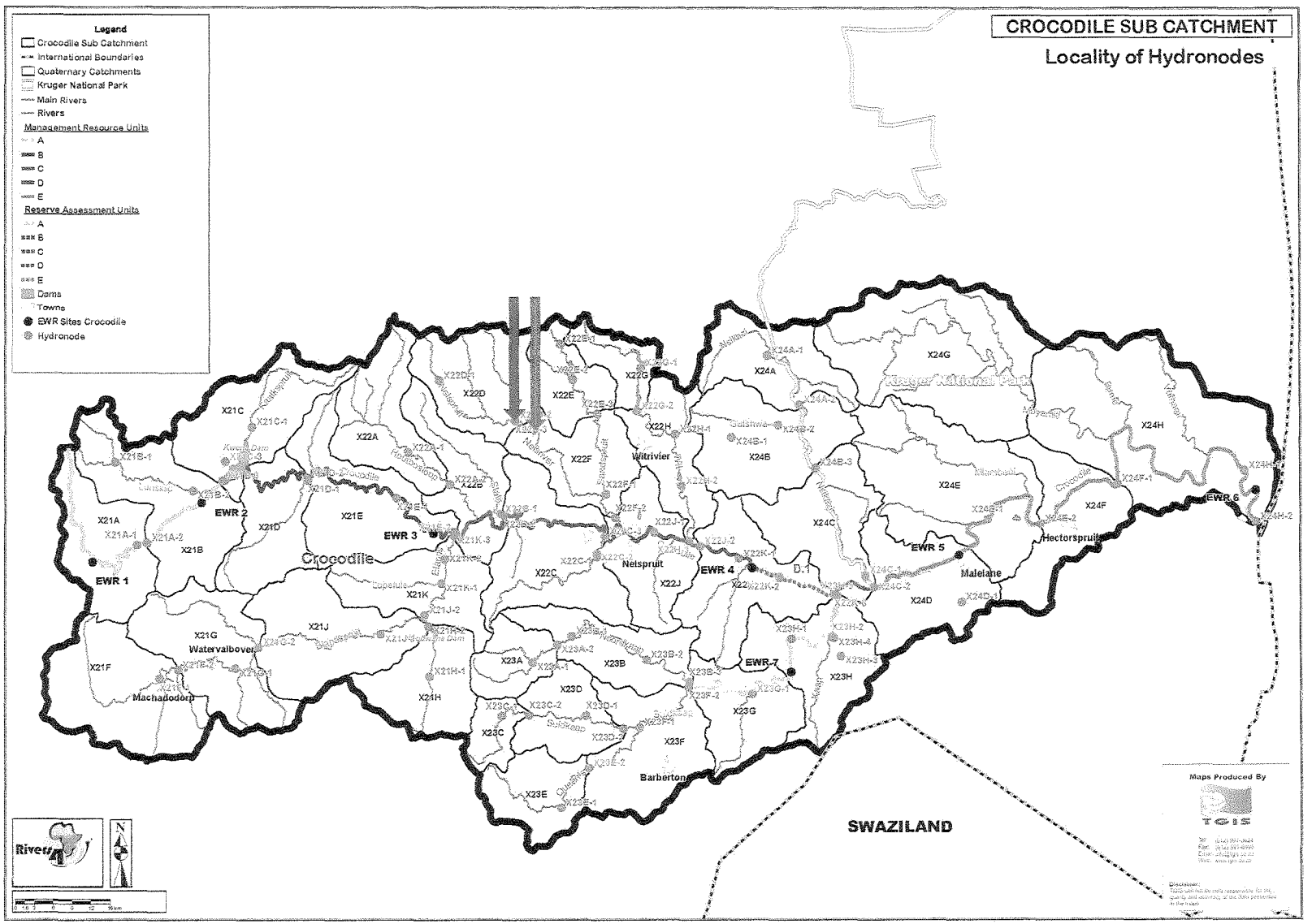
5.2.1 Flows

The flows used in the Comprehensive Ecological Reserve study for the Crocodile study was modelled to provide some indication of required flows for the Ecological Reserve.

Attached map (Figure 37) provides the locality of all the hydronodes (points) where Ecological Water Requirements (EWRs) were estimated as part of the Comprehensive Ecological Reserve study undertaken or DWA (2007 - 2010). The hydronode X22D_2 is situated on the Nel's River as indicated on the map (Figure 37) and this is the point where the information was required for the Reserve study. The point is sufficiently close to the 'abstraction point' that the hydronode data can be used.

Appendix 6 (a and b) lists the modelled flows in the Nel's River, and these were the flows that were used to establish the EWR for the river as shown in Table 31.

Figure 37: The map provides the locality of the hydronode X22D_2 (pointed with red arrow) on the Nel's River where EWRs were estimated as part of the Comprehensive Ecological Reserve study undertaken for DWA (2007 - 2010). Donora project area is indicated by blue arrow.



According to Table 31, there are Maintenance Low Flows and Drought Low Flows. For each month, adequate flows have been established for both of these flow categories. Maintenance Low Flows are the flows that should be in the river during the specific month and not lower. However, during a recognized drought, the Drought Low Flows will be in place and managed accordingly.

Therefore, a measuring device and an operated sluice gate must be in place to provide the appropriate flows in the stretch of river between the weir and the hydro station. This reach of the river may be a refuge to suckermouth *Chiloglanis bifurcus* - Vulnerable and the Natal ghost frog (*Heleophryne natalensis* - SA endemic) which is dependent on good flows. Other species dependant on the aquatic environment includes three species of endemic frogs, 2 water snakes, 2 otter species, two birds: finfoot and half-collared kingfisher.

Table 31: EWR flows for the Nel's River.

Month	Modified Flows (EFR)			
	Maintenance Low Flows	Maintenance Low Flows	Drought Low Flows	Drought Low Flows
	MCM	m3/s	MCM	m3/s
Oct	0.279	0.104	0.168	0.063
Nov	0.357	0.138	0.186	0.072
Dec	0.519	0.194	0.225	0.084
Jan	0.774	0.289	0.285	0.106
Feb	1.11	0.455	0.364	0.149
Mar	1.181	0.441	0.381	0.142
Apr	0.929	0.358	0.321	0.124
May	0.572	0.214	0.237	0.088
Jun	0.434	0.167	0.204	0.079
Jul	0.376	0.140	0.191	0.071
Aug	0.32	0.119	0.178	0.066
Sep	0.279	0.108	0.168	0.065

5.2.2 Fish ladder

Due to the unevenness of the weir area, the bedrock and island areas rise above the wall in places. It is in the corners of these connecting areas where the near-natural fishways should be constructed with rock and concrete to form pools in a rough ladder formation to enable fish to migrate up and down over the weir.

The placements of these fish ladders will have to be established by a fish expert and the fish ladders built to fit in with the natural contours of the site. The steps should not be higher than 15cm and the pools should be large enough to facilitate areas for fish to rest.

5.2.3 Canal

Since the construction work on the canal will take place on an existing structure, there should not be major new impacts. However, there will still be some disturbance in the area around the canal (e.g. working on the canal and transporting material to the site). It is thus very important not to remove or damage large trees, especially Matumi and Kiaat.
The original canal has many places where the canal wall is made up of natural soil and only smaller areas where a brick wall is constructed. In the event of smaller animals falling into the canal, they are able to escape drowning by climbing out of the canal in the natural soil areas. It is thus important to keep these kinds of structures or escape routes viable during the development process.

5.2.4 Pipe line and hydro station

In digging a trench for the pipeline, care should be taken to refrain from removing large indigenous trees, especially matumi and kiaat. An effort should be made to find an alignment route with minimum large trees on it.

It is important to cover the pipeline with the soil originally removed from the trench. The topsoil should not act as a barrier to subterranean animals such as Distant's thread snake *(Leptotyphlops distanti)* - SA endemic, Natal purple-glossed snake *(Amblyodipsas concolor)* - SA endemic, Montane dwarf burrowing skink (*Scelotes mirus*) - SA endemic, Thin-tailed legless skink *(Acontias gracilicaudata gracilicaudata)* - SA endemic Shortheaded legless skink *(Acontias breviceps)* - IUCN 2010: Near Threatened. SA endemic, and the Rough-haired golden mole *(Chrysospalax villosus)* - TOPS NEMBA: Critically endangered species; IUCN 2010: Vulnerable; Endemic.

In releasing the water from the hydro station, it will be recommended that the water is dissipated over rock piles to prevent eroding the river bank, aerate the water, and also prevent fish from trying to swim up towards the hydro station due to the attraction flows.

5.2.5 Power line

In opening an area for the power line, care should be taken to refrain from removing large indigenous trees, especially matumi and kiaat. An effort should be made to find an alignment route with minimum large trees on it.

Collisions are the biggest single threat posed by transmission lines to birds. Most heavily impacted upon are heavy-bodied birds with limited maneuverability, which make it difficult for them to take the necessary evasive action to avoid colliding with power lines. Species vulnerable to power line collisions are generally long living, slow reproducing species.

It is generally believed that birds collide with power lines because the lines are invisible to them, or because they do not see the line before it is too late to avoid it. Birds' limited ability to judge distance makes power lines especially difficult to see, even if they are flying closer to them.

Large birds are especially vulnerable because they are not always quick enough to change their direction before it is too late. Poor weather conditions, such as fog, and rain, as well as darkness may make the lines even more difficult to see.

Important birds that could be impacted on are: Ayres's Hawk-Eagle *(Hieraaetus ayresii)* - SA Red Data (Barnes 2000): Near-threatened; Martial Eagle *(Polemaetus bellicosus)* - NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Vulnerable; African Crowned Eagle *(Stephanoaetus coronatus)* - SA Red Data (Barnes 2000): Near-threatened; Cape Vulture *(Gyps coprotheres)* - NEMBA (TOPS): Endangered species; IUCN 2010 VU; SA Red Data (Barnes 2000): Vulnerable.

There are several ways to help make lines more visible to birds. Marking wires and conductors with white wire spirals and black crossed bands in one study reduced mortality by up to 75 percent. Other potentially helpful devices include bird flappers and diverters, which swivel in the wind, glow in the dark, and use fluorescent colours designed specifically for bird vision.

Certain power lines have been retrofitted with anti-perching devices (bird guards) on transmission towers to physically prevent birds from perching in high risk areas and thus to move the birds to parts of the power line where excreta cannot cause flashovers or shorts. The bird guards, consisting of rows of plastic spikes, prevent birds from landing or roosting above or in close proximity to conductors and insulators.

On lower voltage power lines, the electrocution of birds has quality of supply implications. Measures to prevent electrocutions include the covering of the central phase with insulating material and the modification of the structures to increase the distance between conductors.

5.2.6 General

No animals should be killed or injured by construction workers during the project, this includes snakes. Important snake species include 5 endemic species, 2 Red Data species and the Southern African python (*Python natalensis*) – TOPS NEMBA: Protected species.

6. Discussion

A survey of the site in the Nel's River was done to establish if there could be any effects on the natural environment due to the proposed development, and to obtain some baseline information should future monitoring be required.

Run-of-river hydropower facilities generally rely on the natural flow of rivers and streams, and are able to utilize smaller water flow volumes without the need to build large reservoirs. Infrastructure designed to move water in conduits such as canals, irrigation ditches, aqueducts, and pipelines can also be harnessed to produce electricity (Campbell, 2010).

In most cases, compared to large hydro, small hydropower generating stations (such as Donora) have relatively low environmental impacts because they are constructed in a smaller area (small weir), and rarely cause significant shoreline flooding or require large river diversions, as the case is at Donora. Most of the negative environmental impacts of small hydro development can be mitigated by good design and operating practices to avoid interference with seasonal water flows and minimize impacts on fish and flooding patterns.

Low-head facilities generally do not have the fish passage, dissolved oxygen, and water quality problems associated with larger hydroelectric facilities (Campbell, 2010) because these are generally run-of-river facilities without large reservoirs (such as the Maguga Dam). The Donora project efficiently harnesses a low head, run-of-river resource, as the water impoundment is minimized by the small weir, and in so doing reduces potential dissolved oxygen and sediment problems associated with the use of dams on the aquatic ecology.

According to the Mpumalanga Biodiversity Conservation Plan Handbook the wetland value of the Donora site along the Nel's River region is classified as "Ecosystem Maintenance", indicating that the aquatic habitat in this area is not considered as very important. According to the Present Ecological State (PES) model, the Desktop Habitat Integrity is 85%, the Instream Ecological Class a class B (90%) and the Overall Ecostatus is 87.2% (Ecological Class = B). According to the EIS model, the overall EIS rating is 2.5 and thus the overall EIS category is considered to be "HIGH".

The aquatic habitat scores are high and reflect a "Good" class, and according to the SASS5 macro-invertebrate values, the condition at the site is classified as "Excellent". The relative FRAI score for fish in this stretch of the river falls within the limits of an ecological state category Class B (82.2%), which means this reach is "largely natural with few modifications".

Due to the fact that only a small portion of non-marginal riparian vegetation was removed for the recreation facilities, the change in the non-marginal zone condition is only 8.5%, and due to the same cause, the marginal zone change is only 10.0%. The final riparian vegetation integrity described by the Ecological Class of this reach, resulted in a Class A (90.8%) which reflects a "High" vegetation integrity. In the process of riparian delineation, 6 riparian indicator plant species were observed in the riverine zone, as well as one protected tree species Matumi (*Breonadia salicina*).

Conclusively, in the case of the Donora site, the instream ecological category (EC) is A/B (89.0%), indicating the high level of aquatic integrity. Due to the equally high riparian EC (A=90.8%), the overall EC for the reach is a high A/B (89.0%).

Therefore, even though the conservation value does not come out as high ("Ecosystem Maintenance"), the Nel's River is a very important river with a high integrity (EC = high A/B 89.0%), and the intact riverine vegetation plays a definite role in habitat corridors for migrating animal species. These corridors act as migration routes for fauna along the river, connecting the Drakensberg Escarpment with the Lowveld, as well as radiating from the river into the terrestrial areas, especially along drainage lines with intact vegetation.

According to the Mpumalanga Biodiversity Conservation Plan Handbook the terrestrial aspect is classified as a matrix of "No natural habitat available" and "Least concern." However, the Legogote Sour Bushveld is 57.5% transformed, mostly through cultivation and urbanisation and the vegetation type is considered poorly protected and the ecosystem status is classified as "Endangered" (SANBI, 2008). About 19 endemic animal species and 43 threatened species that have distribution ranges

coinciding with the study area. However, due to development in the area, this list will be reduced if current circumstances are considered.

The Donora hydro project consists of the following proposed activities:

- Raise the **existing** weir by 500 mm to 1.5 meters.
- Enlarge the **existing** canal to 2m X 1.5m wide where necessary over a distance of 1278m to convey water at 3m³/second (10 800 m³/hour = 259 200 m³/day).
- Install a **pressure pipe** (1.2m diameter) from the canal to the hydro station.
- Build the **hydro building** (approx. 48sqm) with an outlet.
- Construct a **maintenance road** to the hydro site (distance 250m and less than 4m wide).
- Build 22kV **overhead power line** to join up with the Eskom network (400m).

In raising the Donora Weir it will become a potential migration barrier for fish. Despite the fact that a major water fall creates a larger fish barrier than a small weir, it is recommended that the small weir can cater for migrating fish and a basic but effective fishway must established at the weir.

The water that will be channelled away will reduce the flow in the area between the weir and the hydro station outlet. This reach of the river may be a refuge for eight special animals. The flows used for the Nel's River study, were obtained from the Comprehensive Ecological Reserve study for the Crocodile River, and was modelled to provide some indication of required flows for the Ecological Reserve. Maintenance Low Flows supplied are the flows that should be in the river during the specific month and not lower. However, during a recognized drought, the Drought Low Flows will be in place and managed accordingly.

Therefore, a measuring device and an operated sluice weir must be in place to provide the appropriate flows in the stretch of river between the weir and the hydro station. In releasing the water from the hydro station, it will be recommended that the water is dissipated over rock piles to prevent eroding the river bank, aerate the water, and also to prevent fish from swimming towards the hydro station, following the high flow releases.

The current canal runs through valley forest (740 m), agricultural and farmstead (330 m) and some lowveld woodland (230m) and approximately 33 tree species are present adjacent to the canal, including two "Protected" trees - Transvaal teak (Kiaat) (*Pterocarpus angolensis*) and Matumi (*Breonadia salicina*). Despite the fact that this is an existing structure and the work will be done by hand and not heavy machinery, it is important not to remove or damage large trees, especially Matumi and Kiaat, and the canal should be constructed in such a way that animals that fall into the water will be able to exit the canal (which is the case currently).

The proposed pipeline will run through lowveld woodland (550 m) and approximate 35 tree species are present adjacent to the line, of which one is "Protected" - Transvaal teak (Kiaat) (*Pterocarpus angolensis*). The proposed power line will run through grassland (190m) and lowveld woodland (260 m) and the 250m long maintenance road will be constructed in lowveld woodland.

In constructing these line structures, care should be taken to refrain from removing large indigenous trees, especially matumi and kiaat. It is important to cover surfaces with the soil originally removed from the area. The topsoil should not act as a barrier to subterranean animals.

Collisions are the biggest single threat posed by transmission lines to birds. There are several ways to help make lines more visible to birds. Marking wires and conductors with white wire spirals and black crossed bands can reduce mortality by up to 75 percent. Other potentially helpful devices include bird flappers and diverters, which swivel in the wind, glow in the dark, and use fluorescent colours designed specifically for bird vision.

No animals should be killed or injured by construction workers during the project, this includes snakes.

It will be important to implement an aquatic monitoring programme in the river reach between the Donora weir and the hydro-electric station outlet. This programme will address the effect of the reduced flow in the river due to the abstraction of water for hydro-electricity. Furthermore, if water quality (especially oxygen) and temperatures could be determined at sites upstream and downstream of the hydro-electric station releases, it will satisfy the uncertainties surrounding these parameters and the production of hydro-electricity. It will also be valuable to assess the capability of the local fish to utilize the newly constructed fishway at the weir.

7. Conclusion

The Donora project area is situated in the Legogote Sour Bushveld, a region of high biodiversity values and endemism, whilst the ecological status of the Nel's River is rated as "High", signifying the level of aquatic integrity.

Due to the importance of the area, it is cautioned that all activities related to the project are carried out with care, recognizing the sensitivity of the local environment. Since the fish assemblage of the Nel's River represents a Class B ("largely natural with few modifications") it will be necessary to construct a fish ladder in the weir, even though the weir is upstream of a major waterfall. A series of simple fish ladders placed strategically in certain areas of the weir will successfully cater for any migratory fish that populate the river.

The amount of water abstracted from the river for power generation, will impact on the reach of river between the weir and the hydro station due to a) lower flows, b) altered temperature regimes and c) lower oxygen levels. These changes will impact on sensitive fish- and frog species, as well as animals utilizing these as prey species (otters, storks, kingfishers, herons, etc.). The riparian zone will also be influenced by a lower water level and varying flows. To mitigate successfully for these conditions, it is essential that the environmental flows formulated during the DWA comprehensive reserve for the Crocodile River Catchment: Nel's River, will be incorporated in the management of the weir and canal.

The Donora low-head hydropower facility generally will not have the problems associated with larger hydroelectric facilities because it is a run-of-river facility with a small weir without the potential dissolved oxygen- and sediment problems related to larger impoundments.

Since the Donora hydropower plant is a run-of-river facility receiving water from a small weir, this facility will not have the potential dissolved oxygen-, temperature- and sediment problems associated with larger hydroelectric facilities fed by larger impoundments.

The construction of the line structures (canal, pipeline, maintenance road and power line, which are proposed traverses this ecologically important landscape), will invariably impact on the environment in a limited and localized way. It is therefore important to avoid the removal of large or protected trees; layer topsoil correctly during the refill of trenches; and finish the planned construction of structures as swiftly as possible with the minimum disturbance to the immediate environment. If these regulations are adhered to, no significant adverse impacts are expected to occur during the construction phase. Furthermore, if the prescribed mitigation measure is implemented on the power line to increase its visibility to birds, no significant impacts are expected to occur regarding the line structures during the operational phase.

Finally, it must be reiterate that the Donora project area is situated in the endangered Legogote Sour Bushveld, a region of high biodiversity values and endemism, while the ecological status of the Nel's River is rated as "High", signifying the level of aquatic integrity. Additionally 2 protected tree species are present, while 19 endemic- and 43 threatened animal species have distribution ranges coinciding with the study area.

Ultimately, it will be of vital importance that the project should be implemented with maximum care regarding the environment, and the prescribed mitigations should be implemented comprehensively. Providing the success of this process, no significant adverse impacts are envisaged to either the aquatic- or terrestrial ecology.

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APPENDICES

Appendix 1: The vegetation observed along transects incorporating the canal, pipeline and power line (individual numbers).

Tree #	Common name	Canal - Individuals	Pipeline & power line
425	African false currant (*Allophyllus africanus*)		1
723	Black bird-berry (*Psychotria capensis*)		
611	Bladdernut (*Diospyros whyteana*)	18	6
393.1	Blunt-leaved currant (*Rhus rehmanniana*)	1	1
594	Blue guarri (*Euclea crispa*)	1	2
76	Broad-leaved beech (beechwood) (*Faurea rochetiana*)		
50	Broom cluster fig (*Ficus sur*)	6	1
447	Buffalo-thorn (*Ziziphus mucronata*)		1
564	Cabbage tree (*Cussonia spicata*)	5	2
401	Cape blackwood (*Maytenus pendicularis*)		
245	Common coral tree (*Erythrina lysistemon*)	1	
	Common fig	1	
456.5	Common forest grape (*Rhoicissus tomentosa*)	8	
162	Common hook-thorn (*Acacia caffra*)	2	2
399	Common spike thorn (*Gymnosporia buxifolia*)		1
351	Common tree Euphorbia (*Euphorbia ingens*)		
471	Common wild pear (*Dombeya rotundifolia*)	3	2
226	Cork bush (*Mundulea sericea*)		
463	Cross berry (*Grewia occidentalis*)		2
605.1	Eastern bluebush (*Diospyros lycioides sericea*)	2	1
577	False assegaai (*Maesa lanceolata*)	7	
160	Flame thorn (*Acacia ataxacantha*)	8	6
	Gland-leaf brides-bush (*Pavetta edentulata*)	1	
506	Governor's-plum (*Flacourtia indica*)	2	
	Hedgehog sage (*Pycnostachys urticifolia*)		
	Helinis integrifolius (*Helininis integrifolius*)		
433	Jacket plum (*Pappea capensis*)		2
403	Koko tree (*Maytenus undata*)		2
546	Large-fruited bushwillow (*Combretum zeyheri*)		
455	Lavender tree (*Heteropyxis natalensis*)		2
326	Live-long (*Lannea discolor*)		
684	Matumi (*Breonadia salicina*)	1	
324	Mitzeeri (*Bridelia micrantha*)	16	1
585	Moepel (*Mimusops zeyheri*)	1	
213	Monkey pod (*Senna petersiana*)		
381	Nana-berry (*Rhus dentata*)		
	Narrow-leaved butterspoon (*Tarenna supra-axillaris barbertonensis*)		
597	Natal guarri (*Euclea natalensis*)		1
456.6	Northern Bushman's grape (*Rhoicissus tridentata*)		1
	Notsung	3	
42	Pigeonwood (*Trema orientalis*)	8	2
208.2	Pride-of-De Kaap (*Bauhinia galpinii*)		4
55	Red-leaved rock fig (*Ficus ingens*)	1	
536	River bushwillow (*Combretum erythrophyllum*)		

	River currant (*Rhus gerrardii*)	4	
237	Round-leaved teak / Bloodwood (*Pterocarpus rotundifolius*)	1	1
106	Shakama plum (*Hexalobus monopetalus*)		
190	Sickle bush (Small-leaved sickle bush) (*Dichrostachys cinerea africana*)		
551.2	Silver cluster-leaf (*Terminalia sericea*)		
253	Small knobwood (*Zanthoxylum capense*)	3	1
	Snake climber (*Adenia gummifera*)		1
245.7	Stainpod (*Flemingia grahamiana*)		
581	Stamvrug /Transvaal milkplum (*Englerophytum magalismontanum*)	3	
318	Tassel berry (*Antidesma venosum*)		
231	Thorny rope (*Dalbergia armata*)	3	2
394.1	Transvaal currant (*Rhus transvaalensis*)		1
585	Transvaal red milkwood (Moepel) (*Mimusops zeyheri*)		
236	Transvaal teak (Kiaat) (*Pterocarpus angolensis*)	2	1
537	Velvet bushwillow (*Combretum molle*)	3	6
702	Velvet wild-medlar (*Vangueria infausta*)	3	
555	Water berry (*Syzygium cordatum*)	17	1
105	Wild custard-apple (*Annona senegalensis*)	1	1
	Wild grape (*Lannea edulis*)		
455	Weeping lavender tree (*Heteropyxis natalensis*)		1
503	Wild mulberry (*Trimeria grandifolia*)	2	2
75	Willow Beechwood (Transvaal) (*Faurea saligna*)		1
232	Zebrawood (*Dalbergia melanoxylon*)	3	1

	EXOTIC INVADERS		
X971	Jacaranda (*Jacaranda mimosifolia*)	3	
	Christmas berry (*Lantana camara*)	1	3
	Guava (*Psidium guajava*)		
	Peanut senna (*Senna didymobotrya*)	6	
X961	Bugweed (*Solanum mauritianum*)	4	2

Appendix 2: The completed SASS 5 form.

TAXON	Upstream	Downstream
Porifera 5		
Coelenterata 3		
Turbellaria 3		
Oligochaeta 1		
Leeches 3		
Amphipoda 15		
Potamonautidae 3		A
Atyidae (Shrimp) 8		
Palaemonidae 10		
Hydracarinae 8		
Notonemouridae 14		
Perlidae 12	A	A
Baetidae 1 spp 4		
2 spp 6	B	
>2 spp 12		B
Caenidae 6		
Ephemeridae 15		
Heptageniidae 10		A
Leptophlebiidae 13		
Oligoneuridae 15	B	A
Polymitarcyidae 10		
Prosopistomatidae 15		
Teloganodidae 12		
Tricorythidae 9	B	B
Calopterydidae 10	A	A
Chlorocyphidae 10		
Chlorolestidae 8		
Coenagrionidae 4		
Lestidae 8		
Platycnemidae 10		
Protoneuridae 8		
Zygoptera 6		
Aeshnidae 8		
Cordulidae 8		
Gomphidae 6	A	A
Libellulidae 4	A	A
Belostomatidae 3		
Corixidae 3		
Gerridae 5		
Hydrometridae 6		
Naucoridae 7		A
Nepidae 3		
Notonectidae 3		
Pleidae 4	A	B
Veliidae 5	A	
Corydalidae 8		
Sialidae 6		
Dipseudopsidae 10		
Ecnomidae 8		
Hydropsychidae 1= 4	B	B
Philopotamidae 10	B	
Polycentropodidae 12		
Psychomyiidae/Xip.. 8		

Barbarochthonidae 13		
Calamoceratidae 11		
Glossosomatidae 11		
Hydroptilidae 6		
Hydrosalpingidae 15		
Lepidostomatidae 10		
Leptoceridae 6	A	
Petrothrincidae 11		
Pisuliidae 10		
Sericostomatidae 13		
Dytiscidae 5		
Elmidae/Dryopidae 8		
Gyrinidae 5		A
Haliplidae 5		
Helodidae 12		
Hydraenidae 8		
Hydrophilidae 5		
Limnichidae 8		
Psephenidae 10		
Athericidae 13		
Blepharoceridae 15		
Ceratopogonidae 5		
Chironomidae 2	A	
Culicidae 1		
Dixidae 13	A	
Emphididae 6		
Ephydridae 3		
Muscidae 1		
Psychodidae 1		
Simuliidae 5		A
Syrphidae 1		
Tabanidae 5		
Tipulidae 5		
Ancylidae 6		
Bulininae 3		
Hydrobidae 3		
Lymnaeidae 3		
Physidae 3		
Planorbidae 3		
Thiaridae 3		
Viviparidae 5		
Corbiculidae 5		
Spaeridae 3		
Uniondae 6		
SASS Score	**111**	**112**
No of families	**14**	**14**
ASPT	**7.9**	**8.0**

Estimated abundance: 1=1; A=2-10; B=11-100; C=101-1000; D=>1000

Appendix 3. Names of fish expected in the Nel's River in the Donora region.

ABBREVIATION	SCIENTIFIC NAME	ENGLISH COMMON NAME
AURA	*AMPHILIUS URANOSCOPUS* (PFEFFER, 1889)	STARGAZER (MOUNTAIN CATFISH)
BANO	*BARBUS ANOPLUS* WEBER, 1897	CHUBBYHEAD BARB
BARG	*BARBUS ARGENTEUS* GÜNTHER, 1868	ROSEFIN BARB
BMAR	*LABEOBARBUS MAREQUENSIS* SMITH, 1841	LARGESCALE YELLOWFISH
CBIF	*CHILOGLANIS BIFURCUS* JUBB & LE ROUX, 1969	INCOMATI SUCKERMOUTH (OR ROCK CATLET)
CGAR	*CLARIAS GARIEPINUS* (BURCHELL, 1822)	SHARPTOOTH CATFISH
CPRE	*CHILOGLANIS PRETORIAE* VAN DER HORST, 1931	SHORTSPINE SUCKERMOUTH (OR ROCK CATLET)
PPHI	*PSEUDOCRENILABRUS PHILANDER* (WEBER, 1897)	SOUTHERN MOUTHBROODER

Appendix 4: Protected trees of South Africa.

Botanical Name	English Common Names	Tree Number
Acacia erioloba	Camel Thorn	168
Acacia haematoxylon	Grey Camel Thorn	169
Adansonia digitata	Baobab	467
Afzelia quanzensis	Pod Mahogany	207
Balanites maughamii	Torchwood	251
Barringtonia racemosa	Powder-puff Tree	524
Boscia albitrunca	Shepherd's Tree	122
Brachystegia spiciformis	Msasa	198.1
Breonadia salicina	Matumi	684
Bruguiera gymnorrhiza	Black Mangrove	527
Cassipourea swaziensis	Swazi Onionwood	531.1
Catha edulis	Bushman's Tea	404
Ceriops tagal	Indian Mangrove	525
Cleistanthus schlechteri	False Tamboti	320
Colubrina nicholsonii	Pondo Weeping Thorn	453.8
Combretum imberbe	Leadwood	539
Curtisia dentata	Assegai	570
Elaeodendron transvaalensis	Bushveld Saffron	436.2
Erythrophysa transvaalensis	Bushveld Red Balloon	416
Euclea pseudebenus	Ebony Guarri	598
Ficus trichopoda	Swamp Fig	54
Leucadendron argenteum	Silver Tree	552
Lumnitzera racemosa var. racemosa	Tonga Mangrove	
Lydenburgia abottii	Pondo Bushman's Tea	407
Lydenburgia cassinoides	Sekhukhuni Bushman's Tea	406
Mimusops caffra	Coastal Red Milkwood	583
Newtonia hildebrandtii var hildebrandtii	Lebombo Wattle	191
Ocotea bullata	Stinkwood	118
Ozoroa namaquensis	Gariep Resin Tree	373.2
Philenoptera violacea	Apple-leaf	238
Pittosporum viridiflorum	Cheesewood	139
Podocarpus elongatus	Breede River Yellowwood	15
Podocarpus falcatus	Outeniqua Yellowwood	16
Podocarpus henkelii	Henkel's Yellowwood	17
Podocarpus latifolius	Real Yellowwood	18
Protea comptonii	Saddleback Sugarbush	88
Protea curvata	Serpentine Sugarbush	88.1
Prunus africana	Red Stinkwood	147
Pterocarpus angolensis	Wild Teak	236
Rhizophora mucronata	Red Mangrove	526
Sclerocarya birrea subsp. caffra	Marula	360
Securidaca longepedunculata	Violet Tree	303
Sideroxylon inerme subsp. inerme	White Milkwood	579
Tephrosia pondoensis	Pondo Fish-poison Pea	226.1
Warburgia salutaris	Pepper-bark Tree	488
Widdringtonia cedarbergensis	Clanwilliam Cedar	19
Widdringtonia schwarzii	Willowmore Cedar	21

Appendix 5: Lists of Special Species expected to be present under natural conditions in the different project areas.

Riverine habitats

Natal ghost frog (*Heleophryne natalensis)* - **SA endemic**
Yellow-striped reed frog (*Hyperolius semidiscus)* - **SA endemic**
Rattling frog (*Semnodactylus wealii*) - **SA endemic**
Mountain caco (*Cacosternum nanum parvum)* - **SA endemic**
Dusky-bellied water snake (*Lycodonomorphus laevissimus)* - **SA endemic**
Western Natal green snake *(Philothamnus natalensis occidentalis)* - **SA endemic**

Southern African python (*Python natalensis*) – **TOPS NEMA: Protected species.**
Serval (*Felis serval*) - **TOPS NEMA: Protected species.**
Cape clawless otter (*Aonyx capensis*) - **TOPS NEMA: Protected species.**
Spotted-necked otter (*Lutra maculicollis*) - **TOPS NEMA: Protected species.**
Reedbuck (*Redunca arundinum*) - **TOPS NEMA: Protected species**

African Finfoot *(Podica senegalensis)* - **SA Red Data (Barnes 2000): Vulnerable.**
Half-collared Kingfisher *(Alcedo semitorquata)* - **SA Red Data (Barnes 2000): Near-threatened.**
Orange Ground-Thrush *(Zoothera gurneyi)* - **SA Red Data (Barnes 2000): Near-threatened.**
Chiloglanis bifurcus - **Vulnerable**

Canal area

Yellow-striped reed frog (*Hyperolius semidiscus)* - **SA endemic**
Rattling frog (*Semnodactylus wealii*) - **SA endemic**
Plaintive rain frog (*Breviceps verrucosus)* - **SA endemic**
Mountain caco (*Cacosternum nanum parvum)* - **SA endemic**
Distant's thread snake *(Leptotyphlops distanti)* - **SA endemic**
Natal purple-glossed snake *(Amblyodipsas concolor)* - **SA endemic**
Spotted harlequin snake *(Homoroselaps lacteus)* - **SA endemic**
Southern brown egg eater *(Dasypeltis inorata)* - **SA endemic**
Boulenger's Half-banded garter snake (*Elapsoidea boulengeri*) - **SA endemic**
Montane dwarf burrowing skink (*Scelotes mirus*) - **SA endemic**
Thin-tailed legless skink *(Acontias gracilicaudata gracilicaudata)* - **SA endemic**
Delalande's sandveld lizard *(Nucras lalandii)* - **SA endemic**
Barberton girdled lizard (*Cordylus warreni barbertonensis*) - **SA endemic**
Common crag lizard (*Pseudocordylus melanotus melanotus*) - **SA endemic**
Spotted dwarf gecko *(Lygodactylus ocellatus)* - **SA endemic**
Cape Rock-Thrush *(Monticola rupestris)* - **SA endemic**
Sentinel Rock-Thrush *(Monticola explorator)* - **SA endemic**
Buff-streaked Chat *(Oenanthe bifasciata)* - **SA endemic**
Gurney's Sugarbird *(Promerops gurneyi)* - **SA endemic**

Southern African python (*Python natalensis*) – **TOPS NEMA: Protected species.**
Serval (*Felis serval*) - **TOPS NEMA: Protected species.**
Honey badger (*Mellivora capensis*) - **TOPS NEMA: Protected species.**
Reedbuck (*Redunca arundinum*) - **TOPS NEMA: Protected species**
Pangolin (*Manis temminckii*) - **TOPS NEMA: Vulnerable species.**
Giant rat (*Cricetomys gambiensis*) - **TOPS NEMA: Vulnerable species**
Oribi (*Ourebia ourebi*) - **TOPS NEMA: Endangered species.**

Swazi rock snake *(Lamprophis swazicus)* - **Red Data: Rare; SA endemic**
Striped harlequin snake *(Homoroselaps dorsalis)* - **Red Data: near-threatened; SA endemic**
Secretary bird (*Sagittarius serpentarius*) - **SA Red Data (Barnes 2000): Near-threatened.**
Ayres's Hawk-Eagle *(Hieraaetus ayresii)* - **SA Red Data (Barnes 2000): Near-threatened.**
Martial Eagle *(Polemaetus bellicosus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Vulnerable.**

African Crowned Eagle *(Stephanoaetus coronatus)* - **SA Red Data (Barnes 2000): Near-threatened.**
Lanner Falcon *(Falco biarmicus)* - **SA Red Data (Barnes 2000): Near-threatened.**
Peregrine Falcon *(Falco peregrinus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Near-threatened.**
Orange Ground-Thrush *(Zoothera gurneyi)* - **SA Red Data (Barnes 2000): Near-threatened.**

Shortheaded legless skink *(Acontias breviceps)* - **IUCN 2010: Near Threatened. SA endemic**
Cape Vulture *(Gyps coprotheres)* - **NEMA (TOPS): Endangered species; IUCN 2010 VU; SA Red Data (Barnes 2000): Vulnerable.**
European Roller (*Coracias garrulus*) - **IUCN 2010 NT: Near-threatened**
Southern Ground-Hornbill *(Bucorvus leadbeateri)* - **IUCN 2010 VU Vulnerable A4bcd. NEMA (TOPS): Protected species;** SA **Red Data (Barnes 2000): Vulnerable.**
Blue Swallow *(Hirundo atrocaerulea)* - **NEMA (TOPS): Critically Endangered species; IUCN 2010 VU Vulnerable; SA Red Data (Barnes 2000): Critically endangered.**
Rough-haired golden mole *(Chrysospalax villosus)* - **TOPS NEMA: Critically endangered species; IUCN 2010: Vulnerable; Endemic.**
Brown hyaena (*Hyaena brunnea*) - **TOPS NEMBA: Protected species; IUCN 2010: Near threatened.**
Leopard (*Panthera pardus*) - **IUCN (2010): NT Near-threatened. TOPS NEMBA: Vulnerable species.**

Pipeline and hydro plant area

Yellow-striped reed frog (*Hyperolius semidiscus)* - **SA endemic**
Rattling frog (*Semnodactylus wealii*) - **SA endemic**
Mountain caco (*Cacosternum nanum parvum)* - **SA endemic**
Distant's thread snake *(Leptotyphlops distanti)* - **SA endemic**
Spotted harlequin snake *(Homoroselaps lacteus)* - **SA endemic**
Southern brown egg eater *(Dasypeltis inorata)* - **SA endemic**
Boulenger's Half-banded garter snake (*Elapsoidea boulengeri*) - **SA endemic**
Montane dwarf burrowing skink (*Scelotes mirus*) - **SA endemic**
Delalande's sandveld lizard *(Nucras lalandii)* - **SA endemic**
Barberton girdled lizard (*Cordylus warreni barbertonensis*) - **SA endemic**
Spotted dwarf gecko *(Lygodactylus ocellatus)* - **SA endemic**
Gurney's Sugarbird *(Promerops gurneyi)* - **SA endemic**

Southern African python (*Python natalensis*) – **TOPS NEMA: TOPS NEMA: Protected species.**
Giant rat (*Cricetomys gambiensis*) - **TOPS NEMA: Vulnerable species**

Martial Eagle *(Polemaetus bellicosus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Vulnerable.**
African Crowned Eagle *(Stephanoaetus coronatus)* - **SA Red Data (Barnes 2000): Near-threatened.**
Peregrine Falcon *(Falco peregrinus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Near-threatened.**
Orange Ground-Thrush *(Zoothera gurneyi)* - **SA Red Data (Barnes 2000): Near-threatened.**

Striped harlequin snake *(Homoroselaps dorsalis)* - **Red Data: near-threatened; SA endemic**
Ayres's Hawk-Eagle *(Hieraaetus ayresii)* - **SA Red Data (Barnes 2000): Near-threatened.**

Power line area

Yellow-striped reed frog (*Hyperolius semidiscus)* - **SA endemic**
Rattling frog (*Semnodactylus wealii*) - **SA endemic**
Plaintive rain frog (*Breviceps verrucosus)* - **SA endemic**
Mountain caco (*Cacosternum nanum parvum)* - **SA endemic**
Distant's thread snake *(Leptotyphlops distanti)* - **SA endemic**
Natal purple-glossed snake *(Amblyodipsas concolor)* - **SA endemic**
Spotted harlequin snake *(Homoroselaps lacteus)* - **SA endemic**

Southern brown egg eater *(Dasypeltis inorata)* - **SA endemic**
Boulenger's Half-banded garter snake (*Elapsoidea boulengeri*) - **SA endemic**
Montane dwarf burrowing skink (*Scelotes mirus*) - **SA endemic**
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Delalande's sandveld lizard *(Nucras lalandii)* - **SA endemic**
Barberton girdled lizard (*Cordylus warreni barbertonensis*) - **SA endemic**
Common crag lizard (*Pseudocordylus melanotus melanotus*) - **SA endemic**
Spotted dwarf gecko *(Lygodactylus ocellatus)* - **SA endemic**
Cape Rock-Thrush *(Monticola rupestris)* - **SA endemic**
Sentinel Rock-Thrush *(Monticola explorator)* - **SA endemic**
Buff-streaked Chat *(Oenanthe bifasciata)* - **SA endemic**
Gurney's Sugarbird *(Promerops gurneyi)* - **SA endemic**

Southern African python (*Python natalensis*) – **TOPS NEMA: Protected species.**
Serval (*Felis serval*) - **TOPS NEMA: Protected species.**
Honey badger (*Mellivora capensis*) - **TOPS NEMA: Protected species.**
Reedbuck (*Redunca arundinum*) - **TOPS NEMA: Protected species**
Pangolin (*Manis temminckii*) - **TOPS NEMA: Vulnerable species.**
Giant rat (*Cricetomys gambiensis*) - **TOPS NEMA: Vulnerable species**
Oribi (*Ourebia ourebi*) - **TOPS NEMA: Endangered species.**

Swazi rock snake *(Lamprophis swazicus)* - **Red Data: Rare; SA endemic**
Striped harlequin snake *(Homoroselaps dorsalis)* - **Red Data: near-threatened; SA endemic**
Secretary bird (*Sagittarius serpentarius*) - **SA Red Data (Barnes 2000): Near-threatened.**
Ayres's Hawk-Eagle *(Hieraaetus ayresii)* - **SA Red Data (Barnes 2000): Near-threatened.**
Martial Eagle *(Polemaetus bellicosus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Vulnerable.**
African Crowned Eagle *(Stephanoaetus coronatus)* - **SA Red Data (Barnes 2000): Near-threatened.**
Lanner Falcon *(Falco biarmicus)* - **SA Red Data (Barnes 2000): Near-threatened.**
Peregrine Falcon *(Falco peregrinus)* - **NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Near-threatened.**
Orange Ground-Thrush *(Zoothera gurneyi)* - **SA Red Data (Barnes 2000): Near-threatened.**

Shortheaded legless skink *(Acontias breviceps)* - **IUCN 2010: Near Threatened. SA endemic**

Cape Vulture *(Gyps coprotheres)* - **NEMA (TOPS): Endangered species; IUCN 2010 VU; SA Red Data (Barnes 2000): Vulnerable.**
European Roller (*Coracias garrulus*) - **IUCN 2010 NT: Near-threatened**
Southern Ground-Hornbill *(Bucorvus leadbeateri)* - **IUCN 2010 VU Vulnerable A4bcd. NEMA (TOPS): Protected species ; SA Red Data (Barnes 2000): Vulnerable.**
Blue Swallow *(Hirundo atrocaerulea)* - **NEMA (TOPS): Critically Endangered species; IUCN 2010 VU Vulnerable; SA Red Data (Barnes 2000): Critically endangered.**
Rough-haired golden mole *(Chrysospalax villosus)* - **TOPS NEMA: Critically endangered species; IUCN 2010: Vulnerable; Endemic.**
Brown hyaena (*Hyaena brunnea*) - **TOPS NEMBA: Protected species; IUCN 2010: Near threatened.**
Leopard (*Panthera pardus*) - **IUCN (2010): NT Near-threatened. TOPS NEMBA: Vulnerable species.**

Appedix 6a: Monthly distributions (Million cu. m) of IFR flows compared to modelled natural flows.

	Natural flows		Modified flows (IFR)			
Month	Mean Million cu. m	m^3/s	Maintenance Million cu. m	m^3/s	Drought Million cu. m	m^3/s
Oct	0.464	0.173	0.279	0.104	0.168	0.063
Nov	1.086	0.419	0.357	0.138	0.186	0.072
Dec	2.233	0.834	0.519	0.194	0.225	0.084
Jan	3.861	1.442	0.774	0.289	0.285	0.106
Feb	5.758	2.380	1.11	0.459	0.364	0.150
Mar	5.111	1.908	1.181	0.441	0.381	0.142
Apr	2.341	0.903	0.929	0.358	0.321	0.124
May	0.834	0.311	0.572	0.214	0.237	0.088
Jun	0.561	0.216	0.434	0.167	0.204	0.079
Jul	0.492	0.184	0.376	0.140	0.191	0.071
Aug	0.43	0.161	0.32	0.119	0.178	0.066
Sep	0.392	0.151	0.279	0.108	0.168	0.065

Appedix 6b: A summary of the IFR rule curves (Desktop version 2) for Nel's River site E5:

The % readings are exceedance values, which means that the value never be exceeded more than the % indicated, eg:

> In October the flow of 0.078 m^3/s must not be exceeded for 90% of the time, in more understandable language, the flow must never be lower than 0.078 m^3/s for more than 10% of the time.

Data are given in m^3/s mean monthly flow.

IFR

						Maintenance flows			Drought	
Month	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%
Oct	0.130	0.130	0.129	0.128	0.124	0.119	0.109	0.095	0.078	0.065
Nov	0.206	0.206	0.204	0.201	0.194	0.183	0.164	0.136	0.103	0.080
Dec	0.335	0.333	0.330	0.324	0.311	0.289	0.254	0.203	0.144	0.101
Jan	0.583	0.550	0.520	0.490	0.456	0.398	0.347	0.274	0.190	0.129
Feb	1.458	1.335	1.228	1.129	1.030	0.736	0.542	0.409	0.314	0.198
Mar	0.765	0.731	0.700	0.667	0.627	0.403	0.366	0.317	0.259	0.170
Apr	0.511	0.510	0.505	0.478	0.401	0.343	0.309	0.289	0.214	0.144
May	0.255	0.255	0.253	0.250	0.242	0.229	0.205	0.169	0.126	0.094
Jun	0.200	0.200	0.199	0.196	0.191	0.181	0.164	0.138	0.106	0.083
Jul	0.168	0.168	0.167	0.165	0.161	0.154	0.140	0.120	0.094	0.074
Aug	0.143	0.143	0.142	0.140	0.137	0.131	0.120	0.104	0.084	0.069
Sep	0.129	0.129	0.128	0.127	0.124	0.119	0.109	0.096	0.079	0.067

Reserve flows without high flows

						Maintenance flows			Drought	
Month	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%
Oct	0.125	0.124	0.124	0.122	0.119	0.114	0.105	0.092	0.076	0.065
Nov	0.165	0.164	0.163	0.161	0.156	0.148	0.134	0.115	0.092	0.075
Dec	0.232	0.231	0.229	0.225	0.217	0.204	0.282	0.151	0.115	0.088
Jan	0.345	0.344	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
Feb	0.584	0.546	0.540	0.530	0.510	0.474	0.415	0.332	0.233	0.163
Mar	0.527	0.525	0.520	0.510	0.491	0.403	0.366	0.317	0.224	0.154
Apr	0.428	0.427	0.424	0.416	0.401	0.343	0.309	0.268	0.190	0.134
May	0.255	0.255	0.253	0.250	0.242	0.229	0.205	0.169	0.126	0.094
Jun	0.200	0.200	0.199	0.196	0.191	0.181	0.164	0.138	0.106	0.083
Jul	0.168	0.168	0.167	0.165	0.161	0.154	0.140	0.120	0.094	0.074
Aug	0.143	0.143	0.142	0.140	0.137	0.131	0.120	0.104	0.084	0.069
Sep	0.129	0.129	0.128	0.127	0.124	0.119	0.109	0.096	0.079	0.067

Natural duration curves

						Maintenance flows			Drought	
Month	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%
Oct	0.295	0.209	0.190	0.161	0.146	0.131	0.127	0.112	0.101	0.086
Nov	0.802	0.490	0.424	0.336	0.282	0.235	0.201	0.162	0.127	0.100
Dec	1.706	1.090	0.750	0.612	0.553	0.489	0.370	0.280	0.209	0.134
Jan	3.700	2.139	1.676	1.243	0.889	0.635	0.489	0.426	0.310	0.209
Feb	7.688	3.964	3.022	1.773	1.083	0.736	0.542	0.409	0.314	0.198
Mar	5.130	3.278	2.546	1.576	1.001	0.403	0.366	0.317	0.284	0.187
Apr	2.269	1.269	0.980	0.478	0.401	0.343	0.309	0.289	0.243	0.185
May	0.437	0.329	0.287	0.265	0.258	0.239	0.228	0.213	0.194	0.149

Jun	0.282	0.251	0.243	0.228	0.212	0.201	0.189	0.177	0.162	0.139
Jul	0.239	0.217	0.209	0.149	0.179	0.168	0.161	0.153	0.138	0.116
Aug	0.205	0.190	0.175	0.164	0.157	0.146	0.138	0.131	0.123	0.101
Sep	0.212	0.174	0.158	0.150	0.143	0.139	0.127	0.116	0.108	0.093

Appendix 7. FROGS: Available habitat, expected occurrence and observed presence of frogs during the survey (Jacobsen, 1989: Interpreted distribution map; Minter et al, 2004).

Different biotopes surveyed:

1. Weir and abstraction – riverine (aquatic & riparian)
2. Canal – woodland and grassland
3. Pipeline and hydro plant – woodland
4. Power line – woodland and grassland

Listed below are the frogs expected to occur in the available natural habitats of the Donora environment (see table above). The words in **bold font** illustrate the qualifying habitat (preferred habitat) for each species, and the *underlined italics* indicate the disqualifying habitat (the reason why it is unlikely to find the frog in the surveyed biotopes). The shaded cells indicate the area of proposed development that incorporates the preferred habitat, and the number inside a cell gives the number of individuals or definite signs detected during surveys.

FROG SPP	HABITAT PREFERENCE	BREEDING HABITAT	TADPOLES	RSA STATUS	1	2	3	4
Family: Bufonidae								
Eastern Olive toad *(Amietophrynus garmani)*	Various bushveld vegetation types in the Savanna biome. Prefer well-wooded low-lying areas where there is relatively high rainfall (above 600mm/annum). **Breeds in vleis, pans and dams in open or wooded savanna**. Occasionally in quiet backwaters of rivers and pools along small, slow-flowing streams. Tadpole metamorphosis complete after 64-91 days.	Breeds in vleis, pans and dams in open or wooded savanna. Occasionally in quiet backwaters of rivers and pools along small, slow-flowing streams. Tadpole metamorphosis complete after 64-91 days.		Least concern Common and widespread – habitat not threatened; range may have expanded.				
Guttural toad *(Amietophrynus gutturalis)*	Savanna, Grassland & Thicket biome: **Breeds in open shallow pools, vleis, dams, rivers, streams or other more or less permanent water.** Common in suburban gardens and farmland. Excavate burrows in soft ground. Tadpole metamorphosis complete after 5-6 weeks.	Breeds in open shallow pools, vleis, dams, rivers, streams or other more or less permanent water. Tadpole metamorphosis complete after 5-6 weeks.		Population trend: increasing. Not threatened. Least concern. Relatively secure as it is widely distributed, locally abundant and highly adaptable to human settlement.				
Flat-backed toad *(Amietophrynus maculatus)*	Associated with **riverine habitats**; medium and larger rivers. Savanna and grassland, larger river valleys. Call from amongst reeds, grass or rocks next to or in rivers and streams - **fast flowing water.**	Breeding habitat is riverine; alongside rivers in small shallow inlets and puddles created by rising and falling water, also rock pools. Breeds in rivers and streams in savannas. Eggs in marginal pools and backwaters.	Metamorphosis within 2-6 weeks.	Least concern				

Raucous toad *(Amietophrynus rangeri)*	Mesic temperate areas: Fynbos and Grassland biomes. Breeds in rivers (pools along slow-flowing streams), streams and ponds in grassland or woodland. Suburban gardens and farmland. **Favour running water sources. Call from floating vegetation, shallow water near banks, or among reeds.**	Breeds in rivers (pools along slow-flowing streams), streams and ponds in grassland or woodland. Favour running water sources. Eggs entangled in aquatic vegetation.	Tadpole metamorphosis complete after 64-91 days.	Not threatened. Least concern. Species secure, however decline along northeastern escarpment. SA endemic (Incl. Lesotho & Swaziland). Population trend: decreasing.				
Red toad *(Schismaderma carens)*	Wide variety of vegetation types in Savanna biome, also in Rocky Highveld, and Grassland. Breeds in permanent, often fairly deep, muddy - pools, **dams or waterholes in open or wooded savanna.** Wanders to forage. Hibernates at a considerable distance from water, under stones, logs and piles of dead vegetation. Tadpole metamorphosis complete after 37-52 days.	Breeds in permanent, often fairly deep, muddy - pools, dams or waterholes in open or wooded savanna.	Tadpole metamorphosis complete after 37-52 days.	Least concern. Not threatened. Adapts in disturbed areas. Tadpole survives in polluted water.				
Family: Heleophrynidae								
Natal ghost frog *(Heleophryne natalensis)*	Forest and Grassland biomes. **Forested ravines and high altitude montane grasslands. Clear, swift-flowing streams in mountainous terrain. Flow through wooded and forested habitat; headwaters in montane grassland.** Annual rainfall: 800-2700mm. Adults often frequent waterfalls and cascades - beneath submerged rocks, in rock cracks, in caves, exposed on wet rock faces.		Rocky substrates in swift-flowing streams - take cover beneath rocks or in cracks	**SA endemic**				
Family: Hyperoliidae. Subfamily: Hyperoliinae								
Painted reed frog *(Hyperolius marmoratus taeniatus)*	Aestivates under stones and logs. Canopy of surrounding trees or emergent vegetation. Call sites: **emergent reeds and sedges, trees, grasses, bushes,** floating vegetation.	Breeds in almost any permanent body of water in the lowveld and coastal regions. Temporary ponds, pans and vleis; permanent water bodies: marshes, reedbeds, sluggish rivers and streams.		Least concern				
Waterlily Frog *(Hyperolius pusillus)*	Breeds in pans and vleis especially where there are *water lilies and other floating plants.*							
Tinker Reed Frog *(Hyperolius tuberilinguis)*	Variety of bushveld vegetation types; calls from dense stands of emerging vegetation.	Breeds in **reed beds on the periphery of swamps or rivers**, or dense vegetation surrounding inundated pans. Eggs laid loosely attached to reeds or grass stems above the water line.		Does not acquire additional protection				
Yellow-striped reed frog *(Hyperolius semidiscus)*	Low-lying areas of east-coast savanna.	**Breeds in rivers, pans, pools and dams, in moderately deep water with dense reed beds and emergent vegetation along the banks.**	Eggs are laid in clutches, lossely attached to vegetation just below of water surface.	SA endemic				

Family: Hyperoliidae Subfamily: Kassininae								
Bubbling kassina/ Running Frog (*Kassina senegalensis*)	Wide variety of vegetation types in Savanna and Grassland biomes.	**Breeds in both temporary and permanent water bodies: ponds, vleis, well-vegetated shallow pans, marshes and deeper dams in grassland.**	Tadpole metamorphosis slow: 2-3 months.	Not threatened. Least concern. Widely distributed and abundant. Does not require conservation attention. Dams improve breeding habitat. Population trend: stable.				
Rattling frog (*Semnodactylus wealii*)	Breeds in **well-vegetated pans and pools** in both subtropical and temperate regions.			Least concern. **SA endemic (Incl. Lesotho & Swaziland).** Population trend: stable.				
Family: Hyperoliidae Kassininae								
Brown-backed Tree Frog (*Leptopelis mossambicus)*	**Breeds in wooded savanna in the vicinity of streams and pans**							
Family: Microhylidae. Subfamily: Breviceptinae								
Bushveld rain frog (*Breviceps adspersus*)	Savanna biome: **Semi-arid habitats with sandy to sandy-loam soils**. Bushveld vegetation with a **grassy ground layer and distinct upper layer of woody plants.**	No standing water needed. Breeds in burrows in open and closed woodland with sandy soils. No standing water needed.		Least concern. Does not appear to be at risk – game and cattle farming and reserves.				
Plaintive rain frog (*Breviceps verrucosus)*	Forest and adjacent grassland along the eastern escarpment. Coastal forests at sea level in southern KwaZulu-Natal. Also found in suburban gardens and fields adjacent to these habitats.	**Breed in forest and adjacent grassland along the eastern escarpment**.		**SA endemic.** Not threatened.				
Mozambique rain frog (*Breviceps mossambicus*)	Found in a variety of habitats, **including open woodland or grassland. No standing water needed**.			Least concern				
Family: Microhylidae Subfamily: Phrynomerinae								
Banded rubber frog (*Phrynomantis bifasciatus*)	Variety of bushveld vegetation types in Savanna biome. Hot semi arid environments (50-1450m).	**Breeds in shallow temporary pans and pools, or inundated grass in savanna and Acacia. Also small shallow dams.**		Common throughout it range – not threatened.				
Family: Xenopodinae								

Common platanna (*Xenopus laevis)*	Most of the biomes. Restricted to aquatic habitats. Historically occurred in **streams, rivers and their pools**. Currently in man-made water bodies. Breeds in any more or less permanent bodies of water. Breeding = non-breeding habitat. Eutrophic waters seem to produce the highest densities. Burrow into dry mud to aestivate when pools dry up.	Breeding and non-breeding habitats the same. Restricted to aquatic habitats. Historically occurred in streams, rivers and their pools. Currently in man-made water bodies. **Breeds in any more or less permanent bodies of water**. Breeding = non-breeding habitat. Eutrophic waters seem to produce the highest densities. No records of breeding in flowing water.	Hatch in 2-3 days; metamorphosis within 2 mounths.	Not threatened. Least concern. Not threatened in any part of its range. Unprotected. Population trend: Increasing. Common and widespread.				
Family: Ranidae. Subfamily: Petropedetinae								
Mountain caco (*Cacosternum nanum parvum)*	High altitude grassland habits. Calling from beneath grass at the edge of shallow puddles in inundated grassland; seep on grassy slope.	**Breeds in well-vegetated (grassy) ponds, marshes and streams; inundated grassland.**		SA endemic				
Dwarf Puddle Frog (*Phrynobatrachus mababiensis)*	Open to wooded savanna; less frequently grassland; high & low altitudes. Summer rainfall: 500-1000mm p.a. Calls from water's edge well concealed by vegetation.	**Breeds in any moist, marshy area, vlei**, including those at edges of pans among emergent vegetation in permanent, semi-permanent and temporary habitats: **shallow stagnant water amongst emerging vegetation on the edges of grassy pans, small dams and ponds, and in the backwaters of slow-flowing streams and shallow stagnant water**. Eggs laid in a dense mass among emergent vegetation on water.	Tadpoles complete development in 5 weeks.	Not threatened.				
Snoring puddle frog (*Phrynobatrachus natalensis*)	A variety of vegetation types in the **Savanna** and Grassland biome. Shelter under rocks near breeding sites.	Fairly deep water - slow-flowing streams. **Temporary pans and pools, vleis and dams, and even small, slow-flowing streams.** Breeding sites usually have vegetation or other types of cover along their banks.	Eggs on water surface, hatch in 3-4 days; metamorphosis 4-5 weeks.	Not threatened. Least concern. Abundant and often near human habitation. Population trend: stable.				
Family: Petropedetidae								
Family: Ranidae Subfamily: Raninae								
Plain grass frog (*Ptychadena anchietae*)	Savanna biome. Found sheltering amongst grass and plant and plant debris on edges of breeding sites. Adults occur in the **grassy edges of rivers and streams, escape into the water.**	**Temporary pans, shallow pools in riverbeds, waterholes, and more permanent vleis.**		Does not appear to be at risk.				
Sharp-nosed Grass Frog (*Ptychadena*	Moist open **savanna and woodland**.	Breeds in sedge pans, **vleis, inundated grasslands**, pools in						

oxyrhynchus)		rock outcrops and other temporary pools.						
Striped grass frog (*Ptychadena porosissima*)	Wide range of habitats. Temperate to **wooded grassland;** sub-tropical coastal environment.	Breeds in marshy areas, **vleis, inundated grassland** and sedge pans.		Not threatened. Least concern. Population trend: stable.				
Common river frog (*Amietia angolensis*)	Grassland and Savanna biomes; forest fringe. Wide range of wetland habitats. Adults occur in the **grassy edges of rivers and streams, escape into the water**. Banks of slow flowing streams or other permanent bodies of water favoring those with aquatic vegetation. Edges of pools, dams, streams and slow-flowing rivers. Jump in water and hide in soft mud to escape. Spend day floating amongst vegetation or basking on rocks above water level. Call from floating vegetation or from shallow water at the edge.	Breeds in **both standing and flowing water**: **edges of pools, streams** and slow-flowing rivers. **Both standing water in flat areas, and running water transversing slopes of more than 14 degrees**.	Tadpoles complete development in 9-12 months, but take up to 2 years if food is in short supply or water is very cold.	Not threatened. Least concern. Widespread – found in all rivers, ponds, farm dams and other wetlands in its range. Not generally threatened. Population trend: stable.				
Clicking stream frog (*Strongylopus grayii*)	Breeds in almost any shallow body of water which is well provided with vegetation.	**Breeds in almost any shallow body of water which is well provided with vegetation.**		Not threatened. Least concern. **SA endemic.** Population trend: stable.				
Russet-backed sand frog (*Tomopterna marmorata)*	Various habitats in subtropical savanna.	**Breeds in quiet areas of rivers or streams with sandy substrates.**		Not threatened				
Tremolo sand frog (*Tomopterna cryptotis*)	Variety of habitats in open savanna and grassland, including arid areas.	Breeds in temporary rain pools and vleis.		Not threatened. Least concern. Unprotected. Widespread. Secure. Population trend: stable.				
Natal sand frog (*Tomopterna natalensis*)	Variety of vegetation types in the **Grassland and Savanna biome.** Annual rainfall: 300-1000mm. Call from: exposed positions near water edge on bare rock, sand or mud.	Breeds in **shallow permanent streams, rivers, and other places where water flows slowly, but also in standing water: furrows or vleis in grassland. Eggs laid in running water**	Metamorphosis within 2-3 weeks.	Not threatened. Least concern. This widespread species does not appear to require conservation action. Population trend: stable.				

Appendix 8. Reptiles: Available habitat, expected occurrence and observed presence of reptiles during the survey (Jacobsen, 1989; Interpreted distribution map - Branch, 1988).

Different biotopes surveyed:

1. Weir and abstraction – riverine (aquatic & riparian)
2. Canal – woodland and grassland
3. Pipeline and hydro plant – woodland
4. Power line – woodland and grassland

Listed below are the reptiles expected to occur in the available natural habitats of the Donora environment (see table above). The words in **bold font** illustrate the qualifying habitat (preferred habitat) for each species, and the *underlined italics* indicate the disqualifying habitat (the reason why it is unlikely to find the reptile in the surveyed biotopes). The shaded cells indicate the area of proposed development that incorporates the preferred habitat, and the number inside a cell gives the number of individuals or definite signs detected during surveys.

SPECIES	Total habitat	Status	Diet	1	2	3	4
Family Testudinidae (Land tortoises)							
Leopard tortoise (*Stigmochelys pardalis*)	Montane **grassveld**, fynbos, valley bushveld, arid and **mesic savanna**. Level areas in open woodland and scrub or wooded grassland. A shelter in crevices in rock outcrops, under rocks or in burrows dug into old termitaria or earthen banks. Aestivates – in old termitaria or tightly fitting burrows, excavate under rocks, logs – scrape into earth embankments.	Protected. Widespread. Vulnerable but secure.					
Speke's hinged-back tortoise (*Kinixys belliana spekii*)	**Tropical bushveld** (humid conditions) and savanna. Low lying **open woodland** and scrub. Occur on flats but mostly associated with rocky hillsides. Shelters in crevices in rock outcrops, under rocks or in burrows, dug into old termitaria or earthen banks.						
Family Pelomedusidae							
Marsh terrapin / Helmeted terrapin (*Pelomedusa subrufa)*	**Grassland, Closed woodland, Rivers**, Seasonal pools, Pans. Slow-moving and still water, including natural temporary veld pans and pools (seasonal waters) away from perennial rivers and dams (permanent water - crocodiles). Basking - at water's edge, exposed rock, and protruding log or mud bank; fresh or stagnant water-bodies (tolerates wide variation in water quality). Bury themselves up to 5 cm deep in soil, mud or debris to aestivate during winter. Lays eggs in moist soil above high water mark; dig with hind feet.	Secure, protected	Omnivorous: Water weed, insects, frogs. Birds.				
Family Typhlopidae							
Bibron's blind snake *(Afrotyphlops bibronii)*	Highveld and coastal **grassland**. Under stones and in termitaria. Underground.	Partially protected. Widespread. Secure and out of danger.	Ants and termites - eggs & larvae				
Schlegel's beaked blind snake *(Rhinotyphlops schlegelii schlegelii)*	Varied, coastal bush to sandveld. Deep underground. Variety of veld types, mostly **sandy soil**. Large adults deeper underground than smaller specimens, come to surface only after heavy rains have flooded them out.						

Family Leptotyphlopidae							
Long-tailed thread snake (*Myriopholis longicaudus)*	Lowveld. **Moist savanna**. Under decaying hardwood stumps and loose boulders.		Ants and termites - eggs & larvae				
Jacobsen's Thread Snake (*Leptotyphlops jacobseni*)							
Cape thread snake / Lesser worm snake *(Leptotyphlops conjunctus incognitus)*	Varied: **grassland**, coastal bush, **mesic and arid savanna**. Burrow underground. Lives underground and only wriggle to surface after being flooded by heavy rains from their underground retreats. In or under rotting logs, among the roots of grass and small bushes. In particularly in or near termitaria where there is an abundance of termites.		Ants and termites - eggs & larvae				
Eastern Cape thread snake *(Leptotyphlops scutifrons conjunctus)*	Varied; **grassland**, coastal bush, **mesic and arid savanna**. Fossorial: under stones, among roots of grass tussocks; moribund termitaria.		Ants and termites - eggs & larvae				
Peter's thread snake / Glossy worm snake *(Leptotyphlops scutifrons scutifrons)*	Varied; **grassland**, coastal bushland, **mesic and arid savanna.** Burrow underground. Usually taken under stones, under rocks on soil, under rotting logs, among grass roots.	Partially protected. Secure.	Ants and termites - eggs & larvae				
Distant's thread snake *(Leptotyphlops distanti)*	Varied, coastal bush, **grassland and savanna**. Burrow underground. Usually taken under stones.	**Endemic to South Africa.**	Ants and termites - eggs & larvae				
Family Boidae							
Southern African python (*Python natalensis*)	Open savanna regions, particularly rocky areas and **riverine scrub**. Moist, rocky, **well-wooded valleys, reed-beds or even bush country, seldom venture far from permanent water**. Eggs are laid in hollow tree trunks, antbear holes, caves or old termite hills. Fond of water in which they may lie and hunt. Dive into deep pools, remain submerged for long periods.	**NEMA TOPS 2007: Protected**	Ambush and constrict: small buck, monkeys, etc. also fish, monitors and crocodiles.				
Family Colubridae							
Brown water snake *(Lycodonomorphus rufulus)*	**Small streams, pans and vleis. Water-living and confined to rivers, streams and other permanent water or the immediate vicinity thereof.** Under cover around water margins. Under rocks, debris, holes in the ground. Among swampy vegetation. Small streams, pans and vleis.	Partially protected. Widespread. Secure.	Mainly frogs				
Dusky-bellied water snake (*Lycodonomorphus laevissimus)*	**Aquatic. Foraging in water. Pools in slow-moving, well-wooded streams;** entering grassland streams in Swaziland. Alongside perennial streams in grassland.	**Endemic to South Africa.** Locally common.	Small frogs, fish and tadpoles swallowed when submerged.				
Spotted house snake (*Lamprophis guttatus*)	Karroid areas to **mesic savanna. Variety of habitats**: Rocky and mountainous areas. Under rocks or in cracks/crevices between rocks at altitudes ranging from 800-2300m. Rock crevices, exfoliating flakes of rock, under rocks on rock.	Partially protected. Uncommon but secure.					

Brown house snake *(Lamprophis capensis)*	Wide distribution: Highveld **grassland** and arid karroid regions. Terrestrial Nocturnal. Eggs being laid in decaying vegetable matter, termite hills or other suitable location. Variety of habitats: Moribund termitaria or any form of shelter. Tolerant of urban sprawl.	Partially protected. Widespread, adaptable. Under no threat.					
Swazi rock snake *(Lamprophis swazicus)*	**Rocky outcrops** in savanna. Nocturnal, sheltering in rock cracks.	**Red Data (1988): Rare** Endemic to South Africa.					
Cape wolf snake *(Lycophidion capense capense)*	Varied: **Grassland and savanna** (open woodland), entering coastal bush and fynbos in Cape. Well-vegetated situations. Damp situations under stones and vegetable debris. Under rocks, logs, in moribund termitaria and under debris.	Partially protected. Widespread, considered secure.					
Cape file snake (*Mehelya capensis capensis*)	Open woodland, mainly **savanna**; entering coastal forest and arid regions. Shelters under large rocks, logs or other debris.						
Nyasa file snake / Black file snake (*Mehelya nyassae*)	**Savanna**, entering coastal forest. Shelters under large rocks, logs or other debris.						
South African slug eater *(Duberria lutrix)*	Highveld grassland & **Savannah**, entering coastal bush and fynbos. Variable habitats – moist areas. Under stones, rotting logs, under plant litter. Moribund termitaria.	Partially protected. Currently secure.					
Mole snake *(Pseudaspis cana)*	Sandy scrubland in SW Cape, highveld **grassland**, mountainous and desert regions. Open woodland. Abandoned animal burrows: Rodent burrows, larger animal burrows.	Partially protected. Uncommon, vulnerable.					
Spotted shovel-snout / East-African shovel-snout (*Prosymna stuhlmannii*)	**Savanna, extending into wooded hills**. Fossorial: Under stones, logs, or heaps of decaying vegetable matter. In termitaria and other similar locations.						
Spotted grass snake *(Psammophylax rhombaetus rhombaetus)*	Widespread in the highveld and **montane grasslands**, mesic thicket and fynbos, entering karroid areas. Rocky and moist places, moist grassland. Under rocks on soil or in crevices, moribund termitaria, holes in earth banks.	Partially protected. Widespread and not uncommon. Considered secure.					
Olive grass snake (*Psammophis (phillipsi) mossambicus*)	Coastal plains and **upland savanna**. Bush **along streams and rivers** rather than the more open dry area. **Mainly ground-living – in grass**; may resort climbing on tops of bushes and shrubs in order to bask in sun. Pursued: quick moving, dash into thick cover where it lies still. Eggs are laid in piles of dead leaves or other similar location.						
Leopard / short-snouted grass (whip) snake *(Psammophis brevirostris brevirostris)*	Highveld & **montane grassland**. Grassland, moist savanna and lowland forest in the east, and Karoo scrub and Namib desert in the west.	Partially protected. Common, under no immediate threat.					

Cross-marked grass snake *(Psammophis crucifer)*	Highveld and **montane grassland**, entering fynbos. Mountain plateaus and moist grasslands.	Endemic to southern Africa Partially protected. Uncommon, considered secure.					
Southern / Bibron's burrowing asp / Bibrons stiletto snake (*Atractaspis bibronii*)	Variable: **grassland**, scrub and open **woodland** to coastal forest in semi-arid to quite moist climates (sea level to 1700m), highveld grassland to semi desert. Occasionally found on surface on warm rainy nights in summer. Moribund termitaria. Rotting logs, under logs on soil, under stones, and crevices at ground level or under debris.	Partially protected. Considered secure.					
Black-headed centipede-eater *(Aparallactus capensis)*	Varied: Highveld and **montane grassland, open woodland**, open scrub veld, grassland and coastal bush. Open bush or savanna country. Found in moribund termitaria, which offer shelter, warm and food. Under stones, under logs, among roots of shrubs and grasses.	Partially protected. Common, not threatened or endangered. Adequately protected.					
Natal purple-glossed snake *(Amblyodipsas concolor)*	**Moist, well-wooded or forested areas** – sea level to 1500m. Semi-fossorial; solitary, often lying buried just below humic soil surface – head partly exposed. Under rocks and rotting logs.	**Endemic to South Africa**					
Common purple-glossed snake (*Amblyodipsas polylepis polylepis*)	**Open woodland** and scrub to coastal forest at altitudes from sea level to 1300m, savannah, **entering dry forest**. Fossorial (burrowing snake) and slow moving. In burrows or piles of vegetation, not found under rocks or logs. Seen abroad after heavy rains have fallen and soil becomes water-logged.						
Striped harlequin snake *(Homoroselaps dorsalis)*	**Moist savanna and Grassland**. Mainly in the Highveld or Savanna, but extends into the Natal midlands. Old termitaria, under stones.	**Endemic to South Africa. Red Data: LR/nt**	Invertebrates and other snakes				
Spotted harlequin snake *(Homoroselaps lacteus)*	**Varied**: Semi-desert to savanna and coastal bush. Highveld grassland. Underground, under rocks and stones on soil, moribund termitaria.	**Endemic to South Africa** Partially protected. Uncommon, considered secure.					
Spotted bush snake *(Philothamnus semivariegatus)*	Open woodland, scrub and coastal forest, **open forest or savanna**: Open forest or bush, even dry and far removed from water, however more frequently where water is – swims with ease. Coastal plain, **along streams and rivers or along river courses.** On rocky hillsides and mountains, shrubs and bushes on rocky ridges. Holes in trees or under loose bark. In crevices between or under rocks. In holes in large termitaria of Macrotermes. Take refuge to trees if disturbed.	Partially protected. Widespread, currently secure.					

Green water snake *(Philothamnus hoplogaster)*	Varied: Coastal plains (bush), fynbos to **higher inland savanna (Arid and mesic savanna) and even montane forest. Home near water bodies** where it hunts for frogs, frequenting marshes, ponds, rivers, reedbeds, pans, vleis and streams. Under logs, stones and under debris. Favours damp localities such as reed swamps, riverine thickets and flood plains of lakes and rivers.	Partially protected. Widespread, not common.	Mainly small frogs and fish; also lizards and grasshoppers.				
Western Natal green snake *(Philothamnus natalensis occidentalis)*	Varied: Wet montane, miombo woodland and **dry forest**. In shrubs or trees close to water. **Home near water bodies** where it hunts for frogs, frequenting marshes, ponds, rivers, reedbeds, pans, vleis and streams.	Endemic to South Africa. Partially protected. Uncommon, secure.					
Rhombic egg-eater *(Dasypeltis scabra)*	Widespread in most veld types: from sea level to an altitude of 2300m. Common in **grassveld and bushveld**. Absent only from true desert and closed-canopy forest. Mainly terrestrial, but climb trees in search of birds' eggs. Any place where it can find shelter: Moribund termitaria, rock crevices, rock faces, heaps of rubble, rotting logs.	Partially protected. Widespread, common. Secure.					
Southern brown egg eater *(Dasypeltis inorata)*	**Montane grassland, woodland** and grassland. 1200-1600m. Rock on rock or soil, under grass tussocks.	**Endemic to South Africa.** Partially protected.					
Red-lipped snake *(Crotaphopeltis hotamboeia)*	Most habitats: **Savannah and open woodland; Grassland** to coastal forest but not in desert. Preference for **damp localities**. Marshy areas. Under virtually any available cover: Under rocks, in termitaria. Eggs laid in vegetable matter.	Partially protected. Occurs widely. Considered secure.					
Eastern tiger snake (*Telescopus semiannulatus semiannulatus*)	**Savanna** and sandveld: **Well-wooded areas** from sea level to 1600m. May be found in grassland. Terrestrial, old dead trees, under rocks, in crevices, in small shrubs and weavers' nests.	Partially protected. Uncommon, low densities. Secure.					
Southern vine snake / Twig snake / Bird snake (*Thelotornis capensis capensis*)	**Savanna woodland**: Open or closed woodland or coastal forest from sea level to 1200m. Almost exclusively arboreal: Live amongst the branches of trees. Entering holes in evergreen trees on slope during cold periods. May hibernate in hole in tree and even hole in ground.	Partially protected. Widespread, considered secure.					
Tree-snake / Boomslang (*Dispholidus typus typus*)	Common in **most wooded regions** outside actual rainforests. From **closed woodland** through more open areas to scrub, from sea level to 1700m. Diurnal, mostly arboreal; move through branches of trees, shrubs and bushes. Mating takes place in trees and eggs are deposited in holes or hollows of trees, woodpeckers' nests or leaf litter on ground wherever suitable conditions exist. Take shelter in holes in trees and large termitaria and hibernate in holes in trees.	Partially protected. Widespread, secure.					
Unresolved group							
Reed snake / Many-spotted snake (*Amplorhinus multimaculatus*)	**Mountain streams and vleis. Reed beds and waterside vegetation.**	Partially protected. Very uncommon,					

		vulnerable.					
Family:Elapidae							
Boulenger's Half-banded garter snake (*Elapsoidea boulengeri*)	**Mesic savanna; moister regions.**	**Endemic to South Africa.**					
Snouted cobra (*Naja annulifera annulifera*)	**Savanna**: Usually in drier regions – bush- and lowveld. Permanent or semi-permanent home or retreat. Animal or other hole in the ground or in a tree, in termite hills or under outcrops of rocks or boulders. Eggs laid in some suitable, sheltered hole or cavity in the ground or in trees.	Partially protected. Widespread, generally common. Secure.					
Mozambique spitting cobra / Mfesi (*Naja mossambica*)	**Savanna: Rocky outcrops and hillsides in fairly closed woodland** at altitudes from sea-level to 1750m along rivers or localities near water. Cleared areas in former forests. Holes in termitaria and other small animal burrows.	Partially protected. Widespread, common. Status is secure.	Preys on toads, small mammals, birds, lizards, insects and snakes.				
Rinkhals *(Hemachatus haemachatus)*	Grassland, from the coast up to 2 500m. **Montane grasslands of old escarpment**. Close to vleis. Rodent and mole burrows, under rocks, among thick grass tussocks.	Partially protected. Declined in numbers. Indeterminate.					
Black mamba (*Dendroaspis polylepis*)	**Savanna** & open coastal bush below 1500m: Lower lying, drier more open woodland and **scrub to wooded grassland**, **moist savanna** and **lowland forest** (900-1200m). Ground living snake, also at home in bush, shrubs or trees - in thickets, commonly on hillsides and outcrops, granite hillocks, termite mounds, hollow tree trunks. Female will find a good place to lay eggs, burrow must be damp but not wet, and warm, but not too hot (termite nests).	Partially protected. Widespread, mostly uncommon. In need of greater conservation effort.	Actively hunts rodents, squirrels, hyrax and other suitable sized mammals, as well as fledgelings birds and other snakes.				
Family:Viperidae							
Puff adder *(Bitis arietans arietans)*	Widespread: Fynbos, **grassland, scrub and woody savannas**, from sea level to 1800m. Absent only from desert, dense forest and mountain tops. Any sort: rock on rock, rock on soil, logs, moribund grass.	Partially protected. Widespread, status is secure.					
Berg adder *(Bitis atropos)*	**Montane species**. Montane grasslands (up to 3000m), and coastal and montane fynbos. **Rocky slopes and hillsides**. Under slabs of rock and grass tussocks.	Partially protected. Rare, vulnerable.					
Snouted night adder (*Causus defilippii*)	**Open to closed woodland** from sea level to an altitude of 1200m. Under rocks on soil or under rotting logs, often associated with rocky outcrops, burrowing.						
Family:Amphisbaenidae							
Van Dam's round-headed worm lizard *(Zygaspis vandami)*	Alluvial sands with mesic savannah. Usually found under stones on sandy or humic soils.		It feeds on termites.				
Family:Scincidae							

Montane dwarf burrowing skink (*Scelotes mirus*)	**Rocky montane grassland**. Live in grass among rocks on upper mountain slopes and summits.	**Endemic to South Africa**					
Mozambique dwarf burrowing skink (*Scelotes mossambicus*)	Prefers **rocky grassland** and alluvial sand. Found under stones on mountain slopes, or logs on alluvial sand or loamy soils.						
Giant legless skink (*Acontias plumbeus*)	Lowveld in woodland and alluvial **sandy areas, forested areas**. Fossorial: Usually found below soil surface in sandy soil admixed with vegetable matter, accumulated leaf litter and humic soils in damp situations. Under stones, logs and other rotting vegetation, termitaria and among roots of trees.	Protected. Uncommon, widely distributed. Status currently secure.					
Shortheaded legless skink *(Acontias breviceps)*	**Montane** and highveld **grasslands**. Under rocks on soil. Soil loamy.	**IUCN 2010: Near Threatened. Endemic to South Africa**					
Thin-tailed legless skink *(Acontias gracilicaudata gracilicaudata)*	**Grassland**: Compact hard soils. Moist areas adjacent to streams or drainage lines, under rocks.	**Endemic to South Africa**					
Rainbow rock skink (*Trachylepis quinquetaeniata margaritifer*)	Rock-living form: Confined to **rocky outcrops and koppies in bushveld country**: Sandstone, granite, rhyolite, dolerite and basalt, in vertical and horizontal crevices. Granite domes and other hard rock surfaces (paragneiss and some sandstone).	Protected. Status currently secure and under no threat.	Insects				
Striped skink *(Trachylepis striata striata)*	Variety of **bushveld and savanna types**, and a wide range of ecological conditions from sea level to high mountain tops, desert to tropical bush. Although mainly **arboreal, they also inhabit rocky koppies and will cross open ground readily. Among rocks and boulders, on the ground and in trees.**	Protected. Widespread, adaptable. Considered secure.					
Speckled Rock Skink *(Trachylepis punctatissima)*	Variety of bushveld and savanna types, and a wide range of ecological conditions from sea level to high mountain tops, desert to tropical bush. Although **mainly arboreal, they also inhabit rocky koppies and will cross open ground readily.** Among rocks and boulders, on the ground and in trees. Forages on rock outcrops as well as trees.	Protected. Widespread and adaptable. Status is currently secure.	Small insects (beetles, moths, etc.) and other small invertebrates.				
Variable skink (*Trachylepis varia*)	Varied: **Very adaptive**, wide variety of habitats: from sea level to high mountain slopes: Bushveld, open woodland and scrubby grasslands without rocks and grassland. Desert, karroid veld, montane grassland, savannah, coastal bush, mesic thicket. Terrestrial and diurnal: Amongst rocks and stones at rocky or stony localities, but avoids extensive rocky areas. Broken ground, rocks and tree bases. Also running on ground. Uses boles of trees, rocks or logs as vantage points to survey surroundings for prey. Forage among leaf litter under trees or shrubs or amongst grass tussocks, under grass tufts, tree trunks or in any convenient hole in the ground. At night: among stones, beneath bark of fallen logs, in holes in the ground or buried in leaf-litter. Small rocky outcrops, sheltering in burrows under rocks and logs, soil-filled rock cracks.	Protected. Widespread. Considered secure.	Insects (grasshoppers, caterpillars and termites), spiders - sometimes other lizards.				

Sundevall's writhing skink (*Mochlus sundevallii sundevallii*)	**Sandy savanna and open bushveld country**. A nocturnal fossorial to terrestrial species - lead largely a sub-terrestrial existence. In search of food they often burrow to the surface of the ground. Shelter under stones, rotting logs, accumulations of dead leaves and other debris. Eggs laid in a suitable nook underground, particularly termitaria.	Protected. Widespread. Under no immediate threat.					
Family:Lacertidae							
Ornate scrub lizard *(Nucras ornata)*	Broken **montane grassland and mesic savanna** on sandy soils. Terrestrial: forages around grass tussocks, etc.						
Delalande's sandveld lizard *(Nucras lalandii)*	**Montane** and temperate (Highveld) **grassland**. Under rocks on soil in slight depression; burrows under stones or between stones, grass tussocks in open grassland.	Endemic to South Africa. Protected. Uncommon, considered secure.					
Family:Cordylidae							
Yellow-throated plated lizard *(Gerrhosaurus flavigularis)*	Wide range of habitat: Scrub- or bush-covered flats near coast to **high mountain slopes and plateau; including highveld, bushveld and lowveld.** Bushveld, lowveld, grasslands (highveld) Savannah. On stony hillsides, sandy flats, woodland and grassland. Burrows of considerable lengths dug in ground under suitable sheltering bushes, shrubs, under boulders etc. Also shelters in rodent burrows, under rocks (lay half buried in soil), moribund termitaria. Escape to suitable refuge through low matted vegetation. Lays eggs in small chamber dug in leaf litter or on soil under a stone or rock in a hole which the female excavates, buried and left to incubate.	Protected. Status – secure.	Catch grasshoppers, termites and millipedes.				
Giant plated lizard *(Gerrhosaurus validus validus)*	Arid and mesic savanna, open woodland (up to 1400m): **Hills and outcrops in bushveld country.** Terrestrial and rupicolous (rock-living); gregarious: confined to granitic and other boulder-strewn hills and outcrops. May forage several hundred meters from base of outcrop in which they live, quickly retreat back to suitable crevice or burrow in rocky retreats. Shelter in deep Crevices or Cracks between and under rocks on outcrops. Upper slopes of large granite koppies. Lays eggs in soil-filled rock crevices.		Invertebrates and vegetable matter (flowers, leaves, figs and other soft fruit), will also eat small lizards.				
Large-scaled grass lizard / snake lizard *(Chamaesaura macrolepis)*	**Montane grassland. Rocky hillsides covered with grass; flat rocks and grass tussocks.**	Protected. Rare and could be endangered.					
Cape grass lizard / snake lizard *(Chamaesaura anguina)*	**Montane grassland**, gentle slopes. Flat rocks and grass tussocks.	Protected. Appears currently to be secure.					
Barberton girdled lizard (*Cordylus warreni barbertonensis*)	**Montane, well-wooded rocky outcrops.**	**Endemic to South Africa**					
Common girdled lizard *(Cordylus vittiver)*	**Rocky outcrops in Grassland**. In cracks in small rock outcrops.	Protected. Widespread, status is secure.	Wide range of large invertebrates, including beetles, crickets and				

			grasshoppers.				
Common crag lizard (*Pseudocordylus melanotus melanotus*)	**Rock outcrops on mountain plateaus and in rolling grassland**. Slope and foothill specialists. In rock cracks.	**Endemic to South Africa**					
Family:Varanidae							
Water monitor *(Varanus niloticus niloticus)*	**Near water: rivers**, dams, pans and major lakes. Major river valleys. Shelter in holes in banks, in animal burrows or in crevices between rocks or under rocks, marginal vegetation. Basking in sun on rocks, outcrops, tree stumps, branches of overhanging trees or amongst vegetation on banks - never far from water. Escape into water – swim swiftly. Forage in marginal vegetation. Hibernate in large rock crag on rocky cliff or koppie bordering river. Young – marginal reed beds. Eggs deposited in hole dug deep into a living termite nest or sandbank by female, roughly covered over – termites seal up securely.	Protected by Provincial legislation (CITES, Appendix 11). Widespread, status considered secure.	Crabs and mussels; frogs, fish, birds and their eggs, eggs of terrapin and crocodile, insects				
Family:Agamidae							
Distant's ground agama (*Agama aculeata distanti*)	Semi-desert and savanna: Open highveld (**Grassland) and sandy thornbush (woodland)** country with suitable rodent and other small animal burrows for shelter; burrows in termitaria; under stones and debris partly buries in soil.	Protected. Widespread in TVL. Sparsely distributed. Secure.					
Southern rock agama *(Agama atra atra)*	Semi-desert to fynbos, from sea level to mountain tops. **Rocky outcrops and mountain plateaus**, also rocky plains. May shelter under bark of dead trees. Shelter in deep cracks. Eggs in hole in damp soil.	Protected. Widespread, locally common. Secure.	Ants and termites; also beetles, grasshoppers; plant material				
Southern tree agama *(Acanthocercus atricollis)*	**Open woodland with large trees, areas covered by Acacia thickets, woodland or woodland savanna, open bush and forest country** (not in rain forests). Arboreal; diurnal, lizards, most commonly - trunks of large trees. Descend to ground to forage and cross to another tree. Spend most of their time foraging in larger trees - more complex and provide greater refuge from predators, increased foraging surfaces and potential invertebrate. May shelter in holes, crevices, hollow tree trunk or crack in branch or under peeling bark. Lay eggs in hole dug in moist soil.						
Family:Chamaeleonidae							
Flap-necked chameleon (*Chamaeleo dilepis dilepis*)	Various kinds of woodland: **Savanna woodland; and wooded grassland**, along streams. Wooded areas; branches of trees; branches of shrubs; Open forest and bush country, savanna woodland. Lays eggs in tunnel in damp soft soil at a sheltered spot. Diurnal, arboreal species, common in suitable habitat.	Protected. Widespread, out of danger.					
Family:Gekkonidae							

Haacke's flat gecko (*Afroedura multiporis haackei*)	Solitary or semi communal. Inhabits cracks in exfoliating granite, cracks in shale, occasionally found in houses. Usually in sites with the opening facing downwards, protected from rainwater. Nocturnal, **foraging among boulders close to its daytime retreat.**						
Spotted dwarf gecko *(Lygodactylus ocellatus)*	**Rocky hillsides**. Exclusive rupicolous; among rocks and stones on exposed hillsides.	**Endemic to South Africa.** Protected. Common, status is secure.					
Cape dwarf gecko *(Lygodactylus capensis)*	**Well-wooded dry savanna**: Open woodland and well-wooded dry savanna country. Diurnal and arboreal gecko. Inhabiting trees with holes or loose bark, which provides shelter. Also shelters among rocks and dead vegetation. Marked preference for Baobab, Acacia and Mopane – plenty suitable rough bark as cover. Eggs are laid in rock cracks, crevices, under stones or under loose bark. Forage in low scrub and on dead trees. Observed clinging, head down, near base of tree waiting for prey.	Protected. Widespread, abundant. Under no threat.					
Wahlberg's velvety gecko (*Homopholis wahlbergii*)	Land type varied - **mesic and arid savanna**, Coastal bush. Living in holes of old tree trunks, holes in dead trees and branches, under bark, in holes in baobab trees, empty swallow nests in caves and rock overhangs, or amongst rocks and boulders – latter case prefer those lying in river-beds near the water; rock fissures, particularly on overgrown koppies along river beds. Feeding both day and night but forage away from their retreat only at night. Eggs are laid in a rock crack/ crevices or beneath loose bark and in holes in trees.		Large insects - grasshoppers, cockroaches, aslo termites and millipedes.				
Moreau's tropical house gecko (*Hemidactylus mabouia mabouia*)	Varied; arid and **mesic savanna**, and coastal bush. Arboreal in wild and very territorial. Common under loose tree bark and in the hollows of trees (particularly baobab), in the crowns of palms, and in rock cracks and crevices. In fact, in any dark convenient place on or above the ground (also piles of rubble). In the wild the eggs are laid under a rock or in a crevice and sometimes in a communal depository. Mainly nocturnal.						
Van Son's gecko (*Pachydactylus vansoni*)	Land type: Varied – karroid veld, grassland and mesic savanna. Terrestrial; **inhabits rocky outcrops** and more frequently - tunnel under rotting rocks or logs on soil; disused termitaria, occasionally low rock cracks. Solitary, nocturnal. At night – emerge to forage, it moves about on the ground in search of food. Eggs laid in soil under rocks or stones, under bark; or logs; in old termitaria in summer.	Protected. Status is secure.					
Transvaal thicktoed gecko (*Pachydactylus affinis*)	Widespread in TVL. **Rocky outcrops** and dead termite nest in Highveld grassland. Nocturnal; Largely rupicolous: Seek refuge during day and move about slowly in crevices and under stones on rocky outcrops and hillsides; moribund termitaria, piles of rubble or other suitable refuges. Eggs deposited in any suitable spot under bark, under stones and in rock cracks.	Widespread in TVL.					
Turner's thicktoed gecko *(Chondrodactylus turneri)*	Terrestrial, **restricted to rock outcrops**. Semi-desert and arid savanna, entering moist habitats. Eggs laid in small hole in sand or rock cracks.						

Appendix 9. BIRDS: Available habitat, expected occurrence and observed presence of birds during the survey (Gibbons, 1997; Harrison et al, 1997).
Different biotopes surveyed:

1. Weir and abstraction – riverine (aquatic & riparian)
2. Canal – woodland and grassland
3. Pipeline and hydro plant – woodland
4. Power line – woodland and grassland

Listed below are the birds expected to occur in the available natural habitats of the Donora environment (see table above). The words in **bold font** illustrate the qualifying habitat (preferred habitat) for each species, and the *underlined italics* indicate the disqualifying habitat (the reason why it is unlikely to find the bird in the surveyed biotopes). The shaded cells indicate the area of proposed development that incorporates the preferred habitat, and the number inside a cell gives the number of individuals or definite signs detected during surveys.

BIRD	Biotope (Geographical area)	Breeding	SA status	1	2	3	4
2. Cormorants & darters							
Little Grebe *(Tachybaptus ruficollis)*	More permanent waters*: lakes, ephemeral pans and dams; emergent or overhanging vegetation, weedy shores. Backwaters in slow flowing rivers and streams.* More permanent water. Infrequent: slow-flowing streams. Rarely in estuaries and sheltered bays.	Nest - floating heap of water plants, either on open water or concealed in vegetation.	Common resident or nomad				
Whitebreasted cormorant *(Phalacrocorax lucidus)*	Coastal and fresh waters: Dams and impoundments, streams and *large rivers*. Mainly aquatic, in both salt and freshwater. Interior - streams and rivers.	Colonial nester. Nest fixed to tree - islands, trees along rivers.	Common resident				
Reed cormorant (*Phalacrocorax africanus*)	**Virtually all freshwater habitats** except fast flowing streams. Prefers gently sloping shores. Also estuaries, lagoons and sheltered coastal waters. Freshwater wetlands (any size) and water bodies: ephemeral habitats, major rivers and fast-flowing streams with pools, artificial wetlands: dams, sewage works. Also sheltered coastal waters.	Nest in fork of tree over water or on an island. Also in large reedbed or on ground or rocky outcrop on islands.	Common resident				
African Darter (*Anhinga melanogaster*)	Freshwater wetlands, rivers and streams; *avoids fast-flowing and turbulent water*; adapted to artificial wetlands. Still and slow-moving freshwater bodies with open water. Scarce on fast flowing rivers and in areas with dense floating vegetation. Prefers areas with dead trees, rocks or banks where it can rest after feeding.	Nest built in tree fork, often over water or on a island; also in large reedbed.	Common resident				
3. Egrets, herons and bitterns							

Grey heron (*Ardea cinerea*)	Bodies of shallow open water. Wetlands – **rivers, dams, pans, marshes and estuaries – provided there is sufficient shallow water to feed in.** Mountainous areas: keep to valleys. Tall trees, reed beds and cliffs for roosting. Also marine intertidal zone, estuaries, lagoons. Rarely in dry grasslands.	Tall trees, reed beds and cliffs for breeding and roosting. Nest placed in tree forkon bush or 1.5-2.0m above water in a reedbed.	Relatively uncommon; resident Breeding resident Numbers augmented by Palearctic migrants Expansion in range – artificial water bodies. Common				
Little egret (*Egretta garzetta*)	**Open areas of shallow water**: margins of lakes, dams, **rivers**, marshes, saltpans, estuaries and mangrove swamps. Breeds near water in trees or bushes. Edges of rivers and lakes, estuaries, pans, marshes, and saltpans. Also mangroves, open coastal.	Nest placed in tree or bush above water or reedbed.	Fairly common resident				
Yellowbilled egret (*Egretta intermedia*)	Shallow water or wet grasslands. Margins of lakes, rivers, saltpans and estuaries; *especially seasonal waterbodies, marshes and flooded grasslands.* Prefers shallow water, but also forages in dry grassland close to water.	Breeds in reedbeds or trees.	Uncommon to locally common; local movements, possibly migratory in part				
Great Egret (*Egretta alba*)	*Shallow open water at lakes*, rivers, floodplains, flooded grasslands, marshes, saltpans and estuaries.	Breeds in reedbeds or trees. Nest on platform 2-3m above water in reedbed or 1-5m up in a tree standing in water or island.	Uncommon resident				
Blackheaded heron (*Ardea melanocephala*)	Open habitats, preferring grasslands. **Pastures and field of stubble near wetlands.** Tall trees for breeding and roosting.		Common resident				
Purple heron (*Ardea purperea*)	Larger water bodies and wetlands: *Reedbeds, marshes, reed-fringed rivers and lakes*; flooded areas with tall grasses, rushes and sedges. Dense emergent vegetation, especially reed beds fringing shallow wetlands; also mangroves.	Nest in reedbeds on platform.	Uncommon to common resident				
Cattle egret (*Bubulcus ibis*)	Terrestrial; **open short grassland**. Nests in trees and reedbeds.		Very common resident				
Squacco heron (*Ardeola ralloides*)	Freshwater habitats: *dense emerging/fringing vegetation in the quiet backwaters* of ponds and the edges of slow-flowing rivers and streams. Adequate reed cover and a few bushes or trees are prerequisites. Flooded grasslands and ephemeral pans with emergent vegetation.	Nest: A platform placed in bush or tree over water or in reedbed. <1m above water.	Uncommon to locally common resident				
Green-backed heron (*Butorides striata*)	Densely vegetated rivers, estuaries, **streams**, lakes, ponds, swamps and mangroves. **Wooded areas around margins of rivers, streams**, lakes, estuaries, mangroves reedbeds, and swamps where vegetation overhangs water. Occasional - mudflats, temporarily flooded grassland and seashore.	Nest placed on lateral branch of tree or dense shrub, 0.3-7m above ground or water.	Uncommon resident				

Little bittern (*Ixobrychus minutus*)	Breeding birds confined to *Typha* and *Phragmites reedbeds in standing water*. Migrants in sedges or rank emergent vegetation in shallow water. At edges of wooded streams and rivers. Rank vegetation along ponds.	Nest placed in live bulrushes or dense reeds above water.	Non-breeding Palaeactric migrant				
4. Storks, cranes and spoonbills							
Yellow-billed stork (*Mycteria ibis*)	*Dams, large marshes, swamps, estuaries, margins of lakes and large rivers*, seasonal wetlands. Wetlands, including alkaline and freshwater lakes, rivers, pans, flood plains, flooded grasslands, small pools or streams.	Nest placed on top of tree (Acacia, fig) 3-7m above ground or water.	**SA Red Data (Barnes 2000): Near-threatened.** Non-breeding infra African migrant.				
Black stork (*Ciconia nigra*)	*Shallow water: streams, large rivers, marshes, floodplains*, coastal estuaries, flooded grassland; large and small dams; dry land. Shallows of rivers, pools in dry riverbeds. Uncommon in seasonal pans lacking fish.	Nest up cliff above water: 10-100m.	**NEMBA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Near-threatened.** Uncommon to rare nomadic				
Abdim's stork (*Ciconia abdimii*)	**Grasslands**, pastures and cultivated fields.		Non-breeding intra-African migrant, very common				
White stork (*Ciconia ciconia*)	Open woodland, **grassland**, grassy Karoo and wetland areas.		Non-breeding Palaeactric migrant				
5. Ibis and hamerkop							
Hadeda Ibis (*Bostrychia hagedash*)	**Open moist grasslands & savanna, along well-vegetated river courses**; also marshes, flooded grasslands, edges of large wetlands, gardens.		Very common resident		3		
Sacred ibis (*Threskiornis aethiopicus*)	Grassland habitats, associated with freshwater habitats: *marshes, estuaries and dams*.		Common to very common resident				
Hamerkop (*Scopus umbretta*)	Large perennial waterbodies (lakes, dams and rivers), vleis and ephemeral wetlands, perennial and seasonal rivers with pools. Edges and shallow waters of lakes, pans, swamps and **marshes, rivers, streams** and seasonally flooded ponds, including relatively small puddles.	Nest in sturdy tree or on cliff ledge. Adjacent to or over water.	Common resident				
6. Ducks & geese							
Whitefaced duck (*Dendrocygna viduata*)	Inland waters, mainly in savanna and grassland. *Expanses of shallow water with emergent vegetation*: backwaters of larger rivers, grassy floodplains, small ephemeral pans. Feeds in water - usually in shallows of permanent or seasonal wetlands, or flooded grasslands; on land - natural grasslands.	Ephemeral wetlands. Dense grass or sedges - sometimes over water or island. Dense, long grass or sedges near water edge. Grassy island surrounded by shallow water.	Common resident. Nomadic when breeding. Not threatened.				
Whitebacked duck (*Thalassornis leuconotus*)	*Quite, clear inland waters* with emergent of floating vegetation, natural pans, open vleis, floodplains and river backwaters. Diving to bottom muds in open water.	Seasonal pans and floodplains. Ephemeral pans with stable water levels and isolated stands of sedges, rushes or reeds, and are well covered with aquatic grasses.	Uncommon resident or nomadic at times. Not threatened.				

Egyptian goose (*Alopochen aegyptiacus*)	**Inland waters: rivers, dams, lakes, marshes, pans, and estuaries with some exposed shoreline; wetland edges**. Rich aquatic plant growth. Naturally: Restricted to flood plains and large rivers with broad sandbanks. Currently: Cropfields and cereal fields.	Nests usually on ground, typically in dense vegetation or amomg rocks; often on small islands in water bodies. Aways near water. Also old nests of other birds.	Very common resident				
Spurwinged goose (*Plectopterus gambensis*)	Inland waters / wetland: *larger bodies of water, floating vegetation; croplands.* Flightless moult: Dams and dense swamp. Breeding: smaller system or secluded bay, emerging fringing vegetation. Rivers - shallow areas in open.	Nest: Shallow scrape in ground near water. Island, dense grass or reeds, sometimes in burrow.	Common to very common resident				
Comb Duck (*Sarkidiornis melanotos*)	Inland waters: *seasonal flooded pans and vleis. Rivers - shallow areas in open.*	Nest in cavity of tree (dead, hollow), rotten palm stump, old hamerkop nests. 4-12m above ground.	Locally common ; seasonal movements				
African black duck (*Anas sparsa*)	**Rivers with running water**, pools with wooded banks. Mainly perennial rivers and streams, from fast-flowing mountain streams to wide sandy river mouths, preferring shallow stony bottom streams with wooded banks. Moult: lodged branches undercut banks.	Nest on ground in dense grass or other ground cover on river bank, or in lodged flood debris, tangled roots or hollow stump.	Uncommon localized resident				
Yellowbilled duck (*Anas undulata*)	Inland waters: *Sluggish or still waters and still waters of rivers and streams*; mostly with marginal vegetation such as reeds. Avoid fast flow and saline/ acidic water bodies. Usually floats near emergent aquatic vegetation, occasionally on open water.	Breeds on a variety of freshwater wetlands. Shallow seasonal waterbodies. Nest amongst rushes reeds, dense grass or sedges, often within dense patch of vegetation, screened from above. Close to water - within 20m.	Very common resident				
Redbilled teal (*Anas erythrorhyncha*)	*Shallow, permanent or temporary eutrophic fresh water with grassy surroundings.*		Common resident but nomadic				
Southern pochard (*Netta erythrophthalma*)	*Deep, permanent or seasonal fresh water pans, vleis, clear water; emergent vegetation and seasonal floodplains.*		Common to very common resident				
7. Finfoot and jacanas							
African Finfoot *(Podica senegalensis)*	Quiet wooded streams and rivers flanked by thick riparian vegetation and overhanging trees. Forest and woodland areas: **Streams and rivers lined with reeds, overhanging trees and shrubs**. Avoids stagnant and fast flowing water. Perennial watercourses, clear water. Reclusive species that seldom ventures into open water. Climbs up and roosts in branches overhanging water. Forages close to water's edge and river banks, usually under overhanging vegetation.	Nest: 1-2.5m above water on an overhanging branch, well concealed. Also on flood debris and in rushes above water level.	**SA Red Data (Barnes 2000): Vulnerable.** Uncommon resident; probably rare				
8. Vultures							
Cape Vulture *(Gyps coprotheres)*	Both open country (grasslands) and woodland. Reliant on tall cliffs for breeding and roosting. **Wanders widely**.		**NEMA (TOPS): Endangered species; IUCN 2010 VU C1+2aii; SA Red Data (Barnes**				

			2000): Vulnerable. Locally common				
9. Secretary bird							
Secretary bird (*Sagittarius serpentarius*)	Open country: Savanna, **open woodland, grassland** and dwarf shrubland		**SA Red Data (Barnes 2000): Near-threatened.** Uncommon to fairly common resident. Status: Least Concern.				
10. Hawks and eagles							
African Cuckoo Hawk / African Baza *(Aviceda cuculoides)*	**Forest and dense woodland**, indigenous or exotic.		Uncommon to fairly common resident. Probably rare.				
Black-shouldered Kite *(Elanus caeruleus)*	Wide distribution: Most abundant in **grassland** and fynbos with cultivated areas.		Common resident & nomad				
Yellowbilled Kite (*Milvus migrans parasitus*)	Great variety of habitats: **especially woodlands** (higher rainfall areas)		Common breeding Palaearctic migrant				
African fish eagle (*Haliaeetus vocifer*)	Widespread. Coastal along the sea shore, and at **estuaries** and lagoons; inland on lakes and large rivers. Usually associated with **large water bodies, either flowing or still**, including **estuaries**. Sometimes along open coastline. May remain on seasonally dry rivers once last pools dry up, subsisting on birds and scavenging carcasses. Absent from rivers that flow for only a few weeks a year.	Nest in tall tree (including dead and drowned trees) or on cliff. 12-15m above ground.	Uncommon resident				
Brown Snake Eagle (*Circaetus cinereus*)	Arid **woodland**. Breeds and roosts in trees.		Uncommon to fairly common resident				
Gymnogene / African Harrier-Hawk *(Polyboroides typus)*	Mainly in **forests. Dense woodland, tall riparian vegetation and well-wooded ravines**. Partial to stands of alien trees.		Locally common resident				
Lizard Buzzard *(Kaupifalco monogrammicus)*	**Savanna and woodland**, especially mature broadleaved deciduous woodland.		Fairly common resident; somewhat nomadic				
Gabar Goshawk (*Micronisus gabar*)	**Open woodland:** *Acacia* parkland and Acacia-**dominated** riparian zone.		Common resident				
African Goshawk *(Accipiter tachiro)*	Mainly **indigenous forest; also dense riverine woodland and exotic plantations**.		Common resident				
Shikra *(Accipiter badius)*	All **woodland** types – nests in open woodland.		Common resident				
Little Sparrowhawk *(Accipiter minullus)*	**Forest and woodland types: Dense vegetation - forests, riparian bush and thickets**.		Uncommon resident				

Rufous-chested sparrowhawk *(Accipiter rufiventris)*	**Afromontane forest patches in montane grasslands** and fynbos (forest-grassland mosaic). Copses of alien trees; above 1800m. Wooded kloofs. Hunts over open grassland and fynbos near forest.		Uncommon but regular resident; probably increasing range and numbers because able to exploit exotic plantations				
Black Sparrowhawk *(Accipiter melanoleucus)*	**Forest, wooded kloofs and gorges**, exotic plantations (especially Eucalyptus) in grassveld.		Uncommon to fairly common resident; numbers increasing - able to exploit exotic plantations				
Steppe Buzzard *(Buteo vulpinus)*	Open country: dwarf shrubland, **grassland, savanna, open woodland**, thornveld & fynbos. Also found in dense woodland.		Common non-breeding Palaeactric migrant				
Forest Buzzard *(Buteo trizonatus)*	**Edge of indigenous and exotic forest**, especially pine plantations; not in high mountains.		Uncommon localized resident; probably a threatened species				
Jackal Buzzard *(Buteo rufofuscus)*	**Mountainous and hilly areas: grass** and other short vegetation. Nests on cliffs and in trees.		Locally common				
Wahlberg's Eagle (*Aquila wahlbergi*)	**Woodland – flat areas: river lines and riparian woodlands. Breeding in tall riparian trees in grassland and woodland**		Common intra African breeding migrant				
African Hawk-Eagle *(Hieraaetus spilogaster)*	**Woodlands**: breeds on hill slopes **or along river courses in tall trees.**		Uncommon to fairly common resident				
Ayres's Hawk-Eagle *(Hieraaetus ayresii)*	**Dense woodland, forest edge**, Eucalyptus groves in towns; avoids arid towns.		**SA Red Data (Barnes 2000): Near-threatened.** Scarce intra-African migrant				
Martial Eagle *(Polemaetus bellicosus)*	**Open grassland** and scrub. Large trees for nests. Wide range of vegetation types: deserts, densely **wooded and forested areas.**		**NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Vulnerable.** Fairly common to uncommon resident				
Long-crested Eagle *(Lophaetus occipitalis)*	**Woodland**; exotic plantations, forest edge, cultivated land with orchards, grassland and vlei.		Fairly common, but much reduced in southern parts of range; resident			2	
African Crowned Eagle *(Stephanoaetus coronatus)*	**Dense indigenous forest, including riverine gallery forest**; may range far from forest to hunt.		**SA Red Data (Barnes 2000): Near-threatened.** Common resident in suitable habitat, but numbers declining through deforestation				
11. Falcons, hobbies and kestrels							

Rock Kestrel *(Falco tinnunculus)*	Wide variety of habitat types: arid to mesic conditions. Mountainous areas for breeding. **Montane grassveld with rocky outcrops.**		Common resident				
Eurasian Hobby *(Falco subbuteo)*	**Mostly lightly wooded country**; avoids arid zones and forests.		Uncommon non-breeding Palaearctic migrant				
Lanner Falcon *(Falco biarmicus)*	**Open habitats**. Cliff-nester, also in old nests in trees.		**SA Red Data (Barnes 2000): Near-threatened.** Fairly common resident				
Peregrine Falcon *(Falco peregrinus)*	Cliffs, mountains, steep gorges; **may hunt over open grassland, farmland and forests**; rarely enters cities to hunt pigeons.		**NEMA (TOPS): Vulnerable species; SA Red Data (Barnes 2000): Near-threatened.** F. p. calidus: Uncommon non-breeding Palaearctic migrant F. p. minor: Rare resident				
12. Francolins and guineafowls							
Coqui Francolin *(Peliperdix coqui)*	**Savanna or well-grassed woodland**, sandy areas with good bush cover: grassy clearings and along edges of woodland.		Common resident				
Shelley's Francolin *(Scleroptila shelleyi)*	**Acacia savanna with good grass cover**, edges of cultivated lands, often on stony ground.		Fairly common resident.				
Natal Francolin (*Francolinus natalensis*)	**Woodland types: Savanna with scrub understorey, especially along water courses**, to thickets and coastal forest. Dry riparian vegetation and wooded hills.		Near-endemic. Common resident				
Red-necked Spurfowl *(Pternistes afer)*	**Wooded gorges, edges of upland evergreen forests, riverine scrub**; feeds in clearings and cultivated lands.		Locally common resident; numbers declining because of habitat destruction.				
Swainson's Spurfowl *(Pternistes swainsonii)*	Wide variety of habitats. **Tall grass in open country (grassland) or woodland.** Adjacent to cultivation or close to water.		Near-endemic. Very common resident				
Helmeted Guineafowl (*Numida meleagris*)	**Savanna** mixed with cultivation. Inhabiting most agricultural regions		Very common resident				
13. Sandgrouse and quails							
Common Quail *(Coturnix coturnix)*	Catholic use of habitats: Prefer **perennial grasslands,** less than 0.5m in height, fallow weedy fields, and grassland regenerating after burning.		Common resident or migrating				

Harlequin Quail *(Coturnix delegorguei)*	Relatively short to medium-long, rank, open **grass** with scattered bush cover. Fallow lands and grassy clearings in woodlands, dry floodplains.		Locally common breeding migrant				
Kurrichane Buttonquail *(Turnix sylvatica)*	Open **grassveld**: neither very tall or very dense. **Savanna.** Fallow lands.		Uncommon resident				
14. Crake, rails and flufftails							
Black crake (*Amaurornis flavirostris*)	Rank grass, sedges, reedbeds, bulrushes, papyrus, swampy thickets, bushes and other **vegetation beside flowing, still or open fresh and estuarine waters**. Occurs in tangled growth in which birds climb, roost and nest. In thin cover along very small streams in arid regions.	Nest well hidden and placed in vegetation just above water, sometimes on ground in grass tuft near water or floating among stiff grass stems.	Common resident				
Buff-spotted Flufftail *(Sarothrura elegans)*	**Evergreen forest and adjoining thickets**, overgrown gardens.		Fairly common resident				
15. Coot, moorhens and gallinules							
Common Moorhen (*Gallinula chloropus*)	*Wetlands with emergent fringing vegetation*, including lakes, dams, ponds, pans, rivers, streams, canals, swamps and marshes. Flooded grassland. Temp ponds on floodplains. Sheltered sites with some open water, avoids very open situations.	Nest usually well concealed in sedges, reeds or bulrushes, lower branches of tree, all above water level.	Common resident				
Redknobbed coot (*Fulica cristata*)	*Open freshwater of lakes, lagoons, ponds, pans and vleis, floodplains, reedy swamps.* Occasionally on rivers and tidal lagoons. Favouring wetlands with emergent vegetation and pondweed. Spend much time swimming on open water.	Nest on shallow (>1m) to deep water, out in the open or among emergent vegetation, sometimes on water lily leaves or mat of reeds.	Abundant resident, highly nomadic				
17. Plovers							
Threebanded plover (*Charadrius tricollaris*)	Any freshwater habitat with an *open shoreline*. Open shores of any freshwater habitat, favouring pools, streams and seeps. Also at tidal pools, estuaries and lagoons.	Nest: Simple scrape in sand, dry mud or shingle, usually close to water.	Common resident, nomadic				
Blacksmith plover (*Vanellus armatus*)	**Moist short grasslands** and mudflats on edges of pans, lakes, rivers, and estuaries.	Nest: typically close to water or in seasonally inundated areas.	Common resident, nomadic				
African Wattled plover (*Vanellus senegallus*)	**Wet short grasslands and marshes near vleis, streams and on river floodplains.** Waterlogged grasslands at seeps, streams, edges of marshes and flood plains; exposed areas around lakes and pans.	Nest: Usually on bare ground or open short or burnt grassland.	Locally common resident				
Black-winged Lapwing *(Vanellus melanopterus)*	**Short and burnt grassland**; higher altitudes.		Locally fairly common breeding nomad.				
Crowned Lapwing *(Vanellus coronatus)*	**Dry, short and over-grazed or burnt grassveld.** Widespread in a number of grassland and woodland types. Absent from mountainous and desert areas.		Common resident, nomadic				

18. Sandpipers & other waders							
Wood sandpiper (*Tringa glareola*)	Marshy shorelines: ephemeral pans, vleis, marshes, streams, floodplains and upper reaches of estuaries. *Muddy, sandy or gravel borders of dams and ponds*, inundated short grassland, sandy and muddy riverbeds, natural pans, mixed rocky and sandy beaches, salt marshes, estuaries, tidal and non-tidal lagoons and mangroves. Marsh-like conditions favoured over open shore-lines.	Extralimital.	Common non-breeding Palaearctic migrant				
Common sandpiper (*Actitis hypoleucos*)	Any aquatic habitat, but *favours streams and rivers shores with sandy, gravelly, stony or rocky substrata*, estuaries, tidal creeks in salt marsh, mangroves. Open water edges: streams, rivers, marshes, vleis, coastal lagoons and upper reaches of tidal estuaries. Prefer wet conditions adjacent to water rather than wading in water.	Extralimital.	Fairly common non-breeding Palaeartic migrant				
20. Dikkops & oystercatchers							
Water Thick-knee *(Burhinus vermiculatus)*	Primarily freshwater wetlands, especially large rivers, lakes and dams. Also ,mangrove swamps, estuaries and open beaches. Favours site with **open sand banks; also rocky areas**, but avoids heavily vegetated wetland margins.	Nest: Simple scrape in ground, close to water but fairly open position	Locally common resident.				
Spotted Thick-knee *(Burhinus capensis)*	**Various types of grasslands**; whole of SA highveld. Open grassland and savanna, edges of woodland, semi-desert with scrub, stony slopes of low hills, cultivated land. Sparse ground cover where stony.		Common resident				
24. Doves and pigeons							
Speckled Pigeon (*Columba guinea)*	Mountains, cliffs, rocky gorges, boulder-strewn hills. Inhabitant of cliffs and crags, **fly out to forage on open ground**. Artificial structures. Roosts on cliff ledges, in caves and sometimes on trees.	Nests placed on ledge of cliff, in cave, gulley or rarely in trees.	Common to abundant resident, nomadic				
African Olive-Pigeon *(Columba arquatrix)*	**Afromontane, lowland and coastal forests, riverine forests.**		Locally common resident				
Lemon Dove *(Aplopelia larvata)*	**Understory of evergreen forest and thickets**; also exotic plantations.		Common resident, but easily overlooked.				
Laughing dove (*Streptopelia senegalensis*)	**Open savanna, Acacia thornveld and grassland**; avoids natural high altitude grasslands.		Very common resident				
Redeyed Dove (*Streptopelia semitorquata*)	Tall trees in the vicinity of water. Riparian **woodland, forest verges and other well-wooded country.**		Common resident				
Emerald-spotted Wood-Dove (*Turtur chalcospilos*)	Various deciduous woodland types & moister **thornveld; thickets or drainage lines and in valleys** – taller denser growth.		Common resident			2	

Tambourine Dove (*Turtur tympanistria*)	**Lowland evergreen forest, riverine woodland, dense thickets; less often on edges of montane forest.**		Fairly dommon resident				
Namaqua Dove *(Oena capensis)*	*Dry to semi-arid open woodlands and savannas. More open habitat.*		Common resident, nomad				
African Green Pigeon (*Treron calva*)	**Well-wooded areas, along permanent rivers. Fig trees for food.** Nests in drier woodlands.		Common resident, nomad				
26. Louries							
Livingstone's Turaco *(Tauraco livingstonii)*	**Forest and dense, riparian woodland.**						
Knysna Turaco *(Tauraco corythaix)*	**Evergreen and riverine forest, dense thickets.**		Fairly common resident				
Purplecrested lourie / Turaco (*Tauraco porphyreolophus*)	**Closed woodland, particularly riverine woodland, secondary forest, patches where woodland intergrades with forest,** coastal forest, dense scrub and thickets on termitaria.Riverine forest, evergreen thickets, woodland, dense thornveld, savanna, parks and gardens.	Nest: Mid or upper canopy in densely branched, well-foliaged tree, commonly entwined with creepers, isolated tree 3-9m above ground in well-wooded habitats.	Fairly common resident	1	1	1	
Grey go-away-bird (*Corythaixoides concolor*)	**Open woodland, *Acacia* woodlands, near water.**		Common resident				
27. Coucals							
Burchell's Coucal (*Centropus burchellii*)	Rank and tangled growth. Reedbeds, marshes, and thickets, coastal bush. **Along drainage lines, edges of wetlands.**		Common resident				
28. Cuckoos							
Jacobin Cuckoo *(Oxylophus jacobinus)*	Dry open savannas, Acacia. **Dry to moist woodlands.**		Fairly common non-breeding Palaeartic and Indian migrant				
Levaillant's Cuckoo *(Oxylophus levaillantii)*	Dense, **closed** humid woodland, scrub and **woody growth along streams.** Well-developed woodland – Acacia & broadleaved.		Uncommon breeding intra African migrant				
Redchested Cuckoo (*Cuculus solitarius*)	**Forest and well-wooded habitats: riparian growth, thickets and evergreen forests.** Trees around habitation.		Common intra African breeding migrant	1		1	
African Cuckoo (*Cuculus gularis*)	Variety of **woodlands** – broadleaved and *Acacia*.		Uncommon breeding intra African migrant				
Klaas's Cuckoo (*Chrysococcyx klaas*)	Forest, **moist woodland and savanna.** Trees around habitation.		Fairly common resident and intra African breeding migrant				
African Emerald Cuckoo *(Chrysococcyx cupreus)*	**Canopy of evergreen and riverine forest**		Fairly common breeding intra-African migrant				
Diederik Cuckoo (*Chrysococcyx caprius*)	**Variety of habitats:** from forest edge to semi desert. Not in forests and uncommon in mopane.		Very common intra African breeding summer visitor				

Black Cuckoo *(Cuculus clamosus)*	**Forest edges, woodland riverine bush** exotic plantations farmland, suburban areas. Acacia woodland, riparian thickets and mixed thornveld.		Fairly common intra African breeding migrant	1	1	1	
29. Owls							
Barn owl (*Tyyo alba*)	**Wide range of vegetation types.** Northern woodlands. Needs large trees to roost. Nomadic owls moving in response to rodent population explosion.		Locally common resident				
African Scops-Owl *(Otus senegalensis)*	**Range of woodland types**; tall scattered trees.		Common resident				
Southern White-faced Scops-Owl *(Ptilopsus granti)*	**Woodland, savanna, arid thornveld, riverine bush.**		Fairly common resident				
Cape eagle owl (*Bubo capensis*)	**Wide variety of biomes. Rocky areas**		Uncommon to rare resident				
African Wood-Owl *(Strix woodfordii)*	**Evergreen and riverine forest, dense woodland,** coastal bush, pine plantations; seldom in savanna.		Locally fairly common resident				
Marsh owl (*Asio capensis*)	**Open grasslands**, marshlands and short scrub with high rodent populations preferred.		Uncommon to rare				
30. Nightjars							
Fierynecked nightjar (*Caprimulgus pectoralis*)	Dense broadleaved **woodland, savanna**, coastal bush, fynbos and alien plantations. Ground, preferring areas where there is dense leaf litter.		Common partial migrant				
Freckled nightjar (*Caprimulgus trisyigma*)	Favours areas of **bare granite**, Karoo sandstone, quartzite, mica-schist and weathered basalt substrata on hills, escarpments, boulder-strewn hillsides, in ravines and along dry, rocky river beds. Bare rocky outcrops and escarpments with well-wooded slopes. Requires some vegetation cover. By day roostson exposed rock or among vegetation, in spite of ground temperatures sometimes reaching 60 degrees C.	Nest: Natural hollow on bare rock where stone chips and wind-blown debris of plant material accumulated.	Locally common to very common resident				
31. Swifts and spinetails							
Eurasian swift (Apus apus)	**Mostly open country, but occurs almost anywhere.**		Common non-breeding Palearctic migrant				
Alpine Swift *(Apus melba)*	**Over all vegetation types**: Especially over Alpine grassland and Fynbos – breeding sites. Dry vertical cracks in overhanging cliffs.		Common breeding intra-African migrant				
African Black Swift *(Apus barbatus)*	**Montane habitats**: nesting – horizontal cracks on cliffs or in caves. **Forage - open country.**		Breeding intra-African migrant				
Little Swift *(Apus affinis)*	**Over all vegetation types: prefers open grasslands** and Karoo, not high-altitude alpine grasslands. Occur over water and nests under dry overhangs.		Very common partial migrant				

Horus Swift *(Apus horus)*	Anywhere: common in more humid south and east. Associated with **high altitude grasslands**. Nests in sandbanks.		Common breeding intra African migrant				
Whiterumped Swift (*Apus caffer*)	**Forage over open ground**. Cliffs. Anywhere: common in more humid south and east.		Very common breeding intra African migrant				
32. Mousebirds							
Speckled Mousebird *Colius striatus*	Forest, subtropical thicket and **mesic woodland**. Ecotones: Edges of forests and **closed woodland, wooded drainage lines** and gardens.		Common resident			3	
Red-faced Mousebird *(Urocolius indicus)*	Savanna woodlands, **moist woodlands**, shrubland. Avoiding forest and open grassland.		Very common resident				
33. Trogons							
Narina Trogon *(Apaloderma narina)*	**Evergreen and riverine forests, dense woodland**, moist thornveld, coastal bush, valley bushveld, wattle plantations. Nests in natural hole in tree or dead stump. Forages by sallying from perch, catching prey of leaves, branches or from air.		Uncommon to common mostly resident; possibly breeding migrants from further north				
34. Hoopoe and woodhoopoes							
African Hoopoe *(Upupa africana)*	Catholic use of habitats. **Tall savanna thornveld. Woodland.** Bare ground and short grass.		Sparse to common resident			2	
Common Scimitarbill (*Rhinopomastus cyanomelas*)	Tropical and **subtropical arid woodland**. Absent from closed canopy woodland.		Fairly common resident				
35. Kingfishers							
Half-collared Kingfisher *(Alcedo semitorquata)*	**Clear fast flowing perennial streams, rivers** and estuaries; clear water and well-wooded banks; often near rapids; narrow and secluded with dense marginal vegetation. Broken escarpment terrain. Well-vegetated lake shores and coastal lagoons.	Breeds along perennial, clear-water streams and rivers that have wooded adges. Nests in low alluvial banks (1-1.5m high) along river edge. Face onto river or open pool, and are screened or concealed to some extent by overhanging vegetation, roots or other growth. Riverbanks to excavate nest tunnels.	**SA Red Data (Barnes 2000): Near-threatened**. Uncommon resident				
Malachite kingfisher (*Alcedo cristata*)	**Strictly aquatic environments – availability of fish. River and stream banks** – hung by trees, shrubs and recumbent riverine grasses and weedy vegetation. Prefer well-vegetated, slow-flowing rivers and streams, but not with canopy closed over river. Sheltered shores, coastal lagoons, tidal estuaries, mangrove swamps.	Perennial or seasonal wetlands. Small water courses in breeding season when steep banks required for nest tunnels. Burrow: Earthen bank - along stream, earth mound, soil around upturned roots of fallen tree, wall of aardvark burrow. Low (<1m high).	Common resident				

African Pygmy-Kingfisher *(Ispidina picta)*	**Woodland habitats**; dry land and not necessarily near water. Coastal woodland and more open evergreen forest.		Locally fairly common breeding intra African migrant				
Woodland Kingfisher (*Halcyon senegalensis*)	**Well-developed woodland; tall riverine *Acacia*** stands & mopane; grass understorey heavily grazed.		Common breeding intra African migrant				
Brownhooded Kingfisher (*Halcyon albiventris*)	**Edges of evergreen forests, woodland and riverine woodland.**		Common resident				
Striped Kingfisher (*Halcyon chelicuti*)	**Open woodlands, broadleaved & *Acacia* mesic** and arid conditions.		Common resident				
Giant kingfisher (*Ceryle maxima*)	**Any water body** with sufficient food and overhanging branches to hunt from, - streams, rivers, estuaries, seashores. Perch under canopy in trees alongside streams or at edges of pools. Large rivers and small streams.	Nests in hole made in high alluvial bank, usually one overhanging a flowing river. Seldom less than 2m in height, usually 3m, upper third of bank.	Fairly common resident	1			
Pied kingfisher (*Ceryle rudis*)	**Aquatic environments – availability of fish**. Any water body with small fish, including large rivers and perennial streams, estuaries, lakes, temporarily flooded areas, rocky coasts and intertidal zone of coast. Less common along well-wooded, fast flowing streams.	Nest: Burrow in vertical alluvial sandbank being cut by flowing water, sometimes quite close to the water level. Usually positioned in the least accessible positions available: over water, in a high bank, and near the top of the bank.	Common resident				
36. Bee-eaters							
White-fronted bee-eater *(Merops bullockoides)*	Associated with watercourses . Typically associated with vertical sandy or lateritic riverbanks and watercourses - in **woodlands** (broadleaved and mixed woodland) and in wooded grassland. Also at eroded gullies, perennial rivers and seasonal streams with wooded banks.	Need sandbanks for nesting. Sandy river banks or erosion gully clear of vegetation.	Locally abundant resident				
Little Bee-eater *(Merops pusillus)*	Semi-arid to high rainfall areas. Open spaces to forage – low bushes or reeds. **Savanna and light woodland.**		Common resident				
European Bee-eater (*Merops apiaster*)	**Variety of woodland** and shrubby habitats, avoids relatively mesic and arid conditions.	Nest in riverbanks or erosion gullies.	Common non-breeding Palaearctic migrant & breeding migrant				
Southern Carmine Bee-eater *(Merops nubicoides)*	**Open woodland & savannas**; floodplains & arid *Acacia* steppe; nests in freshly cut sand cliffs. Disperses to open grassy places in variety of woodland types.		Common to abundant non-breeding intra-African migrant				
37. Rollers							
European Roller (*Coracias garrulus*)	**Woodlands, bushveld and grasslands. Open woodland.**		**IUCN 2010 NT: Near-threatened;** Fairly common non-breeding Palaearctic migrant. Population trend: decreasing.				

Lilac-breasted Roller *(Coracias caudata)*	Ecotone between **light woodland and open grassy areas**. Savanna and open woodland (broadleaved & *Acacia*)		Common resident				
38. Hornbills							
Southern Yellow-billed Hornbill *(Tockus leucomelas)*	Variety of dry, **open savanna woodlands** (broadleaved & *Acacia*)		Very common resident				
African Grey Hornbill (*Tockus nasutus*)	**Taller woodland** (broadleaved & *Acacia*) in dry and humid savannas. Bushveld.		Common resident				
Trumpeter Hornbill *(Bycanistes bucinator)*	**Forest, dense woodland with tall trees, riverine bushveld**. Patches of warm, coastal, lowland forests, especially along rivers. Lower altitudes - montane forests, in moist woodlands and mangroves, and along riparian forest strips in arid savanna. Mobile in search of fruit.	Nesting in stand of large trees on hillside, along watercourses, in hills or in isolated stand of trees in dry savanna. Nest in natural cavity in tree trunk or large branch, 2-13m above ground.	Locally common resident; some local seasonal movements.				
Southern Ground-Hornbill *(Bucorvus leadbeateri)*	Any **woodland, savanna, open grassveld**, agricultural lands.		**IUCN 2010 VU Vulnerable A4bcd. NEMA (TOPS): Protected species ; SA Red Data (Barnes 2000): Vulnerable.** Locally common resident, but scarce in settled areas; some local movements.				
39. Barbets & tinker barbets							
Yellow-rumped Tinkerbird *(Pogoniulus bilineatus)*	**Woodland**: broad-leaved. Forages like warbler in vegetation. Nests in hole excavated in dead trunk or underside of sloping branch of tree. Perches in high tree while calling.		Common resident			1	
Yellowfronted Tinker Barbet (*Pogoniulus chrysoconus*)	Broad-leaved **woodland**, moist woodland – mixed woodland and rocky hills.		Common resident				
Acacia Pied Barbet *(Tricholaema leucomelas)*	**Arid savannas**, soft-wooded trees (*Acacia*) present, wooded drainage lines in grassland.		Common resident				
Blackcollared Barbet (*Lybius torquatus*)	Miombo, **moist wooded areas**, along east facing slopes of the Transvaal escarpment, eastern coastal areas. Drier savannas: restricted to riverine vegetation. Coastal bush, woodland, forest edge, riverine forest, parks, gardens.		Very common resident				
Crested Barbet (*Trachyphonus vaillantii*)	**Savanna, woodland and thickets** – broadleaved woodlands. Mixed woodland and *Acacia* habitats. Thornveld, thickets in woodland, riverine bushveld, exotic plantations, parks, gardens.		Common resident				
40. Honeyguides & honeybirds							

Scaly-throated Honeyguide *(Indicator variegatus)*	**Canopy of evergreen and taller riverine forest, bushveld**, thickly wooded valleys, exotic plantations.		Fairly common to uncommon local resident.				
Greater Honeyguide (*Indicator indicator*)	Arid and **moist woodland**: Wide range of woodland types.		Fairly common resident				
Lesser Honeyguide *(Indicator minor)*	Wide range of wooded habitats: **savannas with scattered trees to forest fringes, riverine woodland**; exotic plantations, gardens.		Locally common resident				
41. Woodpeckers & wryneck							
Goldentailed Woodpecker (*Campethera abingoni*)	Wide spectrum of **woodland and savanna types**.		Fairly common resident				
Cardinal Woodpecker (*Dendropicos fuscescens*)	Wide variety of **woodland and savanna**.		Common resident				
Bearded Woodpecker *(Dendropicos namaquus)*	**More arid savanna types**. Savanna and woodland, tall trees in open park-like settings. Broadleaved woodland with tall trees and dead ones.		Fairly common resident				
Olive Woodpecker *(Dendropicos griseocephalus)*	**Evergreen forest**, dense coastal and riverine bush; also into fynbos when foraging.		Fairly common resident inland; scarce on coast.				
Red-throated Wryneck *(Jynx ruficollis)*	Grassland biome: Sour and Mixed **grasslands**, not Alpine grasslands; needs trees for nesting. Only found in grassland where trees are present, even exotics. Forage on open ground, absent where trees are too dense or absent. Thornveld, open bushveld, exotic plantations, farmyards, gardens.		Locally fairly common; generally uncommon; migratory in south, resident in north.				
42. Larks							
Rufousnaped Lark (*Mirafra africana*)	Variety of habitats: **bare patches, sparse grass** cover, suitable perches. Open grassland with termitaria or scattered bushes and bare patches, open savanna woodland with sparse grass cover between trees, bare patches in fallow fields and cultivated lands.		Locally common resident. Common & conspicuous spp . No evidence of range contraction. Not threatened by habitat destruction.				
Flappet Lark (*Mirafra rufocinnamomea*)	**Woodlands: clearings** or drainage lines.		Common resident				
Sabota Lark (*Mirafra sabota*)	Wide **range of savanna habitats**; arid open shrubland on rocks and sands, semi-arid *Acacia* savannas on clays, calcrete and sands, on rocky slopes with tall shrubs, bushes and trees, on edges of wooded drainage lines, mixed woodlands on stony soils.		Common resident				
43. Swallows & martins							

Brown-throated Martin *(Riparia paludicola)*	Associated with water: **Streams, large rivers**, dams, estuaries and open wetlands. Forage over dryland habitats far from water. Wetlands in fairly open habitats.	Extensive sandbanks along rivers support colonies with hundreds of widely spread burrows. Usually in sandy or friable soil in vertical sandbanks along rivers.	Common resident				
Grey-rumped Swallow *(Pseudhirundo griseopyga)*	Dry or burnt **grassland,** bare ground at edges of vleis, clearings in woodland, fallow lands, polo fields, golf courses.		Common resident or local migrant				
Barn Swallow (*Hirundo rustica*)	**All habitats**: more common in higher-rainfall eastern half: moister grassland, woodlands and fynbos.		Abundant non-breeding Palaearctic migrant				
White-throated Swallow *(Hirundo albigularis)*	**Vicinity of wetlands**, especially rivers and other expanses of open water where suitable nesting sites are available.		Common , but localized breeding intra-African migrant				
Wire-tailed Swallow *(Hirundo smithii)*	Always associated with **water bodies**, including large rivers, streams, flood plains, adjacent open grassland, open miombo, mopane woodlands, thornveld and forest edges. Rivers, streams and dams, usually in woodland and around buildings. Breeds widely in lower-lying mesic savannas but is confined to the vicinity of permanent water, especially larger rivers.	Nest: Usually close to overhang, 0.3-15.0m above ground or water. On low rock faces or the undersides of tree stumps in water.	Common resident; seasonal movements at higher elevations				
Blue Swallow *(Hirundo atrocaerulea)*	**Moist montane grassland**, usually with sinkholes, dongas and potholes, often close to evergreen mistbelt forest, usually with nearby stream.		**NEMA (TOPS): Critically Endangered species; IUCN 2010 VU Vulnerable A2c+3c; C1+2a(ii); SA Red Data (Barnes 2000): Critically endangered.** Uncommon to rare breeding intra-African migrant.				
Pearl-breasted Swallow *(Hirundo dimidiata)*	Wide range of habitats: broadleaved **woodlands**, avoiding Acacia woodlands. Wetland sites and open areas.		Breeding intra-African migrant				
Greater Striped Swallow *(Hirundo cucullata)*	**Wide variety of fairly open habitats**: semi-arid Karoo, fynbos, grassland and lightly wooded savanna.		Common breeding intra-African migrant				
Lesser Striped Swallow (*Hirundo abyssinica*)	Variety of **woodland and savanna** habitats.		Common breeding intra-African migrant				
Red-breasted Swallow *(Hirundo semirufa)*	**Open savanna; sweet grassveld**.		Scarce breeding intra-African migrant				
Rock Martin *(Hirundo fuligula)*	**Habitats with rock formations**: Rocky terrain. Rocky hills, cliffs, quarries.	Nest attached to vertical surface of rock face supported by ledge below.	Common resident				
Common House-Martin *(Delichon urbica)*	Wide variety of habitats: fynbos, **grassland, savanna woodland** and cultivated areas. Hilly open country.		Locally common non-breeding Palaearctic migrant				

Black Saw-wing (*Psalidoprocne holomelas*)	**Streams, vleis and clearings** in forest, dense woodland and exotic plantations.		Breeding intra-African migrant, locally fairly common, resident in some areas.			1	
44. Drongo and cuckooshrikes							
Black Cuckooshrike (*Campephaga flava*)	Canopy of moist **woodlands**, both broadleaved and *Acacia* woodland. Moist, arid and riparian woodlands.		Uncommon resident				
Forktailed Drongo (*Dicrurus adsimilis*)	Wide range of vegetation types: **Open bush and woodland; edges of forest patches;** Highveld – alien trees.		Common resident				
45. Orioles							
Blackheaded Oriole (*Oriolus larvatus*)	**Moist woodland**; evergreen or lightly deciduous. Afromontane Forests. Overfly extensive unsuitable habitat – grassveld.		Common resident				
47. Crows and ravens							
Pied Crow (*Corvus albus*)	**Wide variety of biomes**: unrelated to vegetation, not in southern Kalahari.		Very common resident				
White-necked Raven *(Corvus albicollis)*	Mainly mountains, gorges, cliffs, forages in more **open country** at times.		Locally common resident, though generally uncommon.				
48. Bulbuls							
Dark-capped Bulbul (*Pycnonotus barbatus*)	Wide range of habitats: **moister woodland and savanna, riverine bush,** forest edge & regenerating forest (not inside) dense montane scrub, scrubby vegetation, alien plantations. Not in open grassland.		Very common resident	2	2	2	
Sombre Greenbul *(Andropadus importunus)*	**Forest, coastal and riverine bush, dense thicket.**		Common resident.	2	5	1	
Terrestrial Brownbul *(Phyllastrephus terrestris)*	**Evergreen forest, mainly in lowlands, riverine bush and forest, dense thickets.**		Sparse to fairly common resident.				
Yellow-streaked Greenbul *(Phyllastrephus flavostriatus)*	**Evergreen forest.**		Fairly common, but localized resident.				
50. Tits							
Grey Penduline-Tit *(Anthoscopus caroli)*	**Well-developed** broadleaved **woodland**.		Fairly common resident				
Southern Black Tit (*Parus niger*)	Broadleaved **woodlands**.		Common resident				
51. Babblers							

Arrowmarked Babbler (*Turdoides jardineii*)	**Thickets or strips of denser vegetation along seasonal drainage lines.** Broadleaved and mixed woodlands.		Very common resident				
52. Thrushes							
Cape Rock-Thrush *(Monticola rupestris)*	Rocky, mountainous habitats in relatively high-rainfall areas; **gorges, incised river valleys, foothills** & lowlands adjacent to mountains. Cliffs, rocky gorges, **boulder strewn hillsides** and scree slopes, usually with scattered low trees, bushes and succulents, such as Euphorbia and Aloe species.	Nest placed 3-20m above ground in crevices or on ledge on low cliff.	**South Africa endemic.** Locally common resident				
Sentinel Rock-Thrush *(Monticola explorator)*	**Rocky uplands in grassland** biome. High rolling grasslands, rocky slopes, burnt areas, felled plantations.		**South Africa endemic.** Common resident in lowlands; in highlands subject to seasonal altitudinal movement, breeding mostly above 1200m, some birds moving downward in winter to about 600m.				
Orange Ground-Thrush *(Zoothera gurneyi)*	**Moist evergreen montane forest, especially along streams.**		**SA Red Data (Barnes 2000): Near-threatened.** Locally scarce to fairly common resident; some seasonal altitudinal movement.				
Kurrichane Thrush (*Turdus libonyana*)	**Woodland and thickets**. Moist broadleaved and mixed woodland habitat.		Common resident				
Groundscraper thrush (*Turdus litsitsirupa*)	Open **parkland woodlands**; broad-leaved and Acacia woodland – understorey poorly developed & patches of bare ground. Miombo, open overgrazed woodland, plantations.		Fairly common resident				
Olive Thrush *(Turdus olivaceus)*	**Riverine bush and montane forest**. Adapted to plantations. Well-shaded places with damp soil and moist litter.		Common resident				
53. Chats							
African Stonechat *(Saxicola torquata)*	Grassland biome: **High altitude grasslands** down to sea level, moist, open country with rank growth of grass and herbs.		Common resident and altitudinal migrant				
Buff-streaked Chat *(Oenanthe bifasciata)*	Sour grasslands – **rocky habitat** on mountains, hills, ridges and escarpments (1500-1700). Avoids woodlands, including aliens.		Fairly common to uncommon resident. **SA endemic.**				
Familiar Chat *(Cercomela familiaris)*	Broad range of open vegetation types, broken ground and **rocky habitats**. Rocky mountain slopes, rocky hills and outcrops, valley slopes, eroded gullies, sparse woodland along drainage lines.	Nest: Positioning highly opportunistic; in cavity in wall of erosion gully; on rock face, in old burrow or other burrowing-nesting species.	Common resident				

Mocking Cliff-Chat (*Thamnolaea cinnamomeiventris*)	Vicinity of rocky **outcrops in wooded country**. Open well-faulted rock faces with scattered trees and shrubs. *Ficus* trees. Well-wooded rocky ravines, gullies, cliffs, boulder-strewn hillsides and along streams or rivers in valley bottoms where there are large boulders.	Nest: Usually placed in nest of striped swallow under rock overhang or in cave.	Locally common resident				
54. Robins							
Cape Robin-Chat *(Cossypha caffra)*	**Afromontane forest fringe**: cover loving. Wide range of habitats utilized: coastal fynbos, farmstead woodlots, *Leucosidea* scrub, alpine grassland. Bracken-brair fringe of Afromontane forest.		Common resident				
White-throated Robin-Chat *(Cossypha humeralis)*	**Thickets that lines dry water courses in the bushveld** and thornveld. Open woodland – closed thickets under large shade trees. Termite mounds & fire-free places on rocky hills.		Locally common resident				
White-browed robin-chat *(Cossypha heuglini)*	**Dense riverine bush, evergreen thickets**. Sing from low perch in tree or bush. Riverine forest with broken canopy and dense evergreen thickets, lakesides with shady trees and shrubs, Acacia woodland on flood plains. In dry areas restricted to evergreen thickets fringing river courses.	Nests amongst dense shoots of coppicing bush or tree, hollow stump, tangled creepers, hollow in bank, cavity among tree roots on bank, up to 2m above ground.	Locally common resident				
Red-capped robin-chat (*Cossypha natalensis*)	**Evergreen forests and woodland, riparian growth**, deciduous thickets, riverine forests. Keeps to undergrowth of forests, forages on ground (dusk), moves seasonally to higher forest strata when fruit ripen. Sing from low perch. In general, favours linear habitats (eg along wet and dry watercourses).	Nest in hollow stump, rock crevice, hanging creeper or ground.	Scarce to common. Mostly resident.		2		
Chorister Robin-Chat *(Cossypha dichroa)*	**Evergreen forest**, especially in mist belt.		Locally common resident; some seasonal altitudinal movement at higher elevations.				
White-browed Scrub-Robin *(Cercotrichas leucophrys)*	**Woodland and bushveld** habitats. Patches of dense undergrowth in thornveld and broadleaved woodland.		.Common resident				
55. Warblers, apalis and eremomelas							
Bar-throated Apalis *(Apalis thoracica)*	Adaptable, catholic: **Wooded habitats.** Interior of evergreen or semi-evergreen forests, forest fringes, woodland, Karoo scrub, grassveld – where suitable woodland or bush occurs, e.g. along drainage lines.		Common resident				
Yellow-breasted Apalis *(Apalis flavida)*	**Riverine forest, moist bushveld**, mixed woodland, mature thornveld, thickets, middle to lowland evergreen forest, regenerating scrub.		Locally fairly common resident.				

Green-backed Camaroptera *(Camaroptera brachyura)*	Evergreen forests: **lowland, riparian, montane** and temperate forest. Small patches of forest or dense secondary growth and thickets.		Common resident	1	1	1	
Grey-backed Camaroptera *(Camaroptera brevicaudata)*	**Thickets and dense cover in drier deciduous woodlands**.		Common resident				
Barratt's Warbler *(Bradypterus barratti)*	**Dense tangled vegetation along streams, in kloofs, on forest edges**; clumps of bush on coast; also montane scrub and heathlands.		Locally fairly common to very common resident; moves to lower altitudes in winter.				
Cape Grassbird *(Sphenoeacus afer)*	Rank vegetation with long grasses, restios or ferns, in tangled scrub, low sparse shrubland and in **hilly grasslands with scattered bushes**. Avoids areas in which the woody component become too high or dense.		Locally common resident				
Sedge warbler (*Acrocephalus schoenobaenus*)	Perennial and ephemeral wetlands with low **emergent aquatic vegetation**. In papyrus, reeds, elephant grass, bulrushes, sedges, long grass and thickets adjacent to water. Marshland: Reed-beds and long grass, low-growing rush beds. Grassland anthills close to water. Also in low wetland trees tangled with undergrowth.	Extralimital	Fairly common non-breeding Palaearctic migrant				
African reed-warbler (*Acrocephalus baeticatus*)	Usually in moist or wet areas, **including edges of reeds, bulrushes, sedges,** tall herbs and forbs, and tall grass and shrubs along river banks. Marshland: Outskirts of reed-beds where there is a mixture of grass, sedges, rushes and tall willow herbs.	Nest bind to reeds, grass, sedges, well-hidden; 0.3-3.0m above dry or damp ground but usually over water.	Common breeding intra-African migrant				
Great reed warbler (*Acrocephalus arundinaceus*)	**Marshland: Phragmites and tall grass**.		Locally common non-breeding Palaearctic migrant				
Lesser swamp-warbler (*Acrocephalus gracilirostris*)	**Marshland: Phragmites over water**. Reeds and bulrushes in standing water in estuaries, lagoons, rivers, marshes.	Nest on upright reed stems, sedge, bulrush, arum lily.	Locally common resident				
Dark-capped Yellow Warbler *(Chloropeta natalensis)*	Scattered scrub and **rank vegetation along streams and gullies**. Edges of evergreen forest or woodland areas surrounding vleis, reedbeds or dams.		Locally common to scarce resident; some seasonal altitudinal movements				
Longbilled Crombec (*Sylvietta rufescens*)	**Woodland; scrubland**. Catholic in use of different woodland – not found in unwooded grassland and forest interiors.		Common resident				
Yellow-throated Woodland-Warbler *(Phylloscopus ruficapillus)*	Middle layers of **evergreen forest (mostly montane forest).**		Common resident.				

Willow Warbler *(Phylloscopus trochilus)*	Any **woodland: edges of evergreen forests**, savannas, gardens, parks, exotic plantations. Anywhere with trees and bushes ie adequate tree cover; Adequate tree cover.		Fairly common non-breeding Palaearctic migrant				
Broad-tailed Warbler *(Schoenicola brevirostris)*	**Vleis, marshy grassland**, moist grassy hillsides, boggy drainage lines, coarse high grassland.		Sparse and local; resident below about 1000m; at higher elevations breeding migrant. Indeterminate.				
56. Cisticolas & prinias							
Redfaced Cisticola (*Cisticola erythrops*)	**Tall rank vegetation in marshes, along streams and rivers and bordering reedbeds in lowveld**. Sometimes in weeds, rank growth and edges of canefields away from water. Skulks in dense undergrowth.	Nests sewn into broad leaves of herb or shrub up to 50cm above ground.	Locally common to fairly common resident				
Lazy Cisticola *(Cisticola aberrans)*	**Rocky slopes with grass**, dense scrub and occasional trees and thickets. Valley bottoms and in gullies. Rank grass, shrubs and bracken on damp ground, edges of forests.		Locally common resident				
Rattling Cisticola (*Cisticola chiniana*)	**Tree savanna – Acacia woodland** where grassland interspersed with trees & thickets or shrub. Fringes of dense woodland and in coastal scrub patches.		Very common resident				
Wailing Cisticola *(Cisticola lais)*	**Montane grasslands**: Long grass, hillsides, patches of rank growth, some scrub, shrubs or bracken, rocky outcrops.		Common resident				
Levaillant's cisticola (*Cisticola tinniens*)	**Marshland: Stream-side** where there is short grass, sedges and rushes with clumps of taller growth. Marshy areas along rivers and streams, edges of reedbeds, moist grassland, and seasonally flooded endorheic ponds.	Nest: Bond with spider web between leaves and stems of forbs and herbs. 0.1-1.0m above ground or water.	Very common resident				
Croaking Cisticola (*Cisticola natalensis*)	**Rank open moist grassland, edges of vleis, usually with scattered bushes or trees**; also in clearings and edges of forest and regenerating secondary growth.		Common resident or local migrant				
Zitting Cisticola *(Cisticola juncidis)*	**Natural grasslands** and weedy areas, edges of vleis, dams, pans, and salt marshes. *Eragrostis* grass pastures, cereal cropland, edges of cultivation, fallow lands, and any open areas with rank grass. Associated with wetlands.		Common resident				
Wing-snapping Cisticola (*Cisticola ayresii)*	Short moist and **relatively dense grassland** on well-drained soils – Alpine, Sour and Mixed Grasslands.		Common resident				

Tawny-flanked prinia (*Prinia subflava*)	**Marshland: In reeds and sedges in vleis**. Relatively tall and dense patches of vegetation: rank grass on edges of roads or farmlands, drainage lines and edges of dams and rivers, scrubby patches within woodland savannas, secondary thickets, reeds and sedges in wetlands, ecotones between grassland and dense, tall woodlands and forests. Suburban and rural gardens.		Very common resident. Readily adapts to modified habitats. Distribution not changed.				
Karoo Prinia *(Prinia maculosa)*	**Scrub and rank growth along drainage lines**. Karoo and fynbos shrubland and mixture of grassland and scrub. Fallow land and edges of forests and alien plantations.		Common resident				
Drakensberg Prinia *(Prinia [m.] hypoxantha)*	**Montane scrub, rank grassand thickets along streams and edges of forests**, woodland and exotic plantations, tall weeds in fallow lands and on roadsides, gardens.		Common resident				
57. Flycatchers							
Blue-mantled Crested Flycatcher *(Trochocercus cyanomelas)*	**Middle to lower layers of coastal, lowland and mid-altitude evergreen forest (even small forest patches; also thickets in riverine forest.)**		Uncommon and local resident; may have seasonal movements.				
African Paradise Flycatcher (*Terpsiphone viridis*)	**Woodlands: evergreen forests and broadleaved woodlands. Riverine strips, riparian vegetation.**		Common breeding intra-African migrant	1			
Cape Batis *(Batis capensis)*	**Afromontane forests**. Lower levels of evergreen forests, isolated forest fragments: undergrowth tangles and canopy. Densely wooded gorges and exotic plantations in summer; in winter may spread to more open woodland and savanna.		Common resident; some seasonal altitudinal movement.				
Chinspot Batis *(Batis molitor)*	**Major woodland types**. Acacia spp. Valley bushveld, thornveld and karroid brokenveld.		Common resident				
Pale Flycatcher (*Melaenornis pallidus*)	Mainly **broad-leaved woodland and savanna** with well-developed understory. Less often Acacia savanna. In fork of densely foliaged tree, near trunk or far out on branch, 1.5-4m above ground. Perches on lower outer branch at edge of clearing, dropping to ground to catch prey.		Common resident				
Southern Black Flycatcher (*Melaenornis pammelaina*)	**Woodlands** near surface water; taller vegetation, not necessarily clumped, open space at groundlevel.		Common resident				
Fiscal Flycatcher *(Sigelus silens)*	**Fairly open vegetation** with trees or intermittent scrub..		Common resident				
Spotted Flycatcher *(Muscicapa striata)*	**Open woodland**; habitat where bare branches alternate with open space. Open habitat with less well-structured middle and lower stratum.		Common non-breeding Palaearctic migrant				

African Dusky Flycatcher (*Muscicapa adusta*)	**Evergreen and riverine forest**, patches of forest in dense woodland; exotic plantations, well wooded gardens.		Locally common; some populations resident, most locally migratory				
Ashy flycatcher *(Muscicapa caerulescens)*	**Edges of lowland evergreen forests**, upper strata of riverine woodland, thickets in drier woodland, moister savanna, wooded gorges.		Locally common resident				
Grey Tit-Flycatcher (*Myioparus plumbeus*)	**Dense vegetation, upper strata. Riverine strips. Holes in trees for nests.**		Uncommon resident				
58. Wagtails							
African pied wagtail (*Motacilla aguimp*)	**Along margins, rocky patches and sandbanks of large rivers**, pans and dams. Usually near water, preferring wide rivers and open water bodies with sandy banks or exposed rocks and boulders. In drier areas restricted to perennial rivers.	Nest usually built close to water, on ground, in grass tussock, reeds or other vegetation, including flood debris and tree stump over water, in crevices or on rock ledge or cliff.	Common to scarce; mostly resident; non-breeding migrant to much of Transvaal in winter.	1			
Cape wagtail *(Motacilla capensis)*	Almost anywhere where there is water with open ground nearby. **Wide range of natural environments**: require merest trickle of water; open streams in forest habitats, rivers and waterfalls.	Nest concealed in vegetation on ground, often in recess in a steep bank or donga, or in bush or tree.	Common resident				
Mountain wagtail (*Motacilla clara)*	**Largely restricted to small streams and rivers in hilly, forested country, preferring stretches with emergent rock and where water flows over flat rocks**. Especially fond of waterfalls. Also along rivers through woodland and dense thicket, including valley bushveld. Fast-flowing well-wooded rocky streams and rivers, larger forested rivers; sometimes also smaller quiet tributaries, or streams in forest with pools and waterfalls. Forced to move if rivers dry up completely.	Nest built 1-5m above water in a niche in stream bank, rock face, boulder among flotsam on branch over water ot in a tree. Often near deep pool or behind waterfall.	Sparse resident on permanent streams and rivers; nomadic on seasonal tributaries.	2			
59. Pipits and Longclaws							
Yellowthroated Longclaw (*Macronyx croceus*)	**Rank grass, edges of vleis, swampy drainage lines,** with scattered trees and bushes or in savanna or light woodland.		Locally common resident; some irregular local movement away from breeding areas in winter.				
Cape Longclaw *(Macronyx capensis)*	Variety of **grassland types** at fairly high elevations. Not in bushveld; may occur in grassveld adjacent to woodland. In association with wetlands. Moist grassveld: near vleis and dams. Open countryside with thick grass.		Common resident				
Striped Pipit *(Anthus lineiventris)*	**Broadleaved woodland; rocky outcrops and gorge like situations; alongside small woodland streams**. Deeply incised drainage lines. Rock faces.		Locally fairly common resident				

African Pipit *(Anthus cinnamomeus)*	**Grasslands**: open stretches fringing pans, lightly wooded savanna, dry floodplains with short vegetation and recently burnt open veld. Avoids dense rank growth. Fallow fields.		Common resident				
Plainbacked Pipit (*Anthus leucophrys*)	**Mesic grasslands**: edges of well-wooded country, around waterbodies and marshes. Recently burnt grasslands.		Fairly common resident				
Long-billed Pipit *(Anthus similis)*	Slopes in relatively arid and eroded, **broken veld, often steppe-like with erosion scars, stones and outcrop rock interspersed** with grass clumps and low scrub. Low trees and light woodland on stony ground.		Locally common resident				
60. Shrikes							
Red-backed Shrike *(Lanius collurio)*	**Medium dense thornveld. Open habitats** with fewer smaller trees for males; females – skulk in taller woodland. Fallow land with coppicing Acacia bushes, pockets of scrub.		Fairly common non-breeding Palaearctic migrant				
Common Fiscal *(Lanius collaris)*	**Open spaces with exposed perches**, short or sparse ground cover and trees for nesting. Scarce in Arid Woodland, Marula and Knobthorn savanna, Alpine Grassland.		Common resident				
Brubru *(Nilaus afer)*	**Savanna woodlands**. Acacia and broadleaved woodland. From tall, well-developed, mixed woodlands, forest edges, scattered scrubby areas.		Common resident				
Black-backed puffback (*Dryoscopus cubla*)	**Indigenous woodland and forest. Dense woodland.**		Common resident	1	1		
Blackcrowned Tchagra (*Tchagra senegala*)	**Scrub and woodland habitats**. Mesic broadleaved woodlands.		Common resident				
Southern Boubou *(Laniarius ferrugineus)*	**Dense tangled undergrowth, thickets along watercourses** in wide range of woodland types; all woodlands and forest types. Forests and exotic plantations. Grasslands - thickets along watercourses.		Near-endemic. Common resident.				
Orange-breasted Bush-Shrike *(Telophorus sulfureopectus)*	**Woodland**. Mixed riparian woodland.		Very common resident				
Olive Bush-Shrike *(Telophorus olivaceus)*	**Canopy of evergreen forest, tall dense bush, riverine forest.**		Locally fairly common to common resident.				

Gorgeous Bush Shrike (*Telophorus quadricolor*)	**Dense thickets at edges of lowland to mid-altitude evergreen forest** and fairly dry woodland; dune forest; riverine bush, tangles of secondary growth. Forages low down in undergrowth and on ground, creeps into densest vegetation when disturbed. Nest 0.6-1.5m (usually 1m) above ground in tangled creeper or dense bush, well hidden.		Locally common to fairly common resident			1	
Grey-headed Bush-Shrike *(Malaconotus blanchoti)*	**Woodland of medium density.**		Uncommon resident				
White-crested Helmet-Shrike *(Prionops plumatus)*	**Deciduous broadleaved woodland** – breeding. Otherwise – Acacia savanna.		Common resident				
61. Starlings							
Red-winged Starling *(Onychognathus morio)*	**Cliffs and rocky areas**. Common in highland areas; less common on plains. Rocky outcrops and gorges in highland grassland, visits forests to feed on fruit.	Nest: Typically on rock ledge.	Common resident				
Cape Glossy Starling *(Lamprotornis nitens)*	**Wide range of vegetation types**: Not a grassland or forest bird. Depends on trees or tall vegetation for nests. Woodland species.		Common resident				
Plumcoloured Starling / Violet-backed Starling (*Cinnyricinclus leucogaster*)	**Open woodlands**; mixed broadleaved woodlands.		Fairly common to scarce breeding intra-African migrant				
63. Sunbirds & sugarbirds							
Gurney's Sugarbird *(Promerops gurneyi)*	**Montane scrub with Protea and Aloe** (mostly Mountain Sourveld); also gardens and Protea nurseries; may move into suburban gardens inwinter.		**SA endemic.** Locally common resident; local movements determined by flowering plants; some altitudinal movement in winter.				
Amethyst Sunbird *(Chalcomitra amethystina)*	Broadleaved **woodland** types. Gardens and stands of alien trees.		Common resident				
Scarlet-chested Sunbird *(Chalcomitra senegalensis)*	**Woodland, savanna, riverine bush**, gardens.		Common resident; some seasonal fluctuations in some areas.				
Malachite Sunbird *(Nectarinia famosa)*	Fynbos, grassland, Karoo and open savanna: **Scrubby hillsides and forest edge**. Alpine Grassland, Karoo and Fynbos vegetation types. Abundance determined by food plants and their flowering phenology.		Common; resident in lower-lying areas; seasonal migrant from higher regions in winter.				

Collared Sunbird (*Anthreptes collaris*)	**Riverine and lowland evergreen forest**; coastal bush, especially with tangled creepers. Nest suspended to drooping branch of leafy tree or shrub at edge of forest.		Locally common resident				
Southern Double-collared Sunbird *(Cinnyris chalybea)*	**Evergreen forest and bush**, Eucalyptus plantations, gardens.		Locally common to fairly common resident.				
Greater Double-collared Sunbird *(Cinnyris afra)*	**Moist habitats with trees or tall scrub**; not into forests – edge or top of canopy. Coastal, montane and riverine scrub, *Protea* savanna. Mountainous or hilly country. Afromontane and Valley Bushveld.		Common resident				
Whitebellied Sunbird (*Nectarinia talatala*)	Wide range of **woodland and bush** types – moist woodlands. Open savanna.		Common resident				
64. White-eyes							
Cape White-eye *(Zosterops pallidus)*	**Catholic choice of habitat: Evergreen** and coastal forests, fynbos, riverine bush, thickets. Drainage lines. Wooded areas in grassland and alien plantations.		Very common resident and local migrant		3		
65. Sparrows							
House Sparrow *(Passer domesticus)*	**Human dwellings**.		Very common resident, introduced				
Southern Grey-headed Sparrow *(Passer diffusus)*	**Various woodland types**: broadleaved and *Acacia*. Alien tree populations.		Common to abundant resident and nomad				
Northern Grey-headed Sparrow *(Passer griseus)*	Diversity of **fairly open habitats** up to 2500m; commensal with man.						
66. Weavers and queleas							
Lesser Masked-Weaver *(Ploceus intermedius)*	**Acacia savanna, bushveld, dry woodland, riverine trees, usually near water**. Forages mostly in canopies of trees and by probing flowers. Nests suspended from branch on inside or outside of tree, often over water up to 18m above ground. Sometimes also in reeds or low bushes. In small colonies of 10-20 nests.		Locally common resident				
Spectacled Weaver (*Ploceus ocularis*)	**Tall woodland or other tall vegetation**, edge of forest patches and in riverine woodland and thickets.		Fairly common resident.				
Cape weaver (*Ploceus capensis*)	**Nests in reeds and bulrushes along rivers** and dams.		Common resident				
Southern Masked weaver (*Ploceus velatus*)	**Nests in reeds, bushes and trees along watercourses**. Also in trees near homesteads and in other vegetation away from water.		Common resident				

Village weaver *(Ploceus cucullatus)*	**Near water; different woodland vegetation types along river valleys**. Open thornveld, but not in forests and treeless grasslands. Edges of riverine forests, usually near water. Wide range of woodland types along river valleys.	Breeds in mesic savanna especially along rivers. Nesting colonies usually in large trees, 3-10m above ground, commonly overhanging water.	Very common resident				
Redbilled Quelea (*Quelea quelea*)	**Most vegetation types**. Woodlands and grasslands. Annual grasses and surface water.		Abundant nomad. Expanded range and increased in numbers.				
Thick-billed weaver *(Amblyospiza albifrons)*	**Forest types: riparian forest, reeds or bulrushes near forests**. In breeding season at marshes, rivers, with rank grass, reedbeds and papyrus.	Nest between two or more upreight stems of bulrush, reeds or papyrus.	Resident but disperse widely after breeding				
67. Widows							
Fan-tailed Widowbird *(Euplectes axillaris)*	**Open moist grassland**, edges of vleis, rank grassy hillsides, marshes, edges of sugarcane fields.		Common resident; nomadic in winter				
White-winged Widowbird *(Euplectes albonotatus)*	**Woodland and grassland**: rank growth on the margins of open grassy areas, usually near water. Overgrown edges of cultivated areas. Seasonally inundated floodplains and tall grasslands.		Locally fairly common resident and nomad				
Red-collared Widowbird *(Euplectes ardens)*	Mosaic of **grass and bush**: typical of grassland with scattered trees or bushes.		Locally common resident and nomad				
68. Bishops							
Yellow-crowned bishop (*Euplectes afer*)	**Grassland birds**: When breeding, closely associated with marshes or seasonally flooded areas.	Nests in tall grass (temporarily flooded) standing in water. 0.15-0.4m above water surface.	Locally common resident and nomad				
Southern red bishop (*Euplectes orix*)	**Primarily grassland birds**: Nests in reedbeds. Rarely found far from water; strikingly absent from areas without permanent surface water. Found in areas cleared for cultivation. Typically where there is access to perennial water.	Nests in reeds, sedges, or bulrushes standing in water, usually 1-2.5m above water.	Very common resident and nomad. Artificial wetlands increased numbers. Common to abundant.				
Yellow Bishop *(Euplectes capensis)*	**Damp grassy areas** and heathlands.		Locally common resident; nomadic in winter.				
69. Twinspots and finches							
Green Twinspot *(Mandingoa nitidula)*	**Mature evergreen forest**, secondary growth around cultivation, gardens near dune forests, exotic plantations.		Locally fairly common resident.				
African Quailfinch *(Ortygospiza atricollis)*	**Open areas of short grassland**, floodplains, vleis and surrounding sedges. Grassland close to water.		Common resident and nomad				
Bronze Mannikin *(Lonchura cucullata)*	**Edge habitats**; dependent on water. Moist wooded areas.		Very common resident				
Red-backed Mannikin *(Lonchura [b.] nigriceps)*	**Riverine forest, moist thickets**, edges of coastal, lowland to midland evergreen forest, sometimes with tall grass.		Locally fairly common to common				

70. Firefinches & bluebills							
Red-billed Firefinch *(Lagonosticta senegala)*	**Woodland, savanna, riverine and thicket vegetation – near water.**		Common resident and nomad				
Bluebilled Firefinch / African Firefinch (*Lagonosticta rubricata*)	**Moist, wooded habitats**. Forest margins and bracken-briar. Riverine forest, bush and thickets.		Common resident				
Jameson's Firefinch *(Lagonosticta rhodopareia)*	Broadleaved **woodlands – open grassy areas** with thickets; watercourses. Rank grass, edges of thickets, secondary growth, cultivated lands, edges of riverine forest, bushy gullies and rocky hillsides.		Common resident.				
71. Waxbills							
Common Waxbill (*Estrilda astrild*)	**Rank grasslands, reedbeds**, croplands, coastal estuaries, inland wetlands and dams, along ephemeral and permanent rivers.		Common resident				
Blue Waxbill (*Uraeginthus angolensis*)	**Arid thorn savannas**. Reliable on availability of surface water.		Common resident. No changes from past distribution; common				
Swee Waxbill *(Estrilda melanotis)*	**Edges of evergreen forests**, exotic plantations, gardens, bushy hillsides, farmyards, thick streamside bush.		Common resident; some seasonal altitudinal movement.				
Orange-breasted Waxbill / Zebra Waxbill *(Amandava subflava)*	**Moist grasslands**, grassy savannas, and marshes of the Afrotropical region. Fallow lands. Mixed, Sweet and Sour grasslands.		Locally common resident and nomad				
72. Whydahs and widowfinches							
Village Indigobird *(Vidua chalybeata)*	**Thorn savanna**, edges of broadleaved woodland, riverine scrub and woodland.		Common nomad				
Dusky Indigobird *(Vidua funerea)*	Edge habitats. **Savanna & open woodland**. Edges of montane and riverine forests. Moist areas with forest.		Locally common nomad				
Pintailed Whydah (*Vidua macroura*)	Wide range of open **mesic habitats**. Edge habitats with man. Wetlands.		Very common resident and nomad				
73. Canaries							
Cape Canary *(Serinus canicollis)*	Broad spectrum of vegetation types: **Grassland**, fynbos, Karoo, woodland. Frequents "waste" and "disturbed" ground. Fallow fields. Require trees or shrubs for breeding.		Very common resident and nomad				
Forest Canary *(Serinus scotops)*	**Evergreen forest** and adjacent exotic plantations, fynbos, rank secondary growth and well-wooded gardens.		Locally fairly common resident.				