



Amphibian Assessment – Wastewater Treatment Works

Gauteng

November 2017

REFERENCE

Amphibian study

CLIENT



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Report Name	Amphibian Assessment – Wastewater Treatment Works	
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EXECUTIVE SUMMARY

The Biodiversity Company was appointed to conduct an amphibian assessment at a dam in Norkem Park relating to the application for a Wastewater Treatment Works. The proposed area is located in Kempton Park, in the Gauteng Province. The coordinates of the dam are 26°03'55.8"S 28°12'58.3"E.

The study including a desktop review, field visit and amphibian survey (including netting) at the project area in order to find and identify possible amphibian species present and the suitability of the overall habitat for amphibians.

The following conclusions were reached based on the results of this assessment:

- The aim of the study was to undertake an ecological screening, focussing on an amphibian assessment.
- According to the Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b), the project area is situated within, and will impact upon, an area classified as a Critical Biodiversity Area (CBA).
- A field survey was conducted on the 28th of November 2017, by two terrestrial ecologists, where the amphibian presence in the project area was assessed. The timing of the study represented wet season conditions which were optimal.
- The entire dam boundary was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visit.
- Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 11 amphibian species are expected to occur in the project area.
- Two different aquatic survey nets were utilised to sample water for amphibians along the edge of the dam. The water was sampled at seven (7) different locations, including open water areas, reed beds and drainage areas. No amphibians (including tadpoles) were found at any of the sampled locations.
- Two (2) amphibian species were heard calling during the survey, none of which are Red List or protected species.
- The overall impression of the dam was that the water quality appeared to be extremely poor and general aquatic life (besides common avian species) was noticeably low. The water in the dam contained excessive amounts of green algae, was foul-smelling and is assumed to be somewhat polluted.
- The lack of any notable number of amphibian species being present at the site, especially the lack of tadpoles, suggests that there may be a problem with the water quality at the project site.
- A large number (more than 20) dead Sacred Ibis birds were found either in the dam itself or along the shoreline. These birds are generally quite hardy and can tolerate



fairly high levels of human disturbance. The presence of so many dead Sacred Ibis' may further indicate further problems with water quality at the dam.

SPECIALIST OPINION

Based on this assessment, the number and quantity of amphibians recorded at the project site is considered to be extremely low given the time of year, the recent rain fall which has been experienced in the area and the presence of extensive suitable habitat for amphibians.

No Red listed, or protected species were observed but there is a possibility of the Near-Threatened, Giant Bull Frog to occur, especially in the pans on the edges of the main dam. The habitat is potentially suitable for various frog species but the condition of the habitat and the quality of the water at the moment is sub-optimal.

It should also be noted that the dam area is classified as an important CBA and thus, depending on the nature of the development, may require further assessment. It is recommended that extensive water quality tests be conducted to determine the presence of potential pollutants in the dam and the source of these pollutants.



DOCUMENT GUIDE

The table below provides the NEMA (2014) Requirements for Biodiversity Assessments, and also the relevant sections in the reports where these requirements are addressed:

Regulation 326 April 2017	Description	Section in the Report
Specialist Report		
Appendix 6 (a)	A specialist report prepared in terms of these Regulations must contain— details of— i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Second page of report.
Appendix 6 (b)	A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page iii
Appendix 6 (c)	An indication of the scope of, and the purpose for which, the report was prepared;	Section 1 & 2
Appendix 6 (cA)	<u>An indication of the quality and age of base data used for the specialist report;</u>	Section 5.1
Appendix 6 (cB)	<u>A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;</u>	n/a
Appendix 6 (d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 5.2
Appendix 6 (e)	A description of the methodology adopted in preparing the report or carrying out the specialised process <u>inclusive of equipment and modelling used;</u>	Section 5
Appendix 6 (f)	<u>Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;</u>	n/a
Appendix 6 (g)	An identification of any areas to be avoided, including buffers;	n/a
Appendix 6 (h)	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	n/a
Appendix 6 (i)	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
Appendix 6 (j)	A description of the findings and potential implications of such findings on the impact of the proposed activity [including identified alternatives on the environment] <u>or activities;</u>	n/a
Appendix 6 (k)	Any mitigation measures for inclusion in the EMPr;	n/a
Appendix 6 (l)	Any conditions for inclusion in the environmental authorisation;	n/a
Appendix 6 (m)	Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	n/a
Appendix 6 (n)	A reasoned opinion— i. [as to] whether the proposed activity, <u>activities</u> or portions thereof should be authorised; (iA) <u>regarding the acceptability of the proposed activity or activities; and</u>	Section 8



Wastewater Treatment Works

Regulation 326 April 2017	Description	Section in the Report
	ii. if the opinion is that the proposed activity, <u>activities</u> or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
Appendix 6 (o)	A description of any consultation process that was undertaken during the course of preparing the specialist report;	None
Appendix 6 (p)	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	None
Appendix 6 (q)	Any other information requested by the competent authority.	None



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DECLARATION

I, Andrew Husted declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

The Biodiversity Company

November 2017



1 INTRODUCTION

The Biodiversity Company was appointed to conduct an amphibian assessment at a dam in Norkem Park relating to the application for a Wastewater Treatment Works. The proposed area is located in Kempton Park, in the Gauteng Province. The coordinates of the dam are 26°03'55.8"S 28°12'58.3"E.

The study including a field visit and survey at the project area in order to find and identify possible amphibian species present.

A field survey was conducted on the 28th of November 2017, by two terrestrial ecologists, where amphibian presence in the project area was assessed. The timing of the study represented wet season conditions which were optimal.

This report, after taking into consideration the findings and recommendation provided by the specialists herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Terms of Reference

The aim of the study was to undertake an amphibian assessment at a dam in Norkem Park, Kempton Park, Johannesburg and to compile a report based on the findings.

The biodiversity assessment requirements by the Gauteng Department of Agriculture and Rural Development (GDARD) (2014) were considered for the study.

1.2 Proposed Activity

The proposed activity planned for the study area includes the development of Wastewater Treatment Works and associated infrastructure.

2 LIMITATIONS

The following limitation should be noted for the study:

- The timing of the study represented wet season conditions which were optimal, and some rains had fallen which would promote amphibian activity. However, due to safety concerns at the site, no late-night survey was conducted;
- Despite these limitations, a comprehensive desktop study was conducted, in conjunction with the detailed results from the survey, and as such there is a moderate confidence in the information provided.

3 KEY LEGISLATIVE REQUIREMENTS

The following legal framework and requirements apply to the study:

- The National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity; and



- GDARD Requirements for Biodiversity Assessments (Version 3, 2014a): Gauteng's Department of Agriculture and Rural Development's (GDARD) Biodiversity Management Directorate has defined minimum necessary requirements for biodiversity studies.

4 PROJECT AREA

The dam is situated at 26°03'55.8"S 28°12'58.3"E in Norkem Park, Kempton Park (Figure 1). The project area falls within Quarter Degree Square (QDS) 2628AA.

The proposed development will consist of the construction of a Wastewater Treatment Works facility and associated infrastructure.

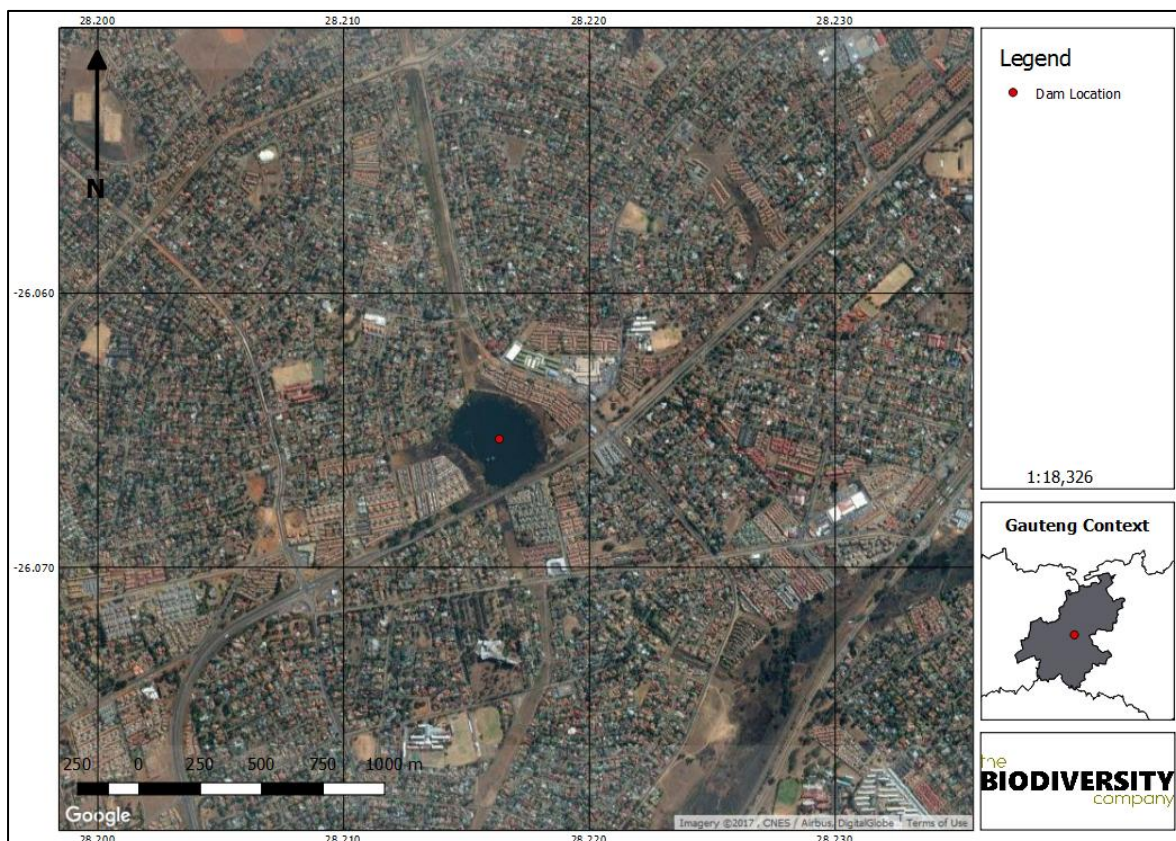


Figure 1: The location of the project area in Norkem, Kempton Park

4.1 Gauteng Conservation Plan Version 3.3

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as 'Irreplaceable' (must be conserved), or 'Important'.

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. Thus, if these



areas are not maintained in a natural or near natural state then biodiversity targets cannot be met.

As shown in Figure 2, the dam area is situated completely within, and will impact on, an area classified as a Critical Biodiversity Area (CBA).

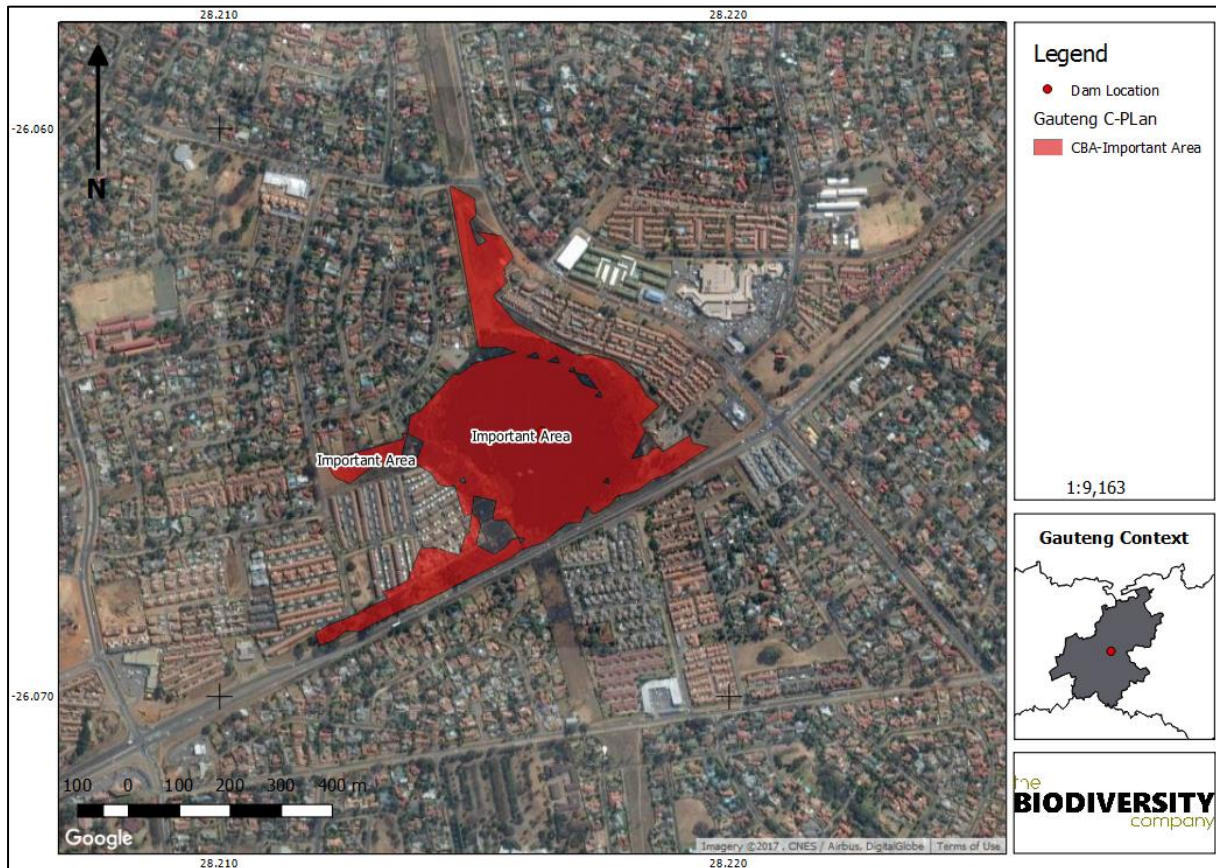


Figure 2: Project area superimposed on the Gauteng Conservation Plan Version 3.3

4.1.1 National Biodiversity Assessment (NBA)

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the Department of Environmental Affairs (DEA) and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Driver et al., 2012).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Driver et al., 2012).

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level (Driver et al., 2012). Ecosystem threat status shows the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends.

Ecosystem types are categorized as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition relative to a series of thresholds.



The project area is situated within the Egoli Granite Grassland, which is an Endangered (EN) vegetation type which is 'hardly protected' (Figure 3).

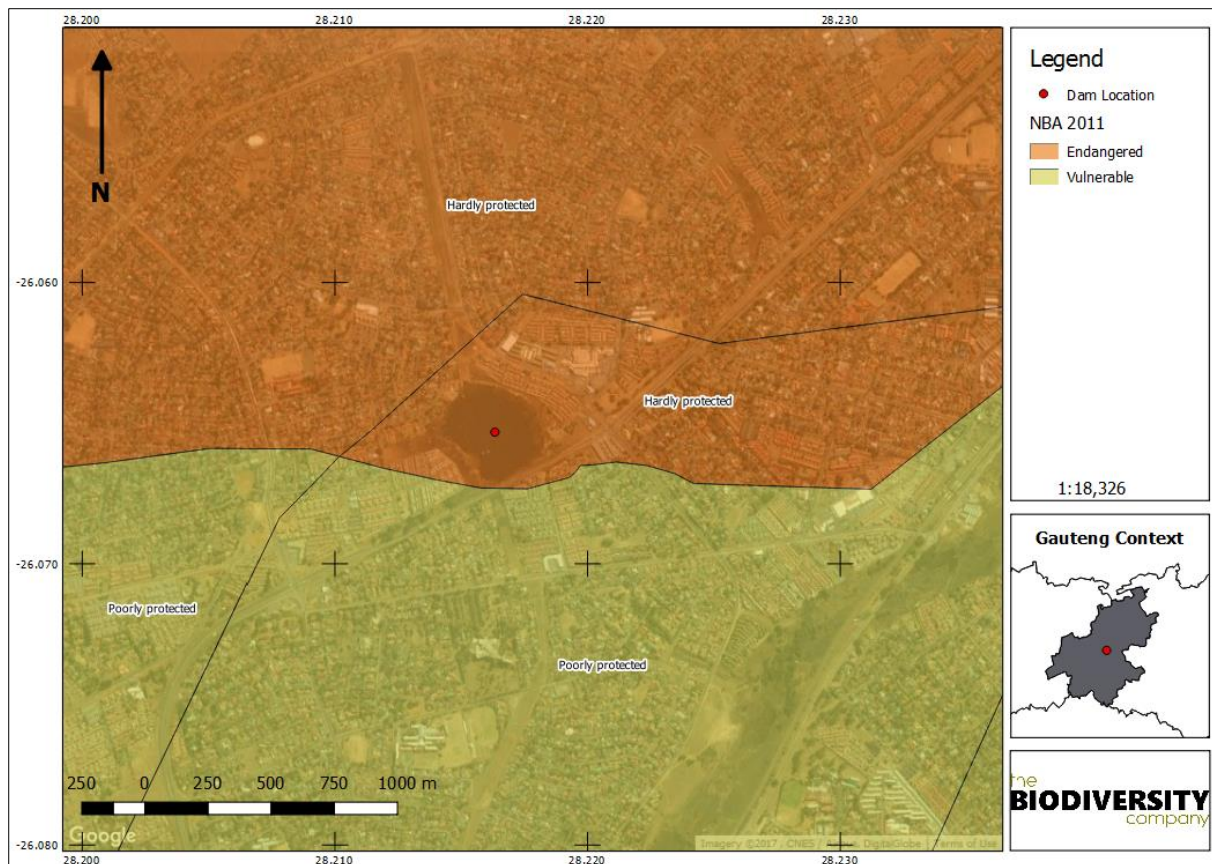


Figure 3: The ecosystem threat status of the vegetation communities in the project area (NBA, 2017)

5 METHODOLOGY

5.1 Desktop Assessment

The following datasets and sources were reviewed for the study:

- Reptiles and amphibians were referenced from ADU (2017), Bates et al. (2014), Du Preez and Carruthers (2009) and the IUCN spatial database (IUCN, 2017) respectively.

The evaluation of species of concern was considered after the field study which served to identify the potential for occurrence. Therefore, all species identified under the above-mentioned references were not necessarily analysed in detail.

Verification of the presence of red and orange listed plant species was one of the objectives of the amphibian assessment.



5.2 Field Survey

A field survey was conducted on the 28th of November 2017, by two terrestrial ecologists, where the amphibian presence in the project area was assessed. The timing of the study represented wet season conditions which were optimal.

The entire dam boundary was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data and investigate areas which showed the highest potential for amphibian activity. Photographs were recorded during the site visit.

Two different aquatic survey nets were utilised to sample water for amphibians along the edge of the dam. The water was sampled at seven (7) different locations, including open water areas, reed beds and drainage areas. Many amphibians can be successfully sampled in this manner, especially tadpoles of amphibians which can then be later identified to species level.

Acoustic monitoring of amphibians was conducted by listening for calls of various species. Frog species have unique calls which can be used to identify them to species level.

All suitable refugia along the shoreline and in the vegetation immediately adjacent to the dam where investigated for the presence of amphibians. This included searching under rocks, logs, vegetation and other suitable cover. Torches were also used to search for amphibians under structures that could not be easily lifted.

The fieldwork attempted to identify the frog species present on site and also focussed on the suitability of the habitat for amphibian species.

The survey included the following:

- A survey for the expected amphibians as per the desktop assessment; and
- Determining the suitability of the area as amphibian habitat.

6 RESULTS AND DISCUSSION

6.1 Desktop Assessment

6.1.1 Expected amphibian species

A list of potential amphibian species which might occur within the project area was obtained from the Animals Demography Unit (ADU, 2017) as well as the IUCN spatial database (IUCN, 2017).

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 11 amphibian species are expected to occur in the project area (table 1).



Table 1: Amphibian species which might occur within the project area:

Species	Common name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Amietia delalandii</i>	Delalande's River Frog	LC	Unlisted	High
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC	High
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC	High
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC	High
<i>Pyxicephalus adspersus</i>	Giant Bull Frog	NT	LC	Moderate
<i>Schismaderma carens</i>	Red Toad	LC	LC	High
<i>Sclerophrys capensis</i>	Raucous Toad	LC	LC	High
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC	High
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC	LC	High
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC	LC	High
<i>Xenopus laevis</i>	Common Platanna	LC	LC	High

Pyxicephalus adspersus (Giant Bull Frog) is the only amphibian species of conservation concern (SCC) which could potentially occur at the project site. This species is listed as Near-Threatened (NT) on a regional scale. The Bullfrog is a frog species of drier savannahs. It is fossorial for most of the year, remaining buried underground in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches. They are active by day during the breeding season. The existence of wetlands or seasonal pans, which the species uses to aestivate may exist within the floodplains and the general Apies river vicinity to the East of the project area means the likelihood of occurrence was rated as moderate.

6.1.2 Habitat condition

Two (2) main habitats were identified at the project site; the first habitat consisted of the of the dam itself including the open water areas and water's edge, including various reed beds and other vegetation cover (Figure 4). The second habitat comprised of the slightly drier vegetation surrounding the water's edge and areas adjacent to the dam (Figure 5).





Figure 4: An example of the periphery of the dam, showing the shoreline and some of the associated vegetation



Figure 5: The drier vegetation surrounding the water's edge

The habitat within the dam and on the water's edge consisted mostly of shallow water with emerged *Typha capensis* and *Phragmites australis* as well as other wetland plants. This habitat is highly suitable for various amphibian species due to the large amount of refuge and forage available. It also provides suitable habitat for breeding and tadpole development under normal water quality conditions.

The drier vegetation habitat consisted of a mix of terrestrial plant species as well as wetland plants in the areas where water collects periodically. This is a unique habitat in its own as it

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may support amphibian species which are less reliant on more sub-merged habitat, such as the Giant Bullfrog.

6.1.3 Amphibian species

Only two (2) amphibian species were heard calling during the survey (Table 2). Visual observation of these calling species could not be achieved. There is a high confidence in the identification of these species by using their calls. Neither of these species are on the Red List or are listed as protected species.

Furthermore, there was a noticeable lack of tadpoles or froglets with none being recorded at any of the sample sites across the dam. With the extensive amount of sampling conducted using aquatic sampling nets, especially close to submerged vegetation, it would be expected that some tadpoles should have been recorded in this manner.

The number and quantity of amphibians recorded at the project site is considered to be extremely low given the time of year, the recent rain fall which has been experienced in the area and the presence of extensive suitable habitat for amphibians.

Table 2: Amphibian species recorded

Species	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC

6.2 General Field Observations

Although not part of the amphibian study, a few important observations were made during the field survey.

The overall impression of the dam was that the water quality appeared to be extremely poor and general aquatic life (besides common avian species) was noticeably low. Although an invertebrate study was not part of this specialist survey, it was noted that extremely low numbers of aquatic invertebrates were captured whilst sampling for tadpoles. The aquatic sampling nets used for this study are those which are used for SASS invertebrate studies, and as such, if invertebrate diversity in the dam was high, a large number of invertebrates would have been recorded during this survey.

The water in the dam contained excessive amounts of green algae, was foul-smelling and is assumed to be somewhat polluted. Accurate water quality tests may be necessary to confirm this.

Amphibians have very porous skin and are very sensitive to changes in water quality, and are therefore often used as indicators for environmental problems such as pollution. The lack of any notable number of amphibian species being present at the site, especially the lack of tadpoles, suggests that there may be a problem with the water quality at the project site.

The water quality could be influenced by a number of factors such as pollution from the surrounding urban environment, which is especially high during the early wet season. This is due to various sources of pollution collecting during the dry season which is then flushed into



wetlands and water bodies after the first heavy rains (Figure 6). Other sources of pollution may be illegal dumping and litter (evident at the project site) as well as pollutants entering the system upstream or from leaking manholes covers which may be discharging sewerage or chemicals into the system.



Figure 6: Field photo of the water's edge showing areas of stagnant water

Worryingly, a large number of deceased Sacred Ibis were observed throughout the project area, as seen in Figure 7. Sacred Ibis' are considered a fairly hardy species of bird which can withstand fairly polluted environments.

The fact that so many dead birds were found (more than 20 individuals of various ages) does suggest that an existing environmental problem may be causing these birds to die off. This may also indicate that the water quality in the dam is sufficiently poor, to the extent that it may be causing these deaths. Another possible reason for the deaths of these birds is that they could be consuming other organisms who have died from consuming toxins/pollutants within the dam itself.



Figure 7: An example of one of the many deceased Sacred Ibis found in the dam at the project site

7 CONCLUSIONS

The following conclusions were reached based on the results of this assessment:

- The aim of the study was to undertake an ecological screening, focussing on an amphibian assessment.
- According to the Gauteng Conservation Plan (Version 3.3) (GDARD, 2014b), the project area is situated within, and will impact upon, an area classified as a Critical Biodiversity Area (CBA).
- A field survey was conducted on the 28th of November 2017, by two terrestrial ecologists, where the amphibian presence in the project area was assessed. The timing of the study represented wet season conditions which were optimal.
- The entire dam boundary was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visit.
- Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2017) 11 amphibian species are expected to occur in the project area.
- Two different aquatic survey nets were utilised to sample water for amphibians along the edge of the dam. The water was sampled at seven (7) different locations, including open water areas, reed beds and drainage areas. No amphibians (including tadpoles) were found at any of the sampled locations.



- Two (2) amphibian species were heard calling during the survey, none of which are Red List or protected species.
- The overall impression of the dam was that the water quality appeared to be extremely poor and general aquatic life (besides common avian species) was noticeably low. The water in the dam contained excessive amounts of green algae, was foul-smelling and is assumed to be somewhat polluted.
- The lack of any notable number of amphibian species being present at the site, especially the lack of tadpoles, suggests that there may be a problem with the water quality at the project site.
- A large number (more than 20) dead Sacred Ibis birds were found either in the dam itself or along the shoreline. These birds are generally quite hardy and can tolerate fairly high levels of human disturbance. The presence of so many dead Sacred Ibis' may further indicate further problems with water quality at the dam.

8 SPECIALIST OPINION

Based on this assessment, the number and quantity of amphibians recorded at the project site is considered to be extremely low given the time of year, the recent rain fall which has been experienced in the area and the presence of extensive suitable habitat for amphibians.

No Red listed, or protected species were observed but there is a possibility of the Near-Threatened, Giant Bull Frog to occur, especially in the pans on the edges of the main dam. The habitat is potentially suitable for various frog species but the condition of the habitat and the quality of the water at the moment is sub-optimal.

It should also be noted that the dam area is classified as an important CBA and thus, depending on the nature of the development, may require further assessment. It is recommended that extensive water quality tests be conducted to determine the presence of potential pollutants in the dam and the source of these pollutants.



9 REFERENCES

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