DRAFT Verification of wetlands on Portion 183 of the farm Olifantsfontein 410-JR in Midrand, Gauteng

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Declaration of Independence

I, **Antoinette Bootsma**, in my capacity as a specialist consultant, hereby declare that I -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member; and
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional judgement.

2014.0.22

Antoinette Bootsma (PrSciNat) Date

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Indemnity

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information at the time of study. Therefore, the author reserves the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although the author exercises due care and diligence in rendering services and preparing documents, she accepts no liability, and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document.

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1 INTRODUCTION

Limosella Consulting (Pty) Ltd was appointed to verify wetland conditions recorded on site in Batchelor (2009) in order to inform the environmental authorization process. Fieldwork was conducted in May 2014.

1.1 Terms of Reference

The terms of reference for the current study were as follows:

- Delineate wetland and riparian conditions on the site,
- Verify their Present Ecological Status, and
- Recommend suitable buffer zones.

1.2 Locality of the Study Site

The site description is the remainder of Portion 183 of the farm Olifantsfontein, Midrand, Ekurhuleni Metropolitan area. The site lies adjacent to Glen Austin Pan (a small part of which encroaches onto the site), east of Allan Road and south of Olifantsfontein Road. Approximate central coordinates are 25°58'25.68"S and 28°10'33.97"E.

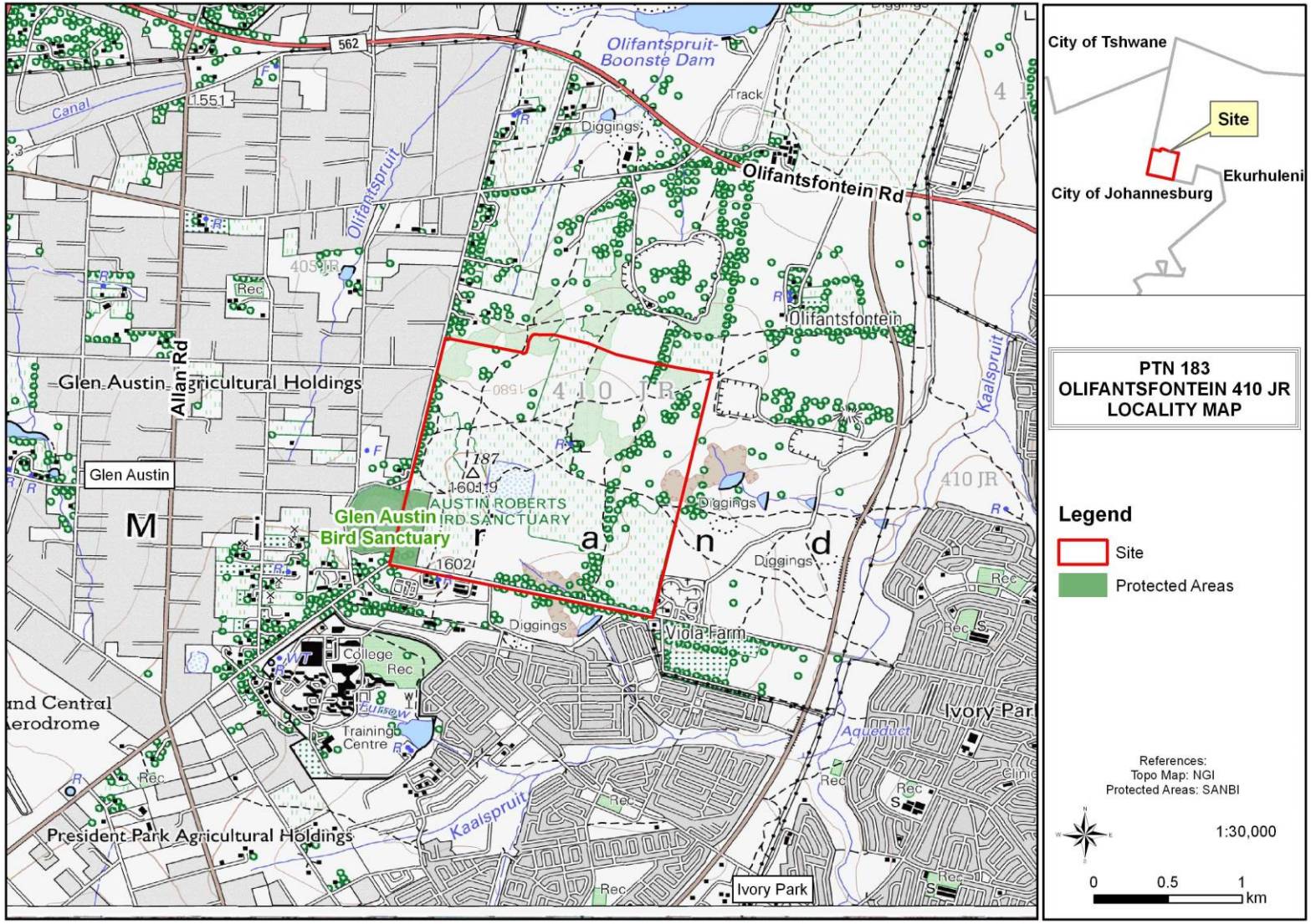

Figure 1: Locality of the area investigated

1.3 Assumptions and Limitations

The recreation grade gps used for wetland and riparian delineations is accurate to within five to ten meters depending on satellite location. Therefore, wetland and riparian delineations plotted digitally may be offset by at least five meters to either side. Furthermore, it is important to note that, during the course of converting spatial data to final drawings, several steps in the process may affect the accuracy of areas delineated in the current report. It is therefore suggested that the no-go areas identified in the current report be pegged in the field in collaboration with a land surveyor for precise boundaries. An assessment of groundwater movement and its interaction with the wetland discussed in this report falls outside of the scope of the current assessment.

Furthermore, the assessment of wetlands and riparian areas is based on environmental indicators such as vegetation that are subjected to seasonal variation as well as factors such as fire. A Red Data scan, fauna and flora, and aquatic assessments were not included in the current study.

Description of the depth of the regional water table and geohydrological processes falls outside the scope of the current assessment. Wetland delineations are based primarily on vegetation gradients and our interpretation of soil indicators. Particularly seepage wetland areas should be verified by suitably qualified pedologists.

1.4 Definitions and Legal Framework

This section outlines the definitions, key legislative requirements and guiding principles of the wetland study and the Water Use Authorisation process.

The National Water Act, 1998 (Act No. 36 of 1998) [NWA] provides for Constitutional water demands including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State and are regulated by the Department of Water Affairs (DWA). The NWA sets out a range of water use related principles that are to be applied by DWA when taking decisions that significantly affect a water resource. The NWA defines a water resource to include a watercourse, surface water, estuary or aquifer. A watercourse includes a river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake, pan or dam, into which or from which water flows; any collection of water that the Minister may declare to be a watercourse; and were relevant its beds and banks.

The NWA defines a wetland as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.” In addition to water at or near the surface, other distinguishing indicators of wetlands include hydromorphic soils and vegetation adapted to or tolerant of saturated soils (DWA, 2005).

Riparian habitat often performs important ecological and hydrological functions, some similar to those performed by wetlands (DWA, 2005). Riparian habitat is also the accepted indicator used to delineate the extent of a river’s footprint (DWAF, 2005). It is defined by the NWA as follows: “Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse, which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a

frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas".

Water uses for which authorisations must be obtained from DWA are indicated in Section 21 of the NWA. Section 21 (c) and (i) is applicable to any activity related to a wetland:
Section 21(c): Impeding or diverting the flow of water in a watercourse; and
Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

Authorisations related to wetlands are regulated by Government Notices R.1198 and R.1199 of 18 December 2009. GN 1198 and 1199 of 2009 grants General Authorisation (GA) for the above water uses on certain conditions:

- GN R.1198: Any activity in a wetland for the rehabilitation of a wetland for conservation purposes.
- GN R.1199: Any activity more than 500 m from the boundary of a wetland.

These regulations also stipulate that these water uses must be registered with the responsible authority. Any activity that is not related to the rehabilitation of a wetland and which takes place within 500 m of a wetland are excluded from a GA under either of these regulations. Wetlands situated within 500 m of proposed activities should be regarded as sensitive features potentially affected by the proposed development (GN 1199). Such an activity requires a Water Use Licence (WUL) from the relevant authority.

In addition to the above, the proponent must also comply with the provisions of the following relevant national legislation, conventions and regulations applicable to wetlands and riparian zones:

- Convention on Wetlands of International Importance - the Ramsar Convention and the South African Wetlands Conservation Programme (SAWCP).
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA].
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004).
- National Environment Management Protected Areas Act, 2003 (Act No. 57 of 2003).
- Regulations GN R.543, R.544 and R.545 of 2010, promulgated under NEMA.
- Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983).
- Regulations and Guidelines on Water Use under the NWA.
- South African Water Quality Guidelines under the NWA.
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 287 of 2002).

1.5 Description of the Receiving Environment

The receiving environment is described in detail in the report compiled by Batchelor (2009).

The study site falls within Quarternary Catchment A21B which drains into the Hennops River. In this catchment, the ratios of Mean Annual Precipitation (MAP) to Potential Evapotranspiration (PET) is 0.32 (Table 1). This value indicates that wetlands lose more water through evapotranspiration than they received through precipitation, unless they are associated with water input from river systems. The functional assessment methodology proposed by Macfarlane *et al*, (2010) classifies the vulnerability of wetlands in this region, based on these values, as Moderately High, specifically with regards to changes to infiltration rates and surface water flows in the catchment.

A surface water spatial layer reflected the presence of two tributaries that flow into the Kaalspruit. To the north, just outside the border of the study area is the source of a tributary of the Olifantsspruit, which is itself a tributary of the Kaalspruit (CDSM, 1996).

The region is underlain by Halfway House granites of the Basement Complex (DDPLG, 2002). The dominant presence of underlying granite in the region is directly related to the presence of Egoli Granite Grassland, a protected grassland type currently under severe pressure from urbanisation (Mucina & Rutherford, 2006).

2 METHODOLOGY

The delineation method documented by the Department of Water Affairs and Forestry in their document "A practical field procedure for identification and delineation of wetlands and riparian areas" (DWAF, 2005), the "Classification System for Wetlands and other Aquatic Ecosystems in South Africa" (Ollis, *et al*., 2013) and the Minimum Requirements for Biodiversity Assessments (GDARD, 2012) was followed throughout the field survey. These guidelines describe the use of indicators to determine the outer edge of the wetland and riparian areas such as soil and vegetation forms as well as the terrain unit indicator.

A hand held recreation grade gps was used to capture GPS co-ordinates in the field. Google Earth, 1:50 000 cadastral maps, historical images (1939 and 1976), and available spatial data were used as reference material for the mapping of the preliminary wetland boundaries. These were converted to digital image backdrops and delineation lines and boundaries were imposed accordingly after the field survey.

2.1 Wetland and Riparian Delineation

2.1.1 Wetland areas

Wetlands are delineated based on scientifically sound methods, and utilizes a tool from the Department of Water Affairs and Forestry named 'A practical field procedure for identification and delineation of wetlands and riparian areas' (DWAF, 2005).

Wetlands are identified based on one or more of the following characteristic attributes (DWAF, 2005) (Figure 2):

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur (Figure 3 and Figure 4);
- The presence of plants adapted to or tolerant of saturated soils (hydrophytes);
- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation; and
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing within 50cm of the soil surface.

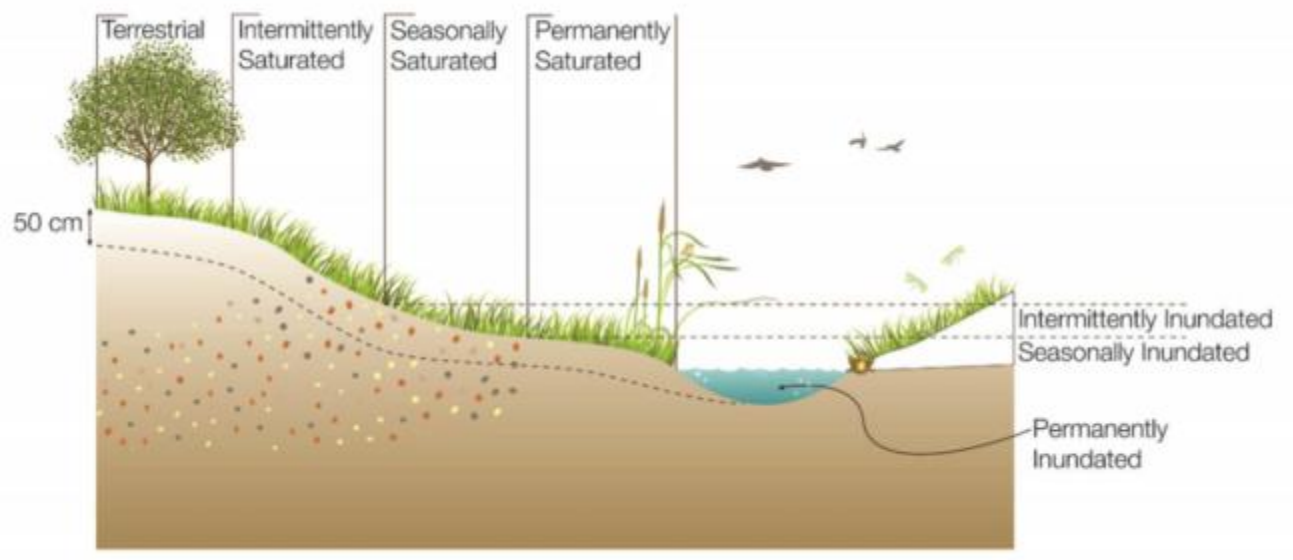

Figure 2: Typical cross section of a wetland (Ollis *et al*, 2013).

<u>The Terrain Unit Indicator</u>

The terrain unit indicator (Figure 3) is an important guide for identifying the parts of the landscape where wetlands might possibly occur. Some wetlands occur on slopes higher up in the catchment where groundwater discharge is taking place through seeps. An area with soil wetness and/or vegetation indicators, but not displaying any of the topographical indicators should therefore not be excluded from being classified as a wetland. The type of wetland which occurs on a specific topographical area in the landscape is described using the Hydrogeomorphic classification which separates wetlands into 'HGM' units. The classification of Ollis, *et al*. (2013) is used, where wetlands are classified on Level 4 as either Rivers, Floodplain wetlands, Valley-bottom wetlands, Depressions, Seeps, or Flats (Figure4).

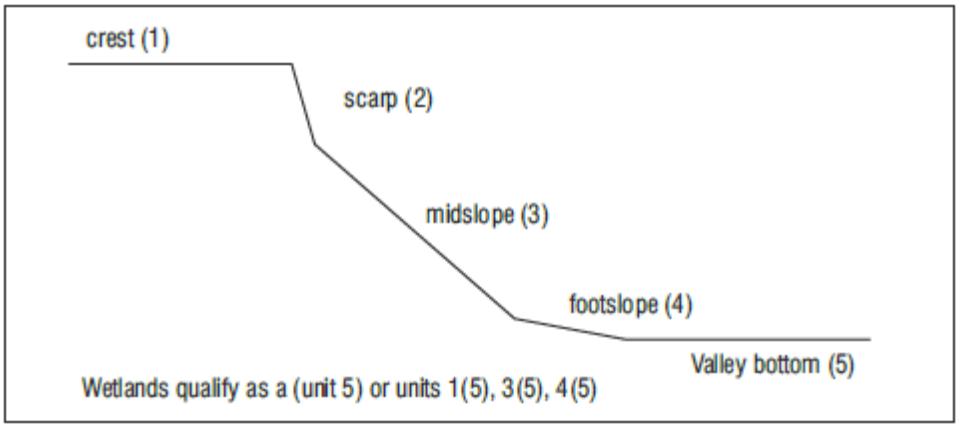

Figure 3. Terrain units (DWAF, 2005).

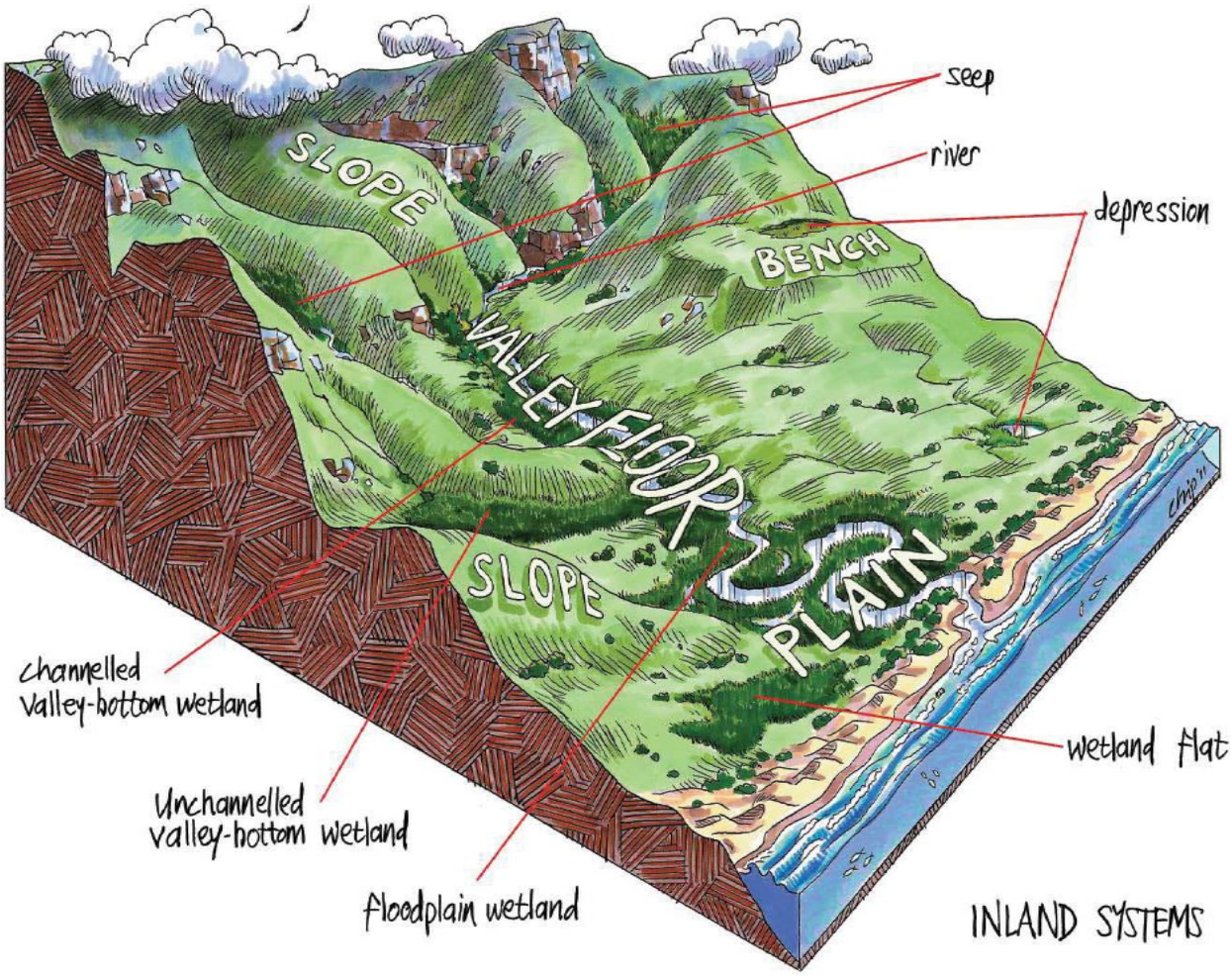

Figure 4: Wetland Units based on hydrogeomorphic tyes (Ollis *et al.* 2013)

The Vegetation indicator

Vegetation is a key component of wetland areas as defined by the National Water Act. However, using vegetation as the only indicator requires undisturbed conditions and therefore soil wetness indicators are also used. Plant communities undergo changes in species composition along a wetness gradient. Some plant species are more adapted to growing under saturated conditions, while some can tolerate or prefer to grow in temporary saturated conditions. This assists the delineation of wetlands and the different zones within wetlands (e.g. the permanent zone and the temporary zone). Similarly, the vegetation along riparian areas is indicative of rich alluvial soils and elevated soil saturation conditions.

Soil wetness indicator

Hydromorphic soils display characteristics resulting from prolonged and repeated saturation including gleying and mottling (DWAF, 2005) (Table 1). These characteristics are used to determine the presence of wetland conditions.

Table 1. Criteria for distinguishing different soil saturation zones and hydric vegetation within a wetland (from Kotze *et al.*, 1994)

SOIL	DEGREE OF WETNESS		
	Temporary	**Seasonal**	**Permanent/Semi-permanent**
Soil depth 0-20cm	Matrix brown to greyish brown (chroma 0-3, usually 1 or 2). Few/no mottles. Non-sulphuric.	Matrix brownish grey to grey (chroma 0-2). Many mottles. Sometimes sulphuric.	Matrix grey (chroma 0-1). Few/no mottles. Often sulphuric.
Soil depth 20-50cm	Matrix greyish brown (chroma 0-2, usually 1). Few/many mottles.	Matrix brownish grey to grey (chroma 0-1). Many mottles.	Matrix grey (chroma 0-1). No/few mottles.

Figure 5: Wetland soils showing mottling and gleying

2.1.2 Riparian areas

Riparian habitat is classified primarily by identifying riparian vegetation along the edge of the macro stream channel. The macro stream channel is defined as the outer bank of a compound channel (Figure 5) and should not be confused with the active river bank. The macro channel bank often represents a dramatic change in the energy with which water passes through the system. Rich alluvial soils deposit nutrients making the riparian area a highly productive zone. This causes a very distinct change in vegetation structure and composition along the edges of the riparian area (DWAF, 2005). The marginal zone has also been referred to as active features or wet bank (Van Niekerk and Heritage, 1993). It includes the area from the water level at low flow, if present (the greenline concept may be used in the absence of base flow (Cagney, 1993)), to those features that are hydrologically activated for the greater part of the Year (WRC Report No TT 333/08 April, 2008). The non-marginal zone is the combination of the upper and lower zones (Figure 6).

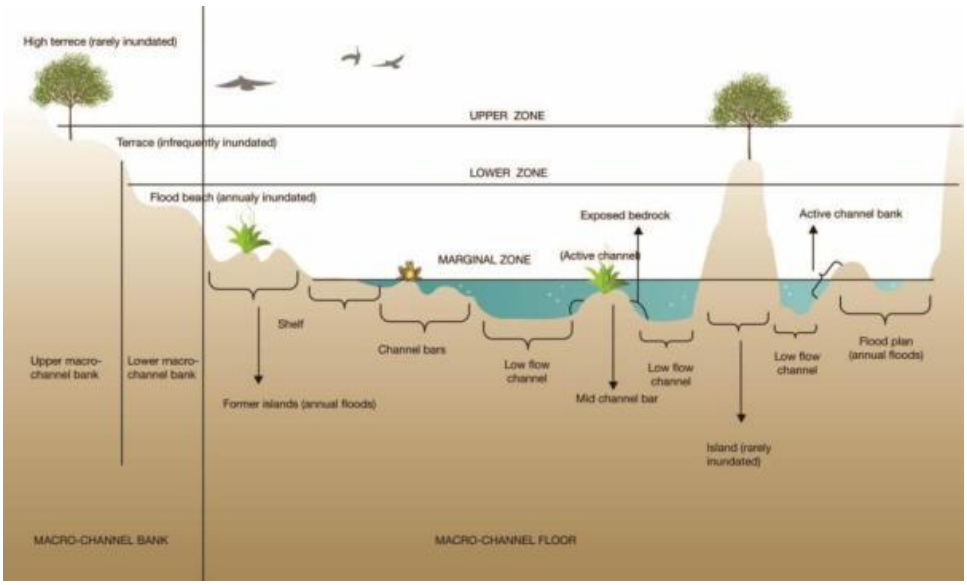

Figure 6: Schematic diagram illustrating an example of where the 3 zones would be placed relative to geomorphic diversity (Kleynhans *et al.* 2007).

2.2 Wetlands within 500 m of the development

According to the Department of Water Affairs and Forestry Regulation GN1199 all wetlands occurring within 500 m of the development should be considered as sensitive features. Development within 500m of wetlands trigger the Water Use Lisence application process.

3 RESULTS

Batchelor (2009) identified 6 wetland areas on the study site (including a small portion of Glen Austin Pan. These wetlands are labelled as A, B, C, D and E (Figure 7). Fieldwork conducted in May 2014 focused on these areas to verify their current extent and Present Ecological Status.

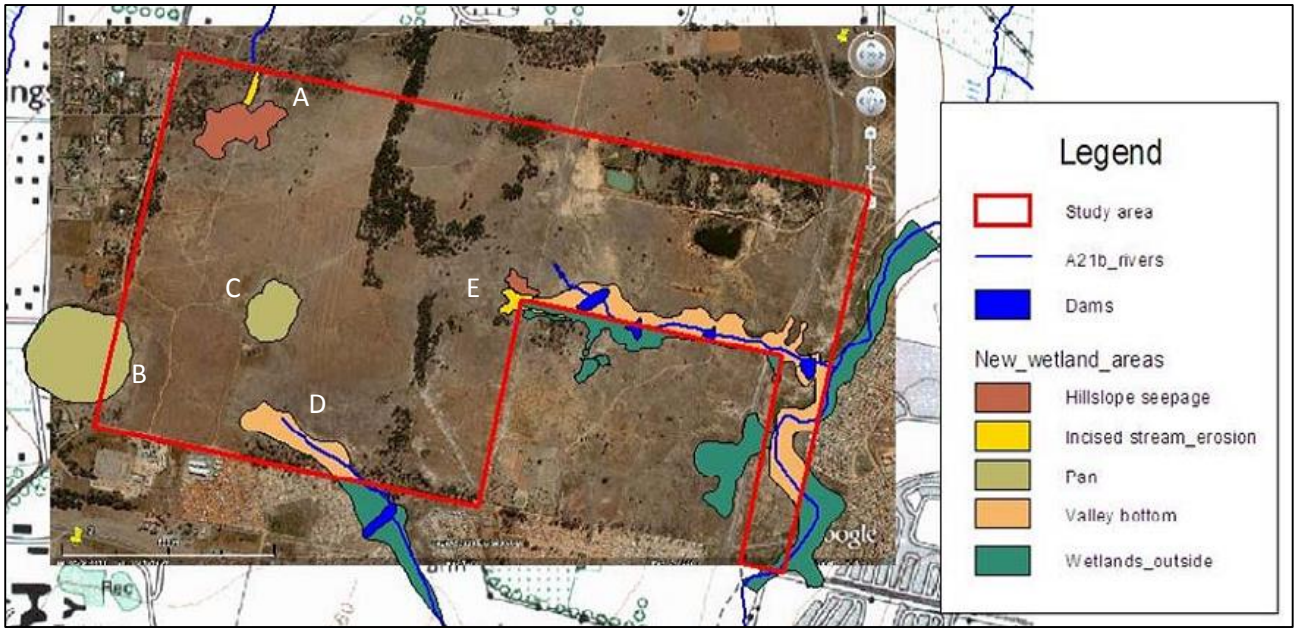

Figure 7: Wetlands recorded in Batchelor (2009)

3.1.1 Wetland delineation

Wetland A: Seepage

Fieldwork conducted in 2014 supported the 2009 delineation. Indicator recorded in this wetland included a typical wetland soil profile with a bleached matrix and iron precipitation in the form of orange mottling above a hard plinthic layer. The plants *Haplocarpa scaposa, Helichrysum nudifolium, Nidorella anomala* and *Burkeya radula* could be seen in this area, together with *Eragrostis gummiflua*. Figure 9 highlights wetland characteristics recorded here.

Batchelor (2009) classified the Present Ecological Status of this wetland as class C/D. This remains an accurate reflection of the PES of the wetland. Impacts to this wetland remain as they were in 2009, namely, historic ploughing, draining, footpaths and grazing.

Wetland B: Glen Austin Pan

The boundaries of Glen Austin Pan remain much the same as they have historically done. This endorheic pan has clear hydrological zonation reflected in the plant species evident in aerial images over a range of years. Glen Austin Pan is known to provide habitat for many bird species as well as a population of the Giant Bullfrog (*Pyxicephalus adspersus*), Figure 10 highlights wetland characteristics recorded here.

Batchelor (2009) classified the Present Ecological Status of this wetland as class B/C. The PES status of this wetland remains unchanged.

Wetland C: Pan

Fieldwork conducted in 2014 supported the 2009 delineation. Clear hydrological zonation remains visible in the plant species occurring around the pan. This zonation has not altered since 2002 (the oldest available images available in Google Earth). Wetland plants recorded at this pan included *Andropogon eucomus, Aristida congesta, Eragrostis gummiflua, Eragrostis plana, Hyparrhenia hirta, Schoenoplectus corymbosus, Persicaria serrulata Centella coriacea, Helichrysum nudifolium, Hypoxis rigidula* and various *Cyperus* species. The close proximity of Glen Austin Pan suggests that bird and frogs utilize this pan. The conservation value of this waterbody should be assessed by a suitably qualified faunal specialist. Figure 11 highlights wetland characteristics recorded here.

Batchelor (2009) classified the Present Ecological Status of this wetland as class B/C. The PES status of this wetland remains unchanged. Impacts since the 2009 survey have not altered the function of the wetland to such a degree that it falls in a lower PES class.

Wetland D: Valley Bottom

Fieldwork conducted in 2014 supported the 2009 delineation. This wetland was characterised by surface water, sandy, though darker organic soil, and plant species typical of wetlands including *Haplocarpa scaposa, Helichrysum nudifolium, Nidorella anomala, Hypoxis rigidula* and *Burkeya radula*. Figure 12 highlights wetland characteristics recorded here.

Batchelor (2009) classified the Present Ecological Status of this wetland as class D/E. Although the integrity of this wetland has deteriorated since 2009, it has not deteriorated sufficiently to be classified as a lower category. Recent dumping is evident in the eastern section of the wetland. The other impacts, such as the

Eucalyptus trees planted along the southern section of the wetland, roads and pathways, have been present for some time.

Wetland E: Seepage

No wetland indicators could be found in this area during the 2014 survey. It appears as though erosion has led to the loss of topsoil exposing the hard plinthic layer. Plant species recorded in this area are not associated with soil moisture, but rather with disturbance. These species included *Seriphium plumosum* (Bankrupbush), *Bidens bipinnata*, *Bidens formosa*, *Senegaia mearnsii* (Black Wattle), *Datura stramonium, Gomphocarpus fruticosa, Tagetes minuta, Solanum incanum and Melia azedarach*.

Batchelor (2009) classified the Present Ecological Status of this wetland as class C/D. This wetland no longer exists.

Wetland conditions recorded in 2014 not reflected in the 2009 study

In the central portion of the site, a large area was found on which wetland indicators were recorded (Figure 8). This area is not reflected in Batchelor (2009). Areas of seepage indicated by rusty red (oxidised Fe)/oily (soluble Mn) water characterised this area. Sedges (hydrophytic plants characteristic of wetlands) occurred in this area in some density. Distinct mottling in soil samples taken in this area provide further evidence of a fluctuating water table characteristic of wetlands.

Figure 8: Location of wetland conditions not presented in Batchelor (2009)

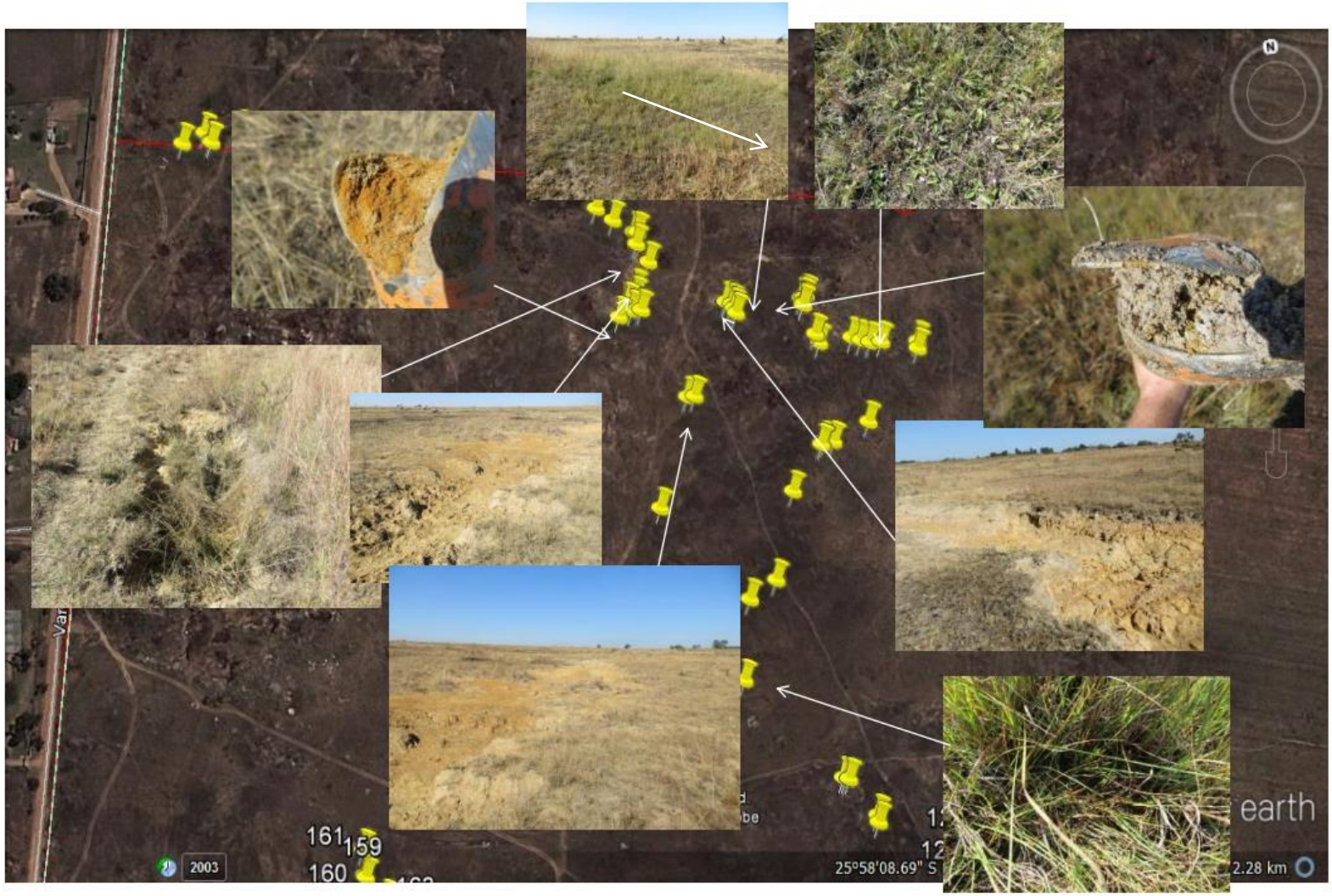

Figure 9: Survey points and indicators recorded on Wetland A, seepage

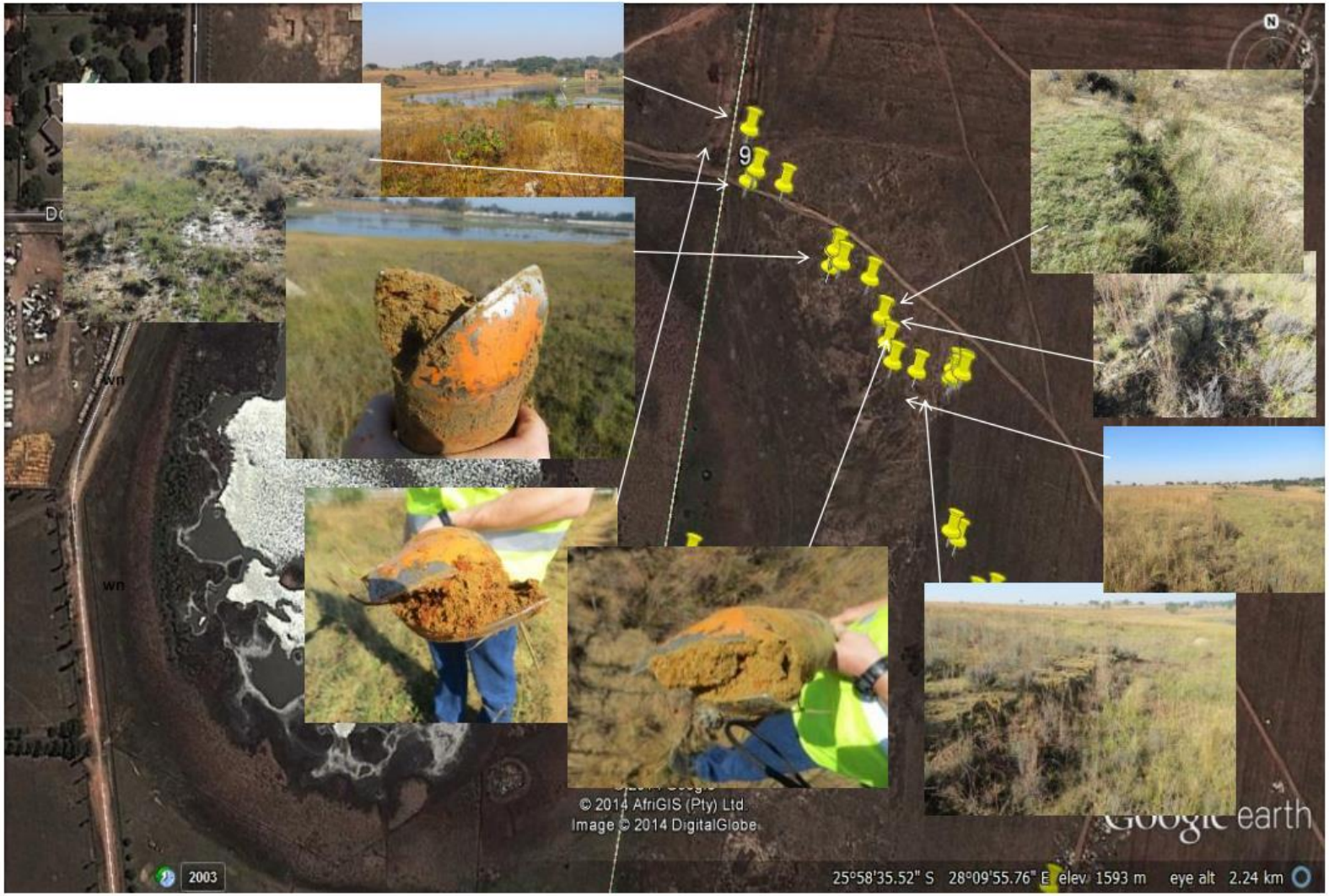

Figure 10: Survey points and indicators recorded on Wetland B, Glen Austin Pan

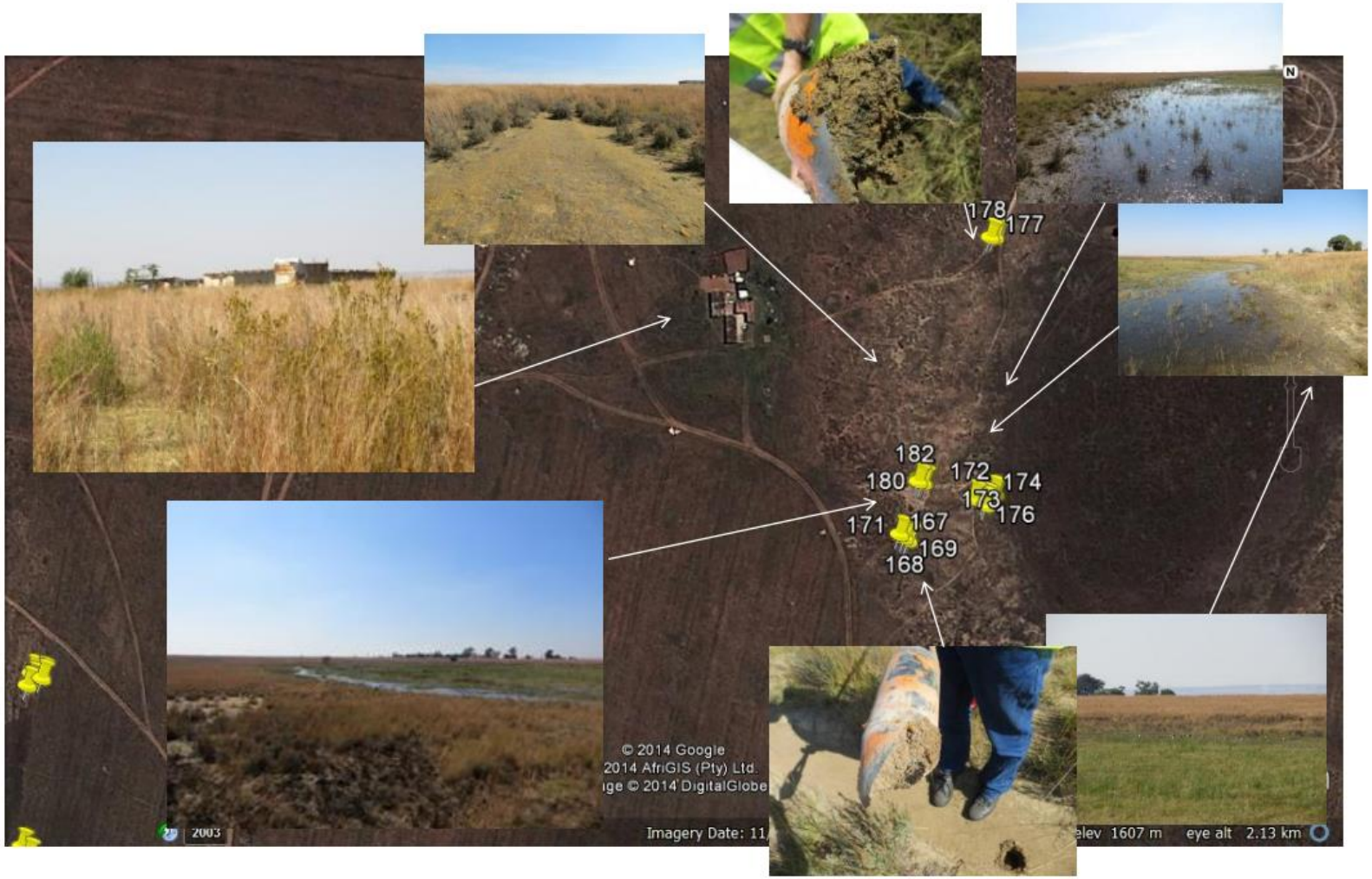

Figure 11: Survey points and indicators recorded on Wetland C, pan

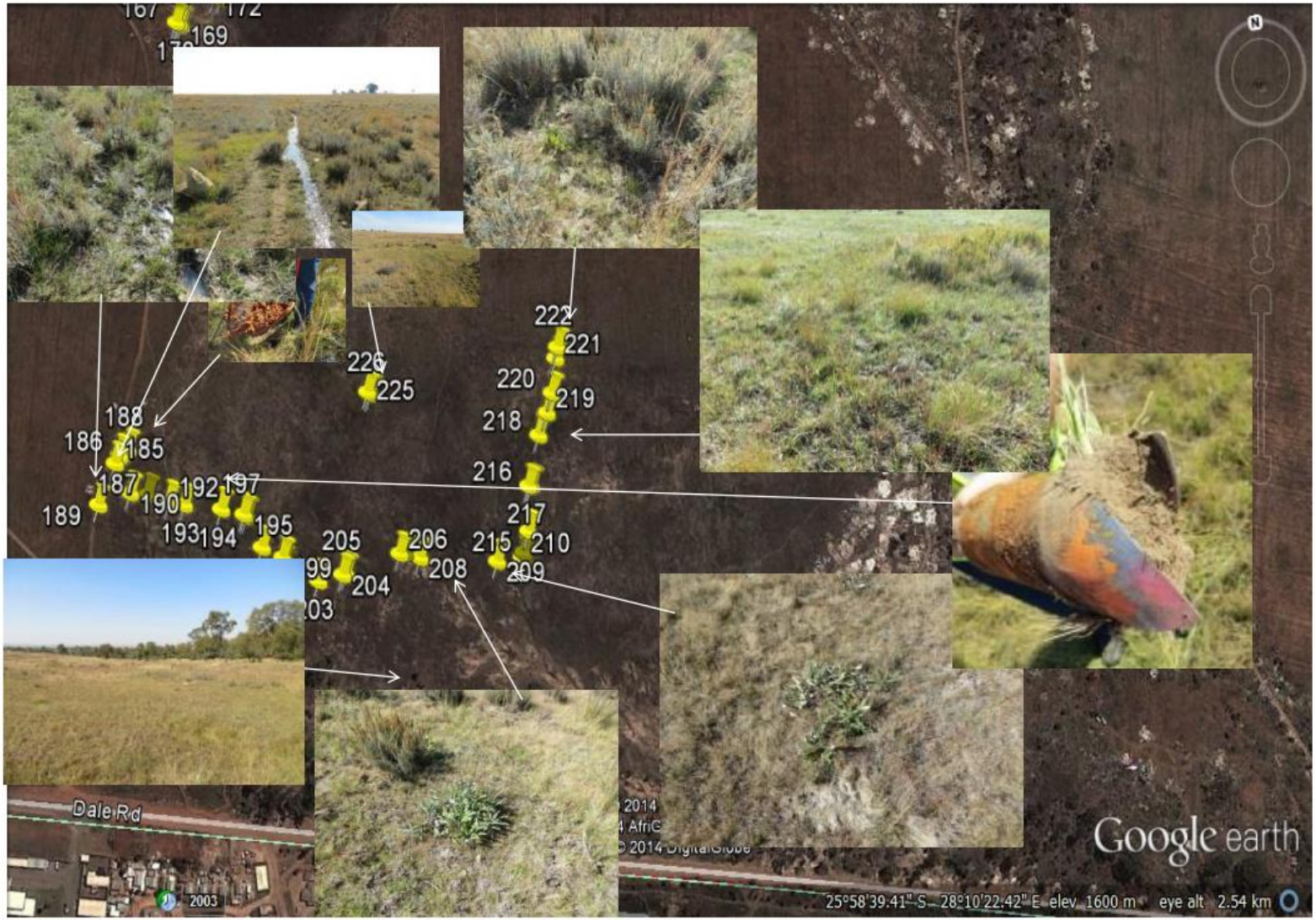

Figure 12: Survey points and indicators recorded on Wetland D, valley bottom

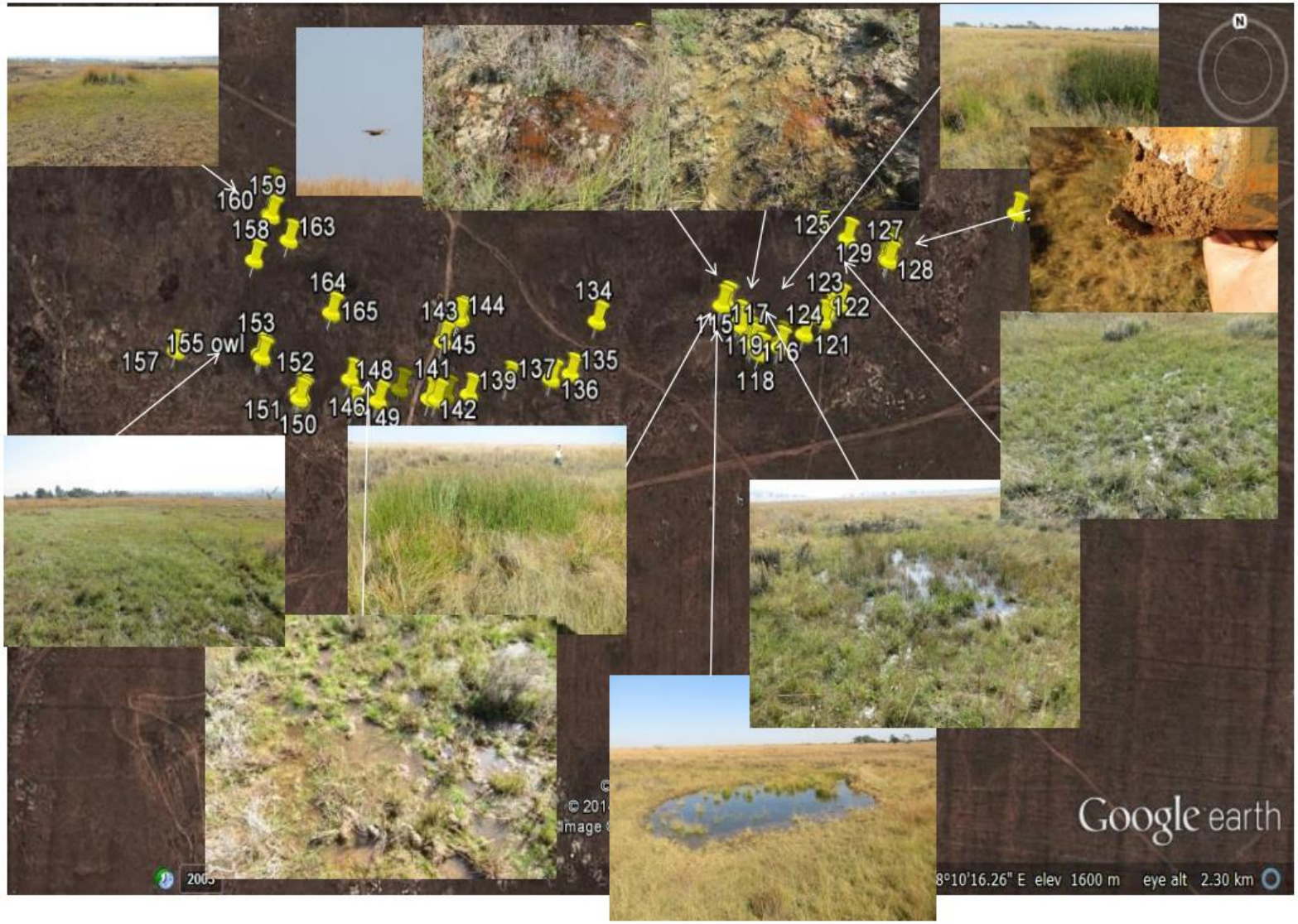

Figure 13: Wetland conditions recorded in the center of the site, not reflected in Batchelor (2009)

4 CONCLUSION

Batchelor (2009) describes five wetlands on the site, including a section of Glen Austin Pan which encroaches onto the site. The current assessment found that four of the wetlands remained on site, with approximately the same extent and Present Ecological Status as was recorded in 2009. The easternmost seepage wetland could not be verified since topsoil has been lost and the hard plinthic layer (ferricrete) has been exposed in this area, to such a degree as to remove any remaining wetland indicators (both soil and vegetation). Wetland conditions were however recorded in the center of the site, in the form of seepage water with a rusty brown/oily colour. Various hydrophytic plant species such as sedges were also recorded here. This wetland area was not reflected in Batchelor (2009).

Figure 14 presents a summary of the wetland conditions recorded during the current assessment, together with the generic 30m buffer zone relevant to wetlands. Please note that this buffer zone does not take into consideration sensitive faunal elements such as bird species or invertebrates.

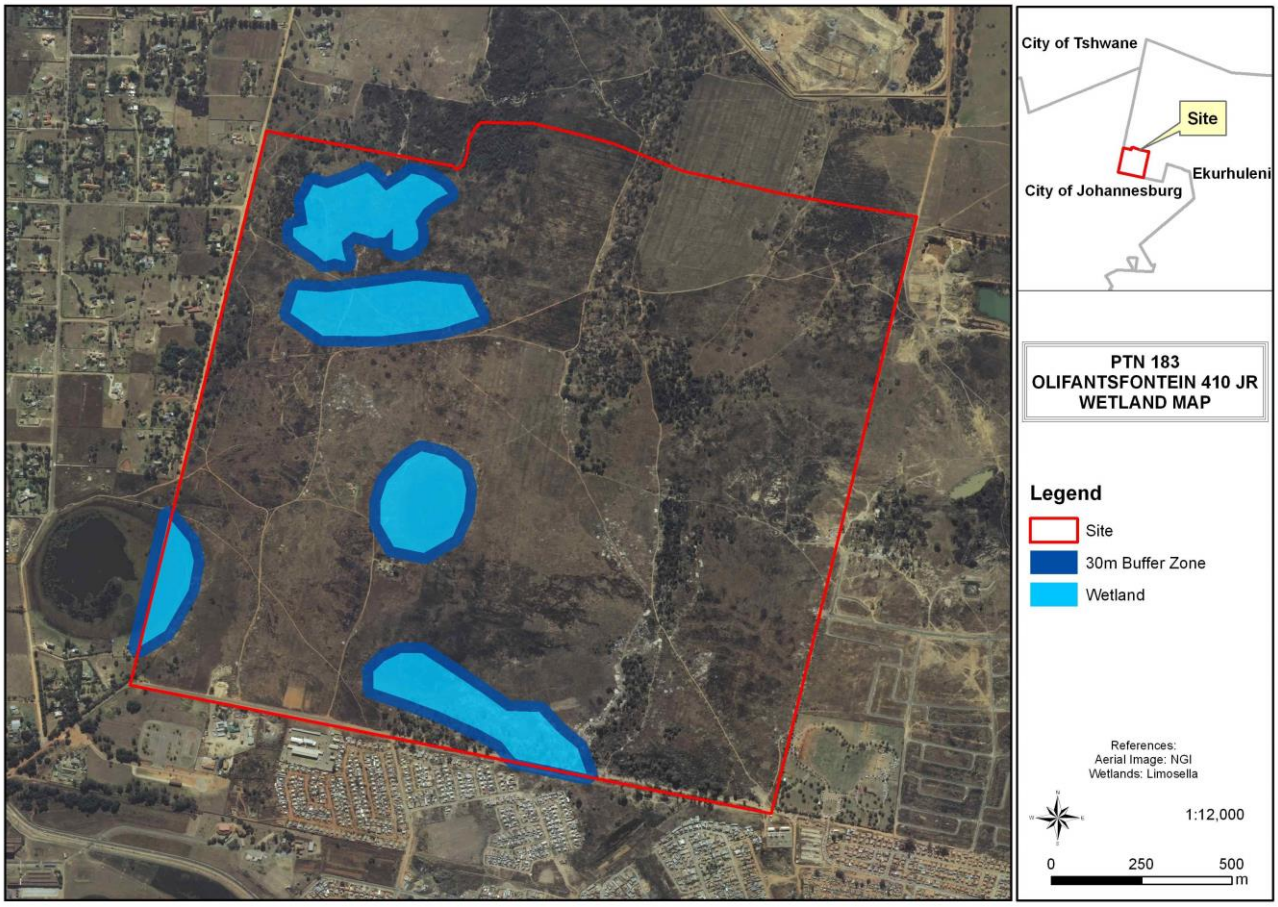

Figure 14: Wetlands recorded in the current assessment, together with their associated buffer zones

5 REFERENCES

Batchelor (2009). Wetland Delineation and Assessment for a Proposed Development near Clayville, Midrand, Gauteng Province. Wetland Consulting Services

Cagney, J. (1993). Riparian Area Management: Greenline riparian-wetland monitoring. Technical Reference 1737-8 U.S. Department of the Interior

Department of Water Affairs and Forestry (2008). *Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas*. Department of Water Affairs and Forestry. Pretoria. South Africa

Department of Water Affairs and Forestry (2005). A practical field procedure for identification and delineation of wetlands and riparian areas. Department of Water affairs and Forestry. Pretoria. South Africa

Department of Water Affairs (2010). National Water Act, 1998 (Act No 36 of 1998) S21(c) & (i) Water Uses. Version: February 2010. Training Manual.

Environmental Potential Atlas, (2001): National Department of Environmental Affairs and Tourism (DEAT)'s Environmental Potential Atlas (ENPAT) series

Gauteng Department of Agriculture, Conservation & Environment (2012). GDARD Minimum Requirements for Biodiversity Assessments Version 2. Directorate Nature Conservation, Johannesburg.

Kleynhans, C.J. (1999): A procedure for the determination of the determination of the ecological reserve for the purpose of the national water balance model for South African Rivers. Institute for Water Quality Studies Department of Water Affairs and Forestry, Pretoria.

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. (2013). Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.