Client
MOSAIC South Africa

Delineation of the wetland edge on a section of Portion 1 of the Farm Wortelgat 723, Hermanus (Spookhuis Area)

Including DWS Risk Assessment

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1 INTRODUCTON

1.1 Background

Construction of up to five new dwellings, a pool and an additional building, referred to as a 'Place of Instruction' has been proposed on Portion 1 of the Farm Wortelgat (Farm 723/1) Hermanus ("the site"). Parts of the farm are managed as a Private Sanctuary and are referred to as Mosaic Farm. The new buildings would be intended to provide visitor accommodation, and would be located east of the existing Spookhuis and associated accommodation on the same farm portion.

Since the site abuts the Hermanus Lagoon / Klein River Estuary, the siting of any proposed buildings / development would need to take cognisance of at least the following legislation, notably:

- The National Water Act (NWA) (Act 36 of 1998), which requires Authorisation and/or Registration of Use for activities taking place within 500m of a wetland where these activities constitute "water uses" as defined in [1]Section 21 c and Section 21i of the NWA;
- The National Environmental Management Act (NEMA) (Act 107 of 1998): Schedules 1 and 2 (4 April 2017) state that authorisation is required in terms of NEMA *inter alia* for development within 32m from the demarcated edge of any wetland outside of urban areas as well as for development in an estuary or (where no setback line has been approved) within a distance of 100 metres inland of the high-water mark of an estuary, whichever is the greater.

The location of the highwater mark was determined by the project surveyor (Geomatics Africa). Freshwater Consulting cc (t/a The Freshwater Consulting Group / FCG) was thereafter appointed by Mosaic Private Sanctuary and tasked with identifying and demarcating the outer edge of the wetland, along the portion of the site within which the additional development is proposed, with a view to informing placement of the proposed new structures.

The present document outlines the wetland delineation process followed and confirms the extent of wetland shown in the attached figures. A Risk Assessment has also been included, for the information of Department of Water and Sanitation.

1.2 Terms of reference

FCG was appointed by Mosaic South Africa ("the client") to provide the following input:

- Undertake a delineation of the upland extent of wetland along some 600m of shoreline of the Hermanus lagoon, on Portion 1 of Farm 723;
- Work with the project surveyor (Mr Nicholas Clark, Geomatics Africa) in undertaking an accurate survey of the delineated wetland edge;
- Produce a report that:
    - Describes the affected wetlands;
    - Recommends an appropriate development setback from the wetlands and their treatment in a development context;
    - Comments on the degree to which the proposed development is likely to constitute a Water Use and would thus require authorisation and/or registration of use through the Department of Water and Sanitation (DWS);

Note that the Terms of Reference initially excluded completion of a Risk Assessment Matrix, which is used by the DWS to determine whether a project is likely to require authorisation in terms of the NWA and / or merely Registration of water uses with the DWS. During the site visit, it was however

[1] Section 21 of the NWA defines a number of different water uses, which include (21c) "impeding or diverting the flow of water in a watercourse" and (21i) "altering the bed, banks, course or characteristics of a watercourse".

agreed however that the specialist would include a Risk Assessment Matrix in the report, for ease of future reference.

1.3 Activities informing this assessment

Input into this project was informed by the following activities / information sources:

- Background information about the site and wetland type, gained from a previous wetland delineation on portion 1 of Farm 723, further east from the present site (see Day 2015);
- A site visit by Dr Liz Day (FCG) on 11 September 2018, during which time:
    - The project background and conceptual plan were discussed with members of the client team (Mr Jo Sinfield and Mr Bas Hochstenbach);
    - The upland edge of the wetland (that is, the edge of the temporary wetland) was initially coarsely delineated, using the protocol outlined by DWAF (2005) (see Section 3.1);
    - The wetland edge as identified above was immediately surveyed by Mr Nicholas Clark (professional land surveyor with Geomatics Africa), who walked the edge of the wetland with Liz Day;
- Consideration of the digitised wetland edge and various setback lines (see Section 1.1) as provided by Geomatics Africa;
- Completion of the present input.

1.4 Limitations and assumptions

- It is assumed that the wetland co-ordinates presented by Geomatics Africa are as determined on site with Liz Day - this is an entirely reasonable assumption;
- This specialist has had no input into the determination of any setback lines other than the wetland edge;
- It must be noted that while the DWAF (2005) protocol for wetland delineation was followed, there are some areas of likely inaccuracy and/or uncertainty, which might affect the accuracy of the plotted wetland edge. These include the fact that very shallow soils (<10cm deep in places) made the use of soil indicators unreliable along parts of the temporary wetland – in such cases, the assumed edge was conservatively plotted, using obligate and facultative wetland plant species zonation as a guide;
- Only the outer wetland edge was delineated – note that the delineated area between the lagoon water body and the delineated outer wetland edge in fact comprises a mosaic habitat including small “islands” of terrestrial habitat. These islands were not considered developable without triggering the need for legal authorisation (they all lay within 32m of the delineated wetland), there was no need to delineated them as separate parcels of land and they all lie within the overall delineated wetland;
- Only wetlands in the area shown in **Figure 2** were identified / delineated – development outside of these areas would require separate assessment / delineation;
- This assessment did not include assessment of red data wetland plant or animal species, and was not intended to provide a detailed baseline assessment;
- Wetland delineation does not take into account the possible impacts of climate-change induced sea-level rise on estuarine extent – a conservative approach has however been taken to assessment of wetland extent;
- Note that this assessment focuses only on the identification of the wetland edge on the assessed portion of the site, and the interpretation of these data with regard to the NWA and the NEMA> Regardless of the degree to which the development is or is not set back from the wetland so as not to trigger authorisation requirements in terms of NEMA, the proposed development itself might trigger NEMA from other perspectives not considered in this study, and an Environmental Assessment Practitioner (EAP) should ideally be consulted with regard to the project as a whole, to ensure that it is legally compliant in all areas.

1.5 Definitions and terminology

1.5.1 River and wetland definitions

The definitions for **watercourses** and **wetlands** that have been used by FCG in this project are those specified by the National Water Act (Act 36 of 1998), which defines a "watercourse" as:

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Wetlands themselves are defined in the Act 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."

1.5.2 Definitions for estuaries

The NEMA (May 2017) amendments refer to the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) for definitions of coastal systems including estuaries. The latter was amended in 2014 (Act No. 36 of 2014: National Environmental Management: Integrated Coastal Management Amendment Act, 2014), with the following definition being included:

'Estuary' means a body of surface water that is

a. *part of a water course that is permanently or periodically open to the sea;*
b. *in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the water course is open to the sea; or*
c. *in respect of which the salinity is measurably higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water.'*

1.6 Site location

Portion 1 of Farm 723 is located in the Western Cape of South Africa, and abuts the southern shores of the Hermanus Lagoon (referred to also in some map layers as the Klein Rivier Vlei or Lagoon), some 10km west by road from the town of Stanford. It is accessed off Wortelgat Road – a gravel road leading from Stanford along the southern shore of the lagoon.

Figure 1 shows the broad location of the assessed site.

Figure 1
GOOGLE Earth image showing site location (red area, circled for ease of reference)

2 OVERVIEW OF WETLANDS IN THE VICINITY OF THE STUDY AREA

2.1 Catchment context

The site lies in the DWS's Olifants / Berg Catchment Management Area, in quaternary catchment G40L. The only significant river in this quaternary is the Kleinrivier and its tributaries. Flows from this river enter the lagoon from the east, near the town of Stanford (see **Figure 2**). Drainage from this quaternary enters the Hermanus Lagoon ("Klein River Lagoon in **Figure 2**). Numerous mainly seasonal minor watercourses pass off the steep mountain slopes of the Kleinriviersberge and pass into the northern shores of the lagoon. South of the lagoon, in the area in which the current site is located, there are no permanent river channels, excluding the Kleinrivier itself, and the watercourses mapped in the national 1:50 000 rivers layer (see **Figure 2**) all comprise seasonal systems, many of which peter off into the surrounding sands long before they reach the lagoon.

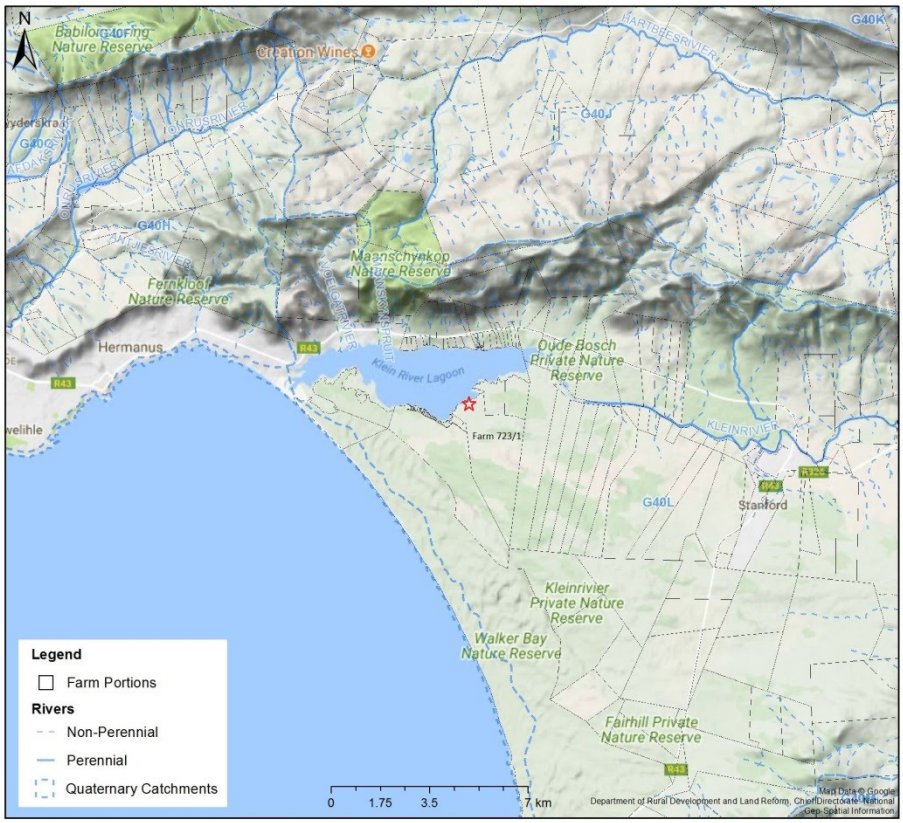

Figure 2
Catchment context of Farm 723/1. Figure adapted from Cape Farm Mapper output (https://gis.elsenburg.com/apps/cfm), with approximate position of delineated part of Farm 723/1 site marked with a star.

2.2 Biodiversity context

Figure 3 shows the site and surrounding area in the context of the Western Cape Spatial Biodiversity Plan (WCSBP) (Stanvliet et al 2017). The figure indicates that most of the site, excluding the area below the 5m contour around the lagoon has been mapped as a terrestrial Critical Biodiversity Area (CBA), with some disturbed patches that have been mapped as Ecological Support Areas (ESAs), mainly along the road. No aquatic CBAs or ESAs have been mapped in this area, with the lagoon and its margins registered only in the National Freshwater Ecosystem Priority Area (NFEPA) data layer of Driver et al (2011). The reason for the exclusion of the lagoon and its margins from the WCSBA is not that the system is not of biodiversity importance. Rather it reflects the classification of the

lagoon as an Estuary (estuaries are not included in the WCSBA), with estuary extent (referred to as the [2]Estuarine Functional Zone (EFZ)) at the time being determined by the 5m contour line, as specified at the time of compilation of the WCSBA. This contour generally extends over any of the freshwater seepage wetlands that do flow into the estuary along the southern shore, and these are thus reflected as estuarine.

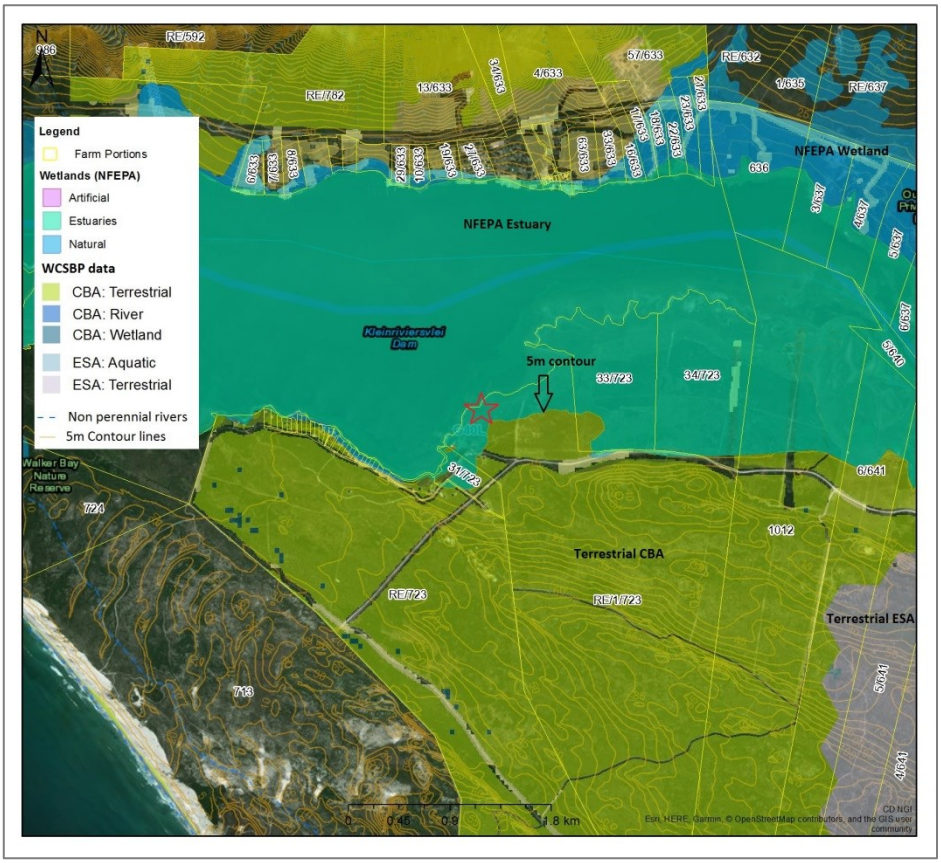

Figure 3
Conservation status of site and surrounding area, with figure (adapted from Cape Farm Mapper output (https://gis.elsenburg.com/apps/cfm)), showing WCSBP data (Stanvliet et al 2017) and NFEPA wetland data, with approximate position of delineated part of Farm 723/1 site marked with a star.

2.3 Vegetation

The National South African Vegetation Map (SANBI 2016) shows that vegetation mapped on Portion 1 of Farm 723 largely comprises Agulhas Limestone Fynbos, with only the dunes on the most southerly edge of the site mapped as Dune Strandveld. These vegetation units are likely to be

[2] The National Estuaries Layer, available from the South African National Biodiversity Institute's BGIS website (http://bgis.sanbi.org) defines the estuarine functional zone as the zone "defined by the 5 m topographical contour (as indicative of 5 m above mean sea level). The estuarine functional zone includes:

- Open water area.
- Estuarine habitat (sand and mudflats, rock and plant communities).
- Floodplain area.

Note that this definition was superseded by the definition provided in Section 1.5.2.

reflected in any wetlands that occur within them, noting that wetlands that are driven by estuarine influences would rather reflect estuarine or salt marsh vegetation types.

2.4 [3]The Klein River Estuary / Hermanus Lagoon

The Klein River estuary falls within the Cool Temperate Biogeographic Zone, as described in Turpie and Clark (2007). It is an important habitat, both from a conservation and a recreational perspective, and the above authors assigned it an overall importance rating of 97%, and ranked it in the top five estuaries in South Africa in terms of conservation importance. Prochaska et al. (2005) noted however that despite its high level of ecological importance, the estuary even then was moderately perturbed, in need of rehabilitation and on a trajectory of ongoing degradation. The most significant impact to estuarine function noted by the latter study was the periodic artificial breaching of the mouth to protect properties that have been developed below the natural flood line, which practice had the effect of reducing scouring during periods of floods and allowing the accumulation of sediments and the expansion of reedbeds.

Anchor (2015) assessed the main threats and ecological importance of the estuary, the key findings of which study can be summarised as follows:

- Estuary condition (Ecological Health and Integrity) was estimated to be 65 (i.e. 65% similar to natural condition), which translates into a Present Ecological State (PES) of C (moderately impacted);
- The main changes affecting PES are considered to be significant changes in the hydrology, mouth status (now a managed system with artificial breaching of the mouth), water quality, microalgae and bird fauna;
- The estuary is rated as "Highly important" from a conservation perspective, and is designated as a desired protected area in the Biodiversity Plan for the National Biodiversity Assessment (Turpie *et al*. 2012);
- The **Recommended Ecological Category** for the estuary is an "A" or its "Best Attainable State", meaning that significant rehabilitation of the estuary is required to meet this objective;
- Changes in river inflow and artificial breaching were judged to have resulted in major changes in the mouth condition, water level, salinity distribution, and water quality in the Klein estuary;
- Key factors influencing the quality and quantity of flows into the estuary were identified as water use for irrigation, agricultural and pastoral run-off containing fertilisers, pesticides and herbicides, effluent from the Stanford WWTW (organic and inorganic nutrient loading), septic and conservancy tank seepage from developments on the banks of the estuary, and litter;
- Increases in organic loading and nutrient input from anthropogenic sources (e.g. agriculture and WWTW effluent) have caused eutrophication of the system with a resultant drop in oxygen levels and occasional hypoxic events;
- Agriculture in the catchment and urban development along banks is believed to have resulted in an increase in toxic substances in the estuary (herbicides and pesticides in the case of the former and metals and hydrocarbons, in the case of the latter).

Drawing on the above findings, Anchor (2015) recommended a number of flow-related requirements, as well as the following key <u>non-flow related</u> management requirements required for achieving the recommended improved ecological status of the estuary. These are listed below, with those of some relevance to the present assessment being highlighted:

- **Reduction in fertilizer use in the catchment;**
- **Educate landowners/farmers on impacts of excessive fertilizer use on the Klein estuary;**

[3] This section has been adapted / updated from previous FCG reports on wetlands in this area

- Improve the quality of effluent from the Stanford WWTW;
- **Eliminate septic and conservancy tanks from properties on the banks of the Klein estuary through provision of sewage reticulation infrastructure;**
- Implement a mouth management plan that satisfies ecological requirements of the estuary (increased breaching water level, improved nursery function, improved water quality, increase connectivity with the Botvlei Estuary through aligning open periods where possible);
- **Institute and enforce an appropriate development set-back line around the estuary that provides adequate protection for estuarine fauna and flora;** - note that the Anchor (2015) study falls short of providing an actual setback distance;
- Management of recreational activities on the estuary through zonation to reduce impacts of kite boarding and sailing on bird populations;
- Improve compliance in respect of use of living marine and estuarine resources (legal and illegal fishing);
- Establish a statutory protected area that covers at least 50% of the estuary in accordance with recommendations tabled by Turpie *et al.* 2004, Turpie & Clark 2007, Turpie *et al*. 2012);
- Motivate for Ramsar status to increase national and international awareness of this important estuary.

3 DESCRIPTION OF THE PRESENT STUDY AREA

The present study area extends along a length of some 600m of shoreline along the southern edge of the Hermanus lagoon. The lagoon edge abuts a low-lying, flat and well-vegetated area, which rises gently into vegetated dunes to the south. The proposed area in which the new development would occur would be between the top of the dune and the estuary, in the assessed area shown in **Figure 4**, noting that the purpose of the wetland delineation is to inform development planning so as to avoid impacting on sensitive wetland areas**.** Invasion by alien vegetation has occurred in much of the area inland of the wetlands, although active alien removal is underway.

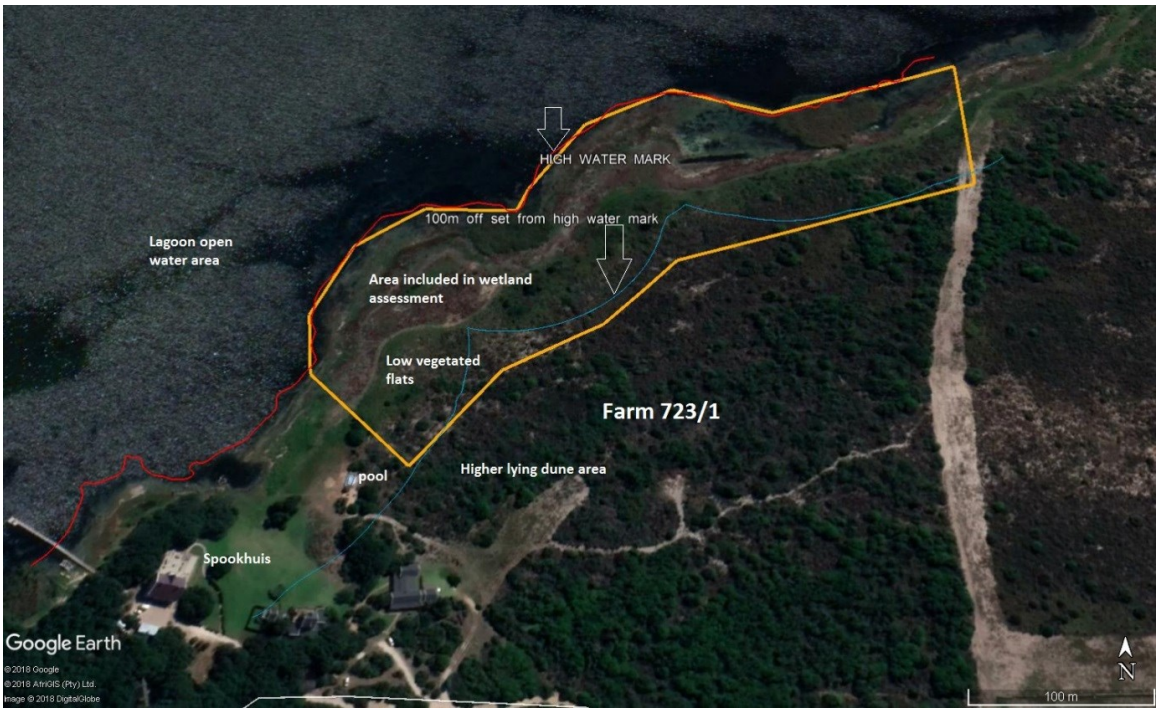

Figure 4
GOOGLE Earth image showing the portion of Farm 723/1 in which wetlands were delineated in this assessment (orange polygon) as well as the high water mark and 100m setback from the highwater mark as surveyed by Geomatics Africa.

The area south of the lagoon highwater mark comprises a band of varying width of brackish to slightly saline estuarine marsh, dominated by *Phragmites australis* reedbed (Photo C). This gives way to wide expanses of seasonally inundated saltmarsh and wetland flats (Photos A to C), dominated by *Juncus kraussii* sedges (wetter areas) and then *Ficinia nodosa* (higher up the shoreline) with the salt-tolerant *Sarcocornia* sp. and *Cottula* sp occurring in places within the (seasonally saturated) areas, along with extensive *Centella* sp., which extends in places from the seasonally inundated pools to the edge of the temporary wetland. These various zones, presumably determined by a combination of different hydroperiod and salinity ranges, give rise to a broad expanse of wetland habitat along the upland edge of the shoreline, which gives way to dense terrestrial habitat with distance upslope. Within the wetland fringes, occasional higher lying areas of terrestrial habitat, including a few milkwoods, add to habitat complexity by creating a mosaic of different habitat types.

The wetlands along the lagoon shoreline, upslope of the highwater mark, are driven in part by marine and estuarine processes (e.g. they may be inundated during spring high tides when the lagoon mouth is closed and the lagoon itself is relatively full) but they would also be expected to be inundated when the lagoon rises as a result of major wet season rainfall. At the time of the present (2018) assessment, the open water pools along the edge of the lagoon were relatively fresh, suggesting a strong freshwater rather than marine influence at that time.

In places, lateral flows also enter the lagoon from upslope areas, with a shallow layer of calcrete across large areas of this portion of the lagoon contributing to a perched seasonally high water table in wetlands draining into the estuarine salt marshes. Two areas were identified in the present study area where there was strong evidence of lateral seepage, resulting in expansion of wetland areas southwards. These seeps would be driven by water percolating through the dunes upslope of the wetland flats, the sands of which act as a large sponge, retaining precipitation and percolating it slowly into the lagoon downslope.

The main impacts affecting the condition of the wetlands along the edge of the lagoon on the present study area comprise:

- Disturbance as a result of the pedestrian path along the lagoon edge – in places this runs through the seasonally inundated wetlands;
- Limited alien invasion;
- Impacts of induced changes in water quality or flow regime in the estuary / lagoon itself (see Section 2.4).

Photo A
View west along delineated shoreline, with temporary wetland edge lying within the scrub zone to the south (left of photo)

Photo B
***Ficinia nodosa* (arrowed) dominating seasonal wetland in this area and extending into temporary wetland with *Helichrysum sp., Imperata cylindrica* grass and *Stenotaphrum secondatum* (buffalo grass)**

Photo C
Highly sensitive seasonally inundated wetland flats supporting numerous frogs including arum lily frogs

Photo D
Dense *Imperata cylindrica* grass with *Ficinia nodosa* patches in seeps into the lagoon

The following section outlines the approach to actual delineation of the wetlands described above, to inform development layout.

4 WETLAND DELINEATION APPROACH AND OUTCOMES

4.1 General approach

DWAF (2005) outlines a procedure for on-site wetland delineation that is considered the accepted protocol for determination of the outer edge of the temporary wetland zone in South Africa. The wetland delineation procedure requires consideration of the following four indicators:

- The terrain unit indicator, which identifies parts of the landscape where wetlands are more likely to occur;
- The soil form indicator, which identifies soil forms that are associated with prolonged and frequent saturation;
- The soil wetness indicator, which identifies the morphological signatures of the soil, developed in the soil in response to prolonged and frequent saturation;
- The vegetation indicator that identifies hydrophilic vegetation associated with frequently saturated soils.

Of the above, the soil wetness indicator is considered the most important, with the other indicators usually being regarded as confirmatory rather than diagnostic (DWAF 2005).

Although vegetation is a key component of the wetland definition in the National Water Act, DWAF (2005) cautions that using vegetation as a primary indicator requires undisturbed conditions and expert knowledge. As a result, greater emphasis is commonly placed on the soil wetness indicator. Nonetheless, vegetation in an untransformed state is a helpful field guide in finding the boundary of the wetland, as plant communities undergo distinct changes in species composition as one moves along the wetness gradient from the centre of a wetland to its edge, and into adjacent terrestrial areas.

In the present case, although the seasonal and permanent portions of the wetland had clear soil indicators of wetland conditions (e.g. numerous mottles below a shallow surface layer of organic material, down to a calcrete layer some 20 – 40 cm below the surface), with distance upslope into the temporary wetland zone, the calcrete layer lay much closer to the soil surface - in places within 5-10cm. In these very shallow areas, soils had insufficient depth to develop clear hydromorphological indicators, and the presence of wetland-associated vegetation was rather relied on to delineate these areas (see also Section 1.4). The fact that the delineation was carried out towards the end of a wet winter meant however that hydrological indicators could also be used – saturated soils within the top 0.5m of the soil surface was also considered as an indicator of at least temporary wetland conditions, and added confidence to the findings of the overall delineation.

The temporary wetland edge as delineated in this study was thus defined largely by bands of obligate wetland vegetation, and tested against the downslope extent of obligate terrestrial vegetation (e.g. *Metalasia muricata* and *Seersia laevigata*). The DWAF (2005) wetland delineation methodology notes however that delineation on the basis of plant communities alone is likely to be accurate where the wetland in question is undisturbed.

In combination with soil and moisture indicators as described above, the following obligate wetland and facultative plants species were therefore used to identify the upland extent of the temporary wetland:

- Obligate wetland plant species (i.e. plants that occur only in wetland conditions):
    - *Ficinia nodosa:* this sedge was the primary determinant of the upland extent of the temporary wetland, and occurred in dense , extensive patches throughout most of the assessed temporary wetland areas;

- Facultative wetland species (i.e. plants that occur in both wetland and terrestrial conditions – given the range in hydrological conditions in temporary wetland areas, many temporary wetland species are likely to be facultative species):
    - *Imperata cylindrica:* Cook (2004) excludes this species from his list of wetland plants. However, this author has found that, although the species occurs (particularly in dune areas) in non-wetland habitat, its occurrence in the south western Cape in dense stands in undisturbed duneslack / lowlands almost invariably is reflective of temporary to seasonal wetland conditions;
    - *Helichrysum* sp. : this plant occurred mainly in the upper seasonal to temporary zone but did extend in places into the terrestrial margins, and was thus not considered a defining indicator.

4.2 Delineation approach in this study

In the context of the above considerations, and given that augering of soils was rendered useless by shallow soils in some parts of the temporary wetlands on the assessed site, the following approach was taken:

- The wetland was delineated on the basis largely of the upland extent of *Ficinia nodosa* and dense stands of *Imperata cylindrica* – patchy stands of *C. imperata* were ignored;
- Where the above species were absent along short sections of the wetland edge, the zone was extrapolated using topography and augered soils where possible;
- Mosaic patches of terrestrial areas were not delineated separately, but were included in the overall wetland fringes – these patches included a few stands of milkwood trees.

On this basis, the wetland was delineated and the edge surveyed by Geomatics Africa as outlined in Section 1.3. The co-ordinates of the route were subsequently plotted onto a georeferenced plan, and provided to FCG as a .kmz overlay, for illustrative purposes in this report. This plan is shown in **Figure 5**, which includes a setback of 32m upslope from the delineated wetland edge.

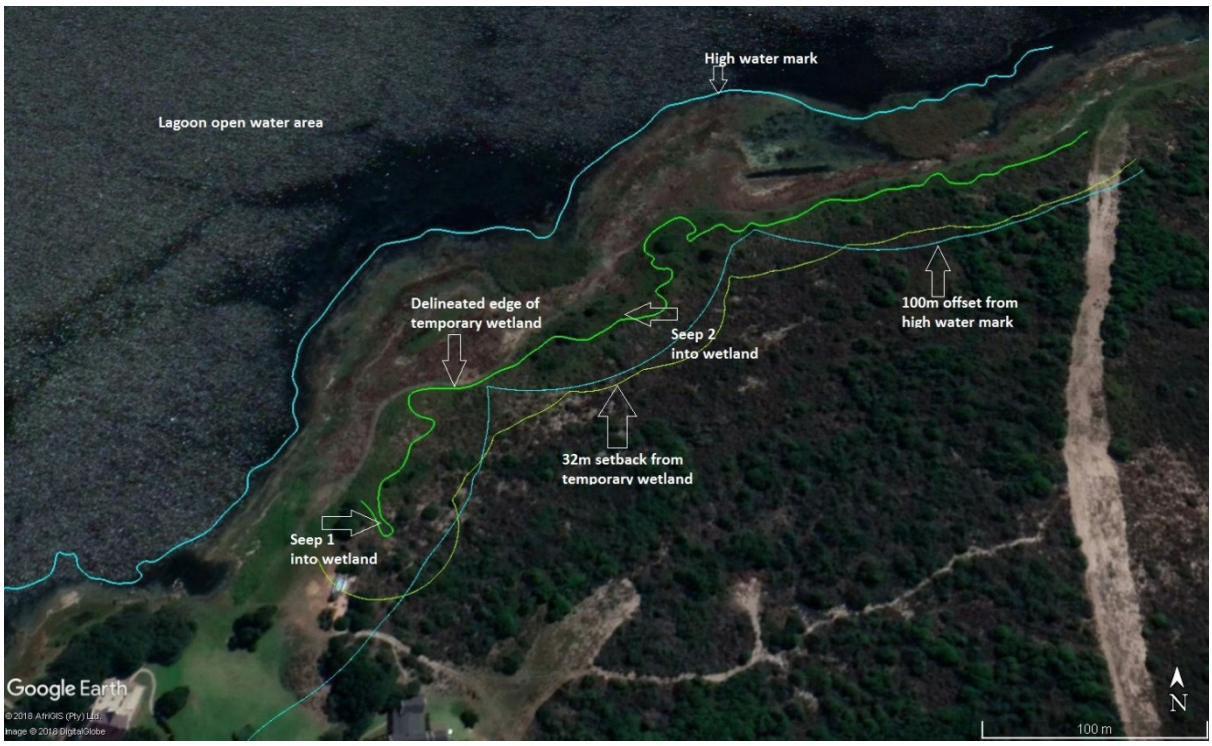

Figure 5
Results of 2018 wetland delineation, as plotted onto GOOGLE Earth imagery.

The delineation includes mostly floodplain flat wetlands associated with the lagoon itself. However, in at least two areas (seep 1 and Seep 2) these wetlands were extended further upslope than elsehwhere along the shoreline, with Seep 1 in fact narrowing and extending as a band of *Imperata cylindrica* up a dune slope. This indicated a source of water emanating from the dune itself, with water close enough to the surface at the lowpoint down the slope that periodic near-surface saturation it supports temporary wetland conditions.

The other seep (seep 2 in **Figure 5**) comprises a broader, lower-lying area just upslope of a patch of milkwoods, which again occurs at a higher level to the main wetland flats along the shoreline, and is assumed to be fed by water percolating from the dunes to the south.

4.3 Implications of the wetland delineation for development planning and layout

4.3.1 NEMA considerations

Any built development within 32m of the demarcated wetland edge or within 100m of the highwater mark would require authorisation in terms of NEMA. **Figure 5** indicates that, along most of the shoreline considered in this assessment, the 32m setback from the delineated wetland defines the lower development boundary, and development closer to the lagoon than this line would require NEMA authorisation. Along a short section of the south western and north eastern ends of the assessed shoreline, the 100m setback from the high water mark in fact extends out slightly beyond the 32m setback, and in these areas would define the development edge for which no authorisation in terms of NEMA would be required. All of these lines fall well beyond the 3.44m contour line that was also surveyed.

Figure 6 shows the combined development edge, derived by Geomatics Africa, and taking into account the outermost development-limiting edge mapped.

Assuming that the Client sets any development back from the development edge shown in **Figure 6**, there should be no triggers for authorisation in terms of NEMA from the perspective of the impacts of the development on any aquatic ecosystem, including estuaries.

4.3.2 NWA considerations

Depending on the detailed design and layout of the proposed development, even if it is situated outside of the development setback shown in **Figure 6**, it is arguable that it might nevertheless incur Section 21c and i "water uses", defined in terms of the NWA as (21c) "impeding or diverting the flow of water in a watercourse" and (21i) "altering the bed, banks, course or characteristics of a watercourse". Such uses might arise through activities such as subsurface drains that diverted subsurface seepage flows away from the wetlands (Section 21c use) , as well as through activities that altered the quality or quantity of surface and/or subsurface flows into the water course, or the characteristics of the watercourse. Such activities could include seepage from septic tanks, overflows from conservancy tanks, runoff from irrigated lawns, channelled runoff from hardened surfaces that caused erosion or channel incision in the wetlands, or simply the spread of alien plant material into wetlands that currently have only low levels of impacts associated with alien invasion or other disturbance.

Measures to avoid / mitigate the risks associated with such activities have been outlined in Section 5. **It is noted however at the outset that it is extremely unlikely that, given the low density of the proposed development, the sandy nature of the soils outside of the demarcated no-development area, and the minimum 32m setback from the temporary wetland edge, which already itself confers a degree of buffering of the more sensitive seasonal wetland beyond, that the proposed development would in fact be associated with any risk to aquatic resources.**

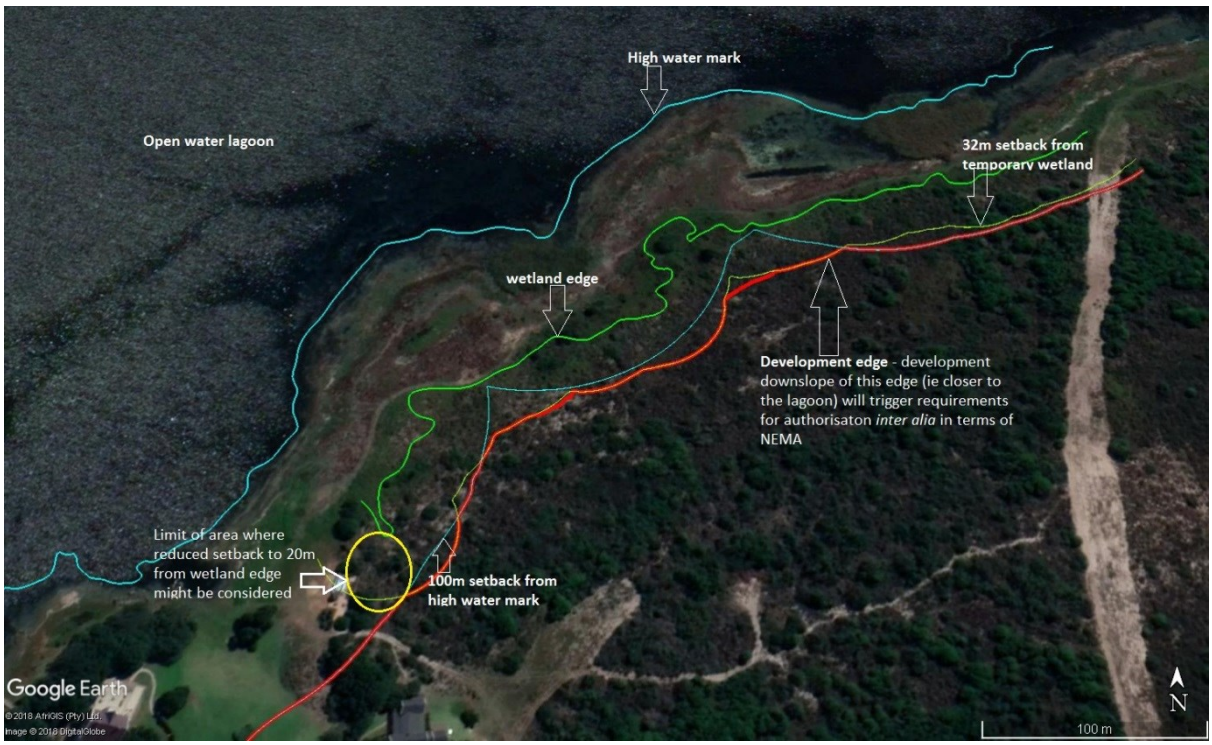

Figure 6
Development setback line, as derived by GEOMATICS Africa and based on the most upland of any of the surveyed development-limiting lines included in Figure 5

5 APPLICATION OF THE DWS RISK ASSESSMENT TO THE PROPOSED DEVELOPMENT

5.1 Background to the Risk Assessment

Where Section 21c and i uses are considered likely, there is a need for their authorisation through a water use licence application (WULA) and/or registration of use through the Department of Water and Sanitation (DWS). In order to inform DWS authorities as to whether a WULA is applicable, or whether alternatively the water use(s) might be considered Generally Authorised in terms of DWS General Notice (GN) 509 of August 2016, and thus require only registration through the DWS, the DWS has developed a Risk Assessment Matrix (DWS 2015), that needs to be completed by a SACNASP registered aquatic specialist. Section 21c and i Water Uses that are assessed as being of a Low Risk, using the Assessment Matrix, are considered Generally Authorised in terms of GN509, and require only Registration of Use prior to implementation.

5.2 Applicability of the Risk Assessment to the present development

As noted in Section 4.3, it is considered extremely unlikely that the proposed development would be associated with any risk to aquatic resources, assuming that all development lies outside of the no-development line shown in **Figure 6**. Nevertheless, in order to allay any concerns on the part of the DWS regarding this issue, a number of best practice measures have been listed below, which if implemented would both completely address any outlying concerns that the development might impose Risk on aquatic resources, and be in line with the non flow-related measures outlined in Anchor (2015), designed to bring about the required improvement in estuary condition. The following measures are recommended for incorporation into development design:

- No hardened development including boardwalks, jetties, slipways should be created [4]within the delineated wetland (or any other wetland) without further specific consideration for authorisation – such activities would comprise definite and potentially significant Section 21c and i water uses;
- New developments should not include lawns or landscaping that utilise fertilisers;
- Discharges from the proposed pool should be dissipated into a soakaway located on the dunes and fully located outside of the no-development area. A saltwater pool should not be used, as this will add to soil salinity in discharge areas;
- Hardened areas of the development (roof areas, paving, parking areas) should be minimised, and where possible porous material should be used for paving and parking to improve infiltration and decrease runoff; roofs should discharge onto the ground as close to the building as possible without risk of structural damage, to minimise concentrated runoff during storms;
- No pathways down steep areas of the dune should be permitted, where these would create erosion into the wetland below or degrade the buffer areas;
- Conservancy tanks rather than septic tanks should be used – note that Anchor (2015) recommends that sewage infrastructure should be used instead of conservancy tanks along the estuary shoreline – in the present case it is arguable that the wetland disturbance likely, and the risk of leakage along sewage pipelines from Stanford to the site would far exceed any risk attached to the use of conservancy tanks on-site and their periodic emptying by truck. This said, the following measures must be applied:

[4] Note that such structures would, if placed within 32m of a wetland, require consideration in terms of NEMA is they exceeded certain threshold sizes

  - Sewage pipelines connecting conservancy tanks associated with individual buildings to a main conservancy tank (as proposed) should all be located outside of the no-development line shown in **Figure 6**;
  - Conservancy tanks must be bunded, so that pollution can be contained in the event of overflows;

- Landscaped or open space areas around new buildings should be planted with locally indigenous plants only and lawns, which should be minimised, should be planted with buffalo grass only, which is prevalent in the wetland already;
- During the construction phases of the development, the no-development zone should be treated strictly as a no-go zone and the disturbance footprint of each unit should extend a maximum of 15 m towards the no-development edge;
- Construction phase disturbance such as wind- or water borne conveyance of litter, sand, or other construction material towards the wetland area is minimised with dust and erosion control measures.

5.3 Findings of the Risk Assessment

Table 1 presents the findings of FCG's application of the Risk Assessment Matrix to the potential Section 21c and i water uses that would be associated with the proposed development, for its layout / planning, construction and operational phases. This assessment assumes that all of the mitigation / control measures outlined above are included.

The assessment outlined in **Table 1** shows that at worst there would be a LOW Risk associated with any of the activities associated with the proposed development on the current site. However, this specialist argues that in fact the Risk to the aquatic resource, assuming full implementation of the Control measures outlined in Section 5.2, most of which are in any case implicit in the proposed project design, would be negligible, and not deserving of ANY registration, given that there would in fact be no likely water use. This issue should be discussed with DWS officials – the Risk Assessment Matrix does not allow for the assignment of zero values for no impact at all, and is thus inherently biased towards the assignment of a low rather than a negligible or zero risk.

Table 1
DWS Risk Assessment for proposed Section 21c and i activities on the wetlands delineated along the Hermanus lagoon on Portion 1 of Farm 723 Hermanus
Impacts assume full implementation of mitigation measures outlined in Section 4.
Risk Matrix completed by Liz Day -SACNASP Reg no. 400270/08

		Development			Severity														
Impact #	Phase	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+Vegetation)	Biota	Severity	Spatial scale	Duration	Conseq.	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Signif.	Risk Rating	Control Measures	Watercourse Type
1	DESIGN / LAYOUT	Development of limited accommodation facilities on Farm 723/1	Proximity to sensitive and ecologically important wetlands	Planned development setback makes this impact very unlikely	1	1	1	1	1	1	1	3	5	1	5	1	12	36	L	• No hardened development including boardwalks, jetties, slipways should be created within the delineated wetland (or any other wetland) without further specific consideration for authorisation – such activities would comprise definite and potentially significant Section 21c and i water uses; • New developments should not include lawns or landscaping that utilise fertilisers; • Discharges from the proposed pool should be dissipated into a soakaway located on the dunes and fully located outside of the no-development area. A saltwater pool should not be used, as this will add to soil salinity in discharge areas; • Hardened areas of the development (roof areas, paving, parking areas) should be minimised, and where possible porous material should be used for paving and parking to improve infiltration and decrease runoff; roofs should discharge onto the ground as close to the building as possible without risk of structural damage, to minimise concentrated runoff during storms; • No pathways down steep areas of the dune should be permitted, where these would create erosion into the wetland below or degrade the buffer areas; • Conservancy tanks rather than septic tanks should be used – note that Anchor (2015) recommends that sewage infrastructure should be used instead of conservancy tanks along the estuary shoreline – in the present case it is arguable that the wetland disturbance likely, and the risk of leakage along sewage pipelines from Stanford to the site would far exceed any risk attached to the use of conservancy tanks on-site and their periodic emptying by truck. This said, the following measures must be applied: o Sewage pipelines connecting conservancy tanks associated with individual buildings to a main conservancy tank (as proposed) should all be located outside of the no-development line shown in Figure 6; o Conservancy tanks should be bunded so that in the event of overflows pollution can be contained; • Landscaped or open space areas around new buildings should be planted with locally indigenous plants only and lawns, which should be minimised, should be planted I wth buffalo grass only, which is prevalent in the wetland already; • During the construction phases of the development, the no-development zone should be treated strictly as a no-go zone and the disturbance footprint of each unit should extend a maximum of 15 m towards the no-development edge; • Construction phase disturbance such as wind- or water borne conveyance of litter, sand, or other construction material towards the wetland area must be minimised with dust and erosion control measures.	Wetland flats around the Kleinmond Lagoon and hillslope seeps into the wetland flats
2	CONSTRUCTION		Construction in vicinity of sensitive wetlands	Passage of construction-associated litter and wind or water borne construction materials into wetland, as well as damage to wetland plants as a result of disturbance or vehicle compaction	1	1	1	1	1	1	1	3	5	1	5	1	12	36	L		
3	OPERATION		Increased numbers of people and residential units in close proximity to the wetlands	Indirect effects of increased numbers of people in close proximity to the wetlands, increasing compaction of paths through wetlands; potential for introduced plants to invade wetlands and possible contamination of sewage from conservancy tank overflow or removals	1	1	1	1	1	1	1	3	3	1	5	1	10	30	L		

6 CONCLUSIONS

This study has provided a reasonably accurate delineation of wetland extent on the area of land for which development of additional accommodation units is planned. The proposed development would be of a low density - five units of 250 m^3 per unit, a pool and an additional building, referred to as a 'Place of Instruction', spread along the area upland of the ± 600m length of assessed shoreline, were considered in this assessment. Assuming (as proposed) that all new development lies outside of the no development zone shown in **Figure 6**, it is considered extremely unlikely that, given the low density of the proposed development, the sandy nature of the soils outside of the demarcated no-development area, and the minimum 32m setback from the temporary wetland edge, which already itself confers a degree of buffering of the more sensitive seasonal wetland beyond, that the proposed development would in fact be associated with any risk to aquatic resources.

This issue should however be discussed with DWS officials regarding the need if any to register negligible water uses.

7 REFERENCES

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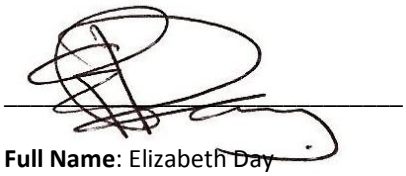
SPECIALIST INDEPENDENCE AND QUALIFICATIONS

I, Elizabeth (Liz) Day as a partner of Freshwater Consulting cc (t/a The Freshwater Consulting Group / FCG), hereby confirm my independence as a specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Mosaic South Africa may be involved with regard to the current assessment of a specified section of the property abutting the lagoon shoreline on Farm 723/1, Hermanus, other than fair remuneration for work performed, specifically in connection with the attached wetland delineation and comments report.



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STATEMENT OF COMPETENCE

Title: Dr
Position: Founding member and environmental consultant at Freshwater Consulting cc (t/a The Freshwater Consulting Group)
Qualification(s): BA, BSc, BSc Hons, PhD (zoology – marine systems)
Experience: > 22 years in freshwater ecosystem assessments
Experience in study area: undertaken freshwater assessments in the Hopies River, the Groot and Klein Hagelkraals Rivers and areas of KLeinmond, Hermanus, Betty's Bay and Pringle Bay; familiar with Estuarine Environmental Management Programmes and their concepts; provided specialist S24G for adjacent Mosaic Farm jetty application, in 2013/2014; provided previous wetland delineation for section of wetland just north-east of current site.
Registration(s): Member of IAIA; Member of SAIEES; Registered Professional Natural Scientist by SACNASP (Reg No 400270/08) for fields of Biological Science, Ecological Science and Zoological Science