Screening assessment for the President Park x6 site

2 June 2020

Compiled by: Ina Venter

Pr.Sci.Nat Botanical Science (400048/08)

M.Sc. Botany

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1. Introduction

Kyllinga Consulting was approached by AdiEnvironmental to conduct a screening assessment for the President Park x6 project. The assessment is mainly a desktop assessment with rapid field verification and included the vegetation of the site as well as wetland areas.

2. Site

2.1. Location

The site is located in the western portion of Emahlahleni, on the south-eastern corner of Mandela Street and Nita Avenue (Figure 1). Nita Avenue is on the western border of the site and Mandela Street is on the northern border of the site. Although some existing development is present on site the southern and northern portions of the site consists of open veld. The site is located to the east of Highveld View and west of Highveld Mall.

3. Existing information

3.1. Water resources and topographical maps

The site is located in quaternary catchment B11J. Watercourses are indicated to the north of the site on the topographical map of the site, north of Mandela Street (Figure 2). The indicated watercourses enter a tributary of the Olifants River to the north of the site.

3.2. Mpumalanga Biodiversity Sector Plan

The site is indicated as an Ecological Support Area in the MBSP freshwater database, with Critical Biodiversity Areas located adjacent to the site to the east. The critical Biodiversity Areas coincide with the wetland areas indicated in the NFEPA database (Figure 4).

The development on site falls within the heavily or moderately modified unit of the MBSP terrestrial database while the remainder of the site is classified as other natural areas (Figure 5).

3.3. Vegetation

The site falls within the Rand Highveld Grassland vegetation type, which is classified as Endangered in Mucina & Rutherford (2006) and as Vulnerable in the Threatened Ecosystems regulations of the National Environmental Management: Biodiversity Act. The vegetation type is classified as Endangered in the National Biodiversity Assessment (2019). Any remaining vegetation that resembles the Ranch Highveld Grassland is considered to be of conservation importance. The northern portion of the site is indicated as diggings and is therefore expected to be transformed.

3.4. NFEPA and wetland probability

According to the NBA database wetland units are expected to the east and north of the site (Figure 2) and the NFEPA database also indicate wetland units to the east and north of the site (Figure 3). The NBA database mainly focus of valley bottom wetlands and streams and poorly represent other wetland systems. The NFEPA database are notoriously inaccurate and poorly represent temporary and seasonal wetness zones. Both of these databases indicate the possibility of wetlands to the east of the site, which may extent into the site.

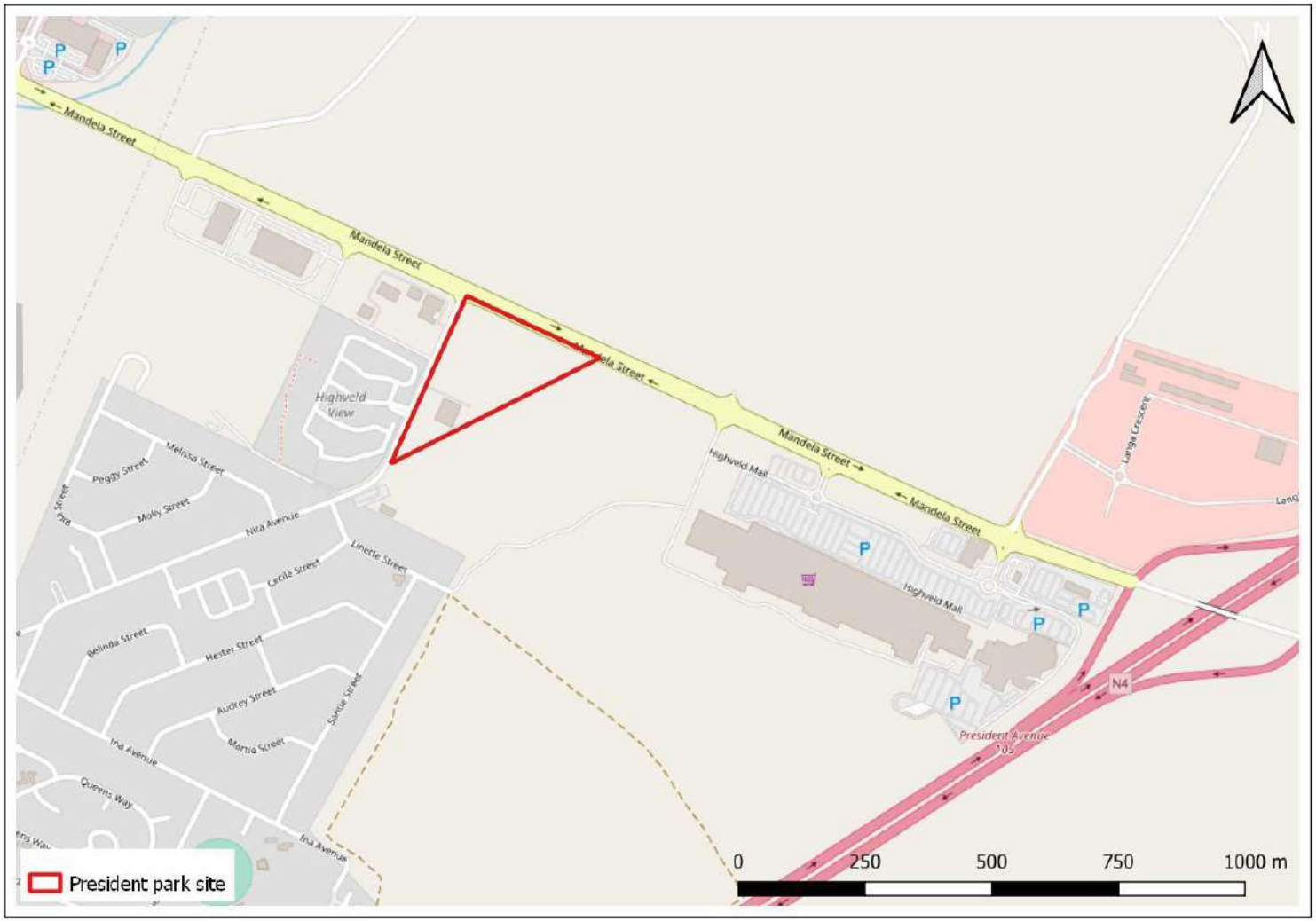

Figure 1: Location of the site.

Figure 2: Predicted watercourses according to the NBA (2018).

Figure 3. Wetland areas identified in the NFEPA database around the sites.

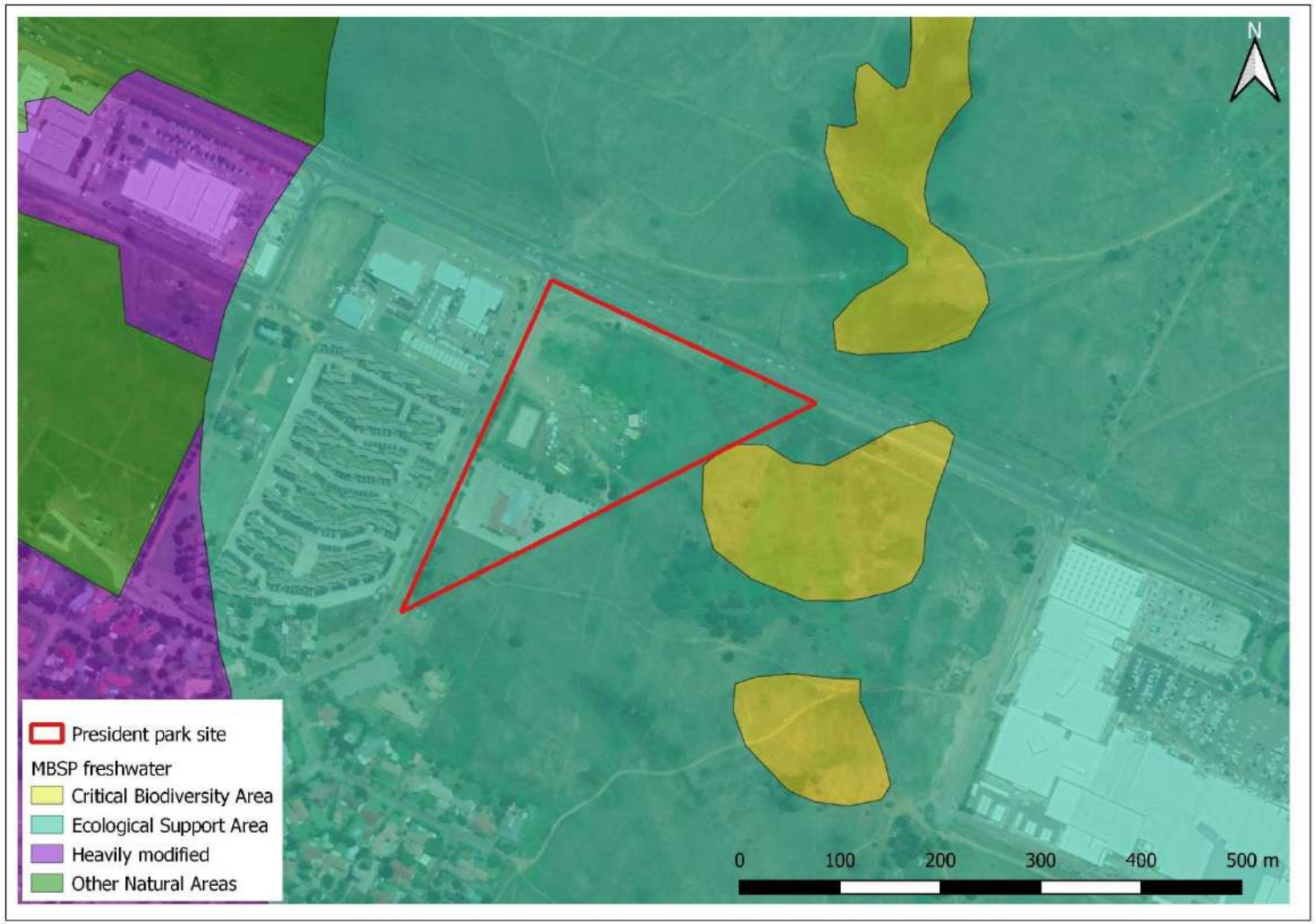

Figure 4: Ecological categories according the MBSP freshwater database.

Figure 5: Ecological categories according the MBSP terrestrial database.

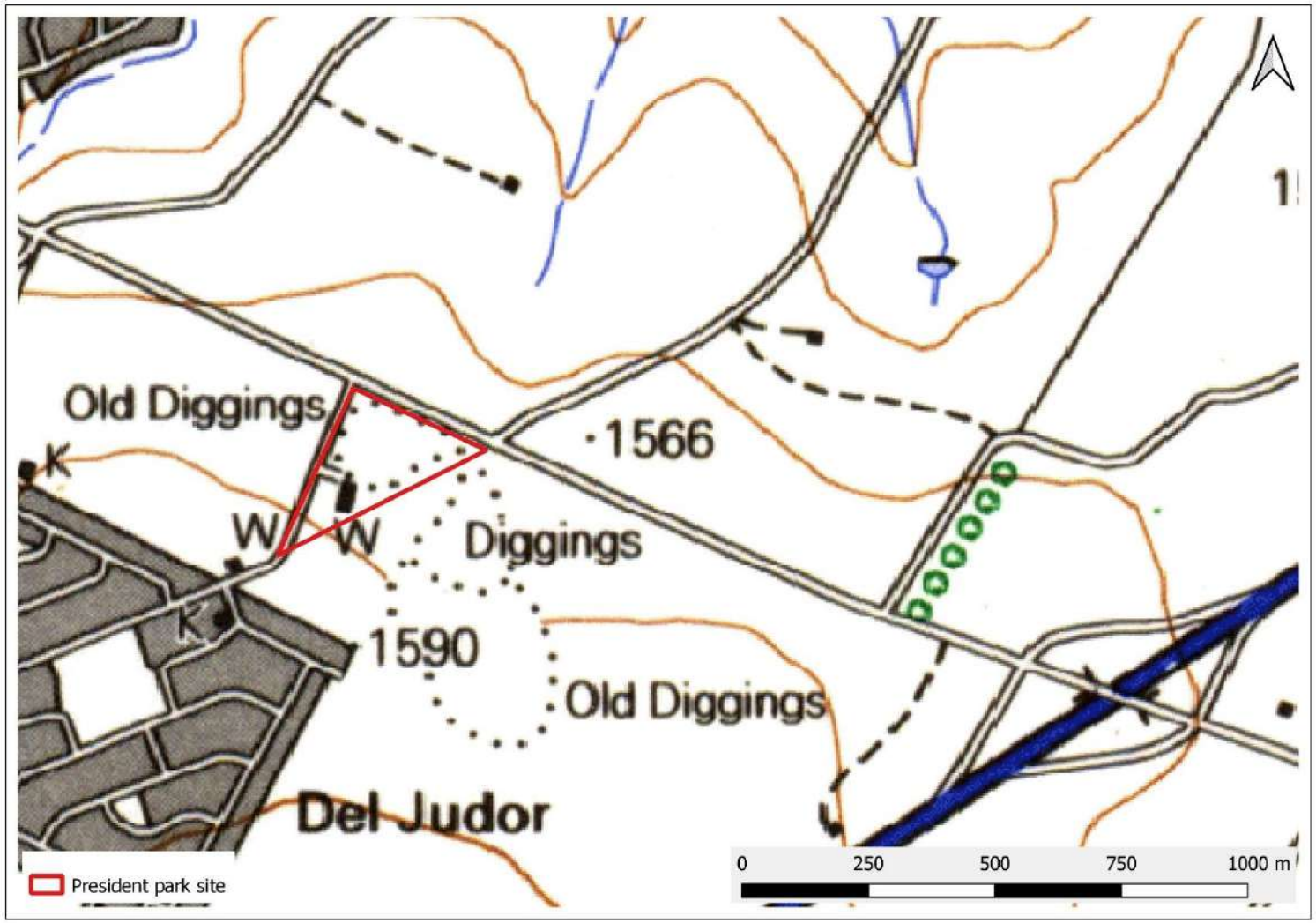

Figure 6: The site on a portion of the 1:50 000 topographical map (2529CD) of 1996.

4. Results and discussion

A rapid site visit took place on site to determine the sensitivity of the vegetation on site and confirm the presence or absence of wetland areas on site or adjacent to the site. The species noted in Table 1 below is a list of the dominant species on site and is not a complete list of the species on site. The site has been terraced some time in the past and several disturbances to the soil and topographical profile is present. The vegetation on site can be divided into three units (Figure 7):

1. Modified grassland
2. Artificial ponding
3. Wetland

In addition to these wetland units, the central portion of the site are developed, and this area is completely transformed. Any vegetation associated with the development is garden areas and does not resemble the natural vegetation at all.

The modified grassland unit consist of a mix of alien and invasive species with a few common indigenous plant species present. The high level of disturbance is present across the site, up to the boundary. *Pennisetum clandestinum* (Kikuyu) is present in patches throughout most of the site and appears to be informally harvested for sale on site. Numerous other weeds are also present and the remaining terrestrial vegetation no longer resembles the Rand Highveld Grassland vegetation type. This is partially as a result of the infill on the northern portion of the site, but also reflects past disturbances on site. The vegetation on site is therefore of low sensitivity and a full vegetation assessment should not be required on site.

The vegetation directly outside the boundary, to the east of the site, is a remnant of the Rand Highveld Grassland vegetation type. Although this unit outside the site is disturbed it is not modified to such an extent that it can be said with surety that it no longer resembles the Rand Highveld Grassland vegetation type. This unit was unfortunately burned at the time of the site visit, but the difference between this unit and the vegetation on site was clear and the historical location of the fence line is clearly visible on site. It is however clear that the vegetation in portions of this property has also been highly modified or transformed in the past. Any activity planned to extend outside the site boundaries will therefore require a vegetation assessment in the summer season before it can commence.

An area where water ponds artificially is present on the northern potion of the site, on the existing infill on site. This has result in the establishment of some wetland species and the area is dominated by *Pennisetum clandestinum, Cyperus congestus* and *Trifolium repens.* Although mottling is present in the soil, the soil is clearly imported to the site and the origin of the mottling is therefore unknown and not necessarily due to the ponding taking place on site. Although this area has some wetland species present the unit should not be considered a wetland area, since it is unlikely to provide any wetland function. The ponding taking place in this area is due to the artificial modifications to the topography of the site.

A wetland unit is present on the northern portion of the site directly adjacent to the infill on site (Figure 8). Although a number of alien species are present in the wetland unit, the vegetation in the wetland is dominated by *Imperata cylindrica, Fimbristylus complanata* and *Cyperus congestus.* This unit is clearly affected by various impacts. The soil is a very wet grey sandy soil with some indications of disturbance. Please note that the delineation included in this report is a desktop delineation, not a full site delineation.

Figure 7: Desktop delineation of vegetation and wetland units on site.

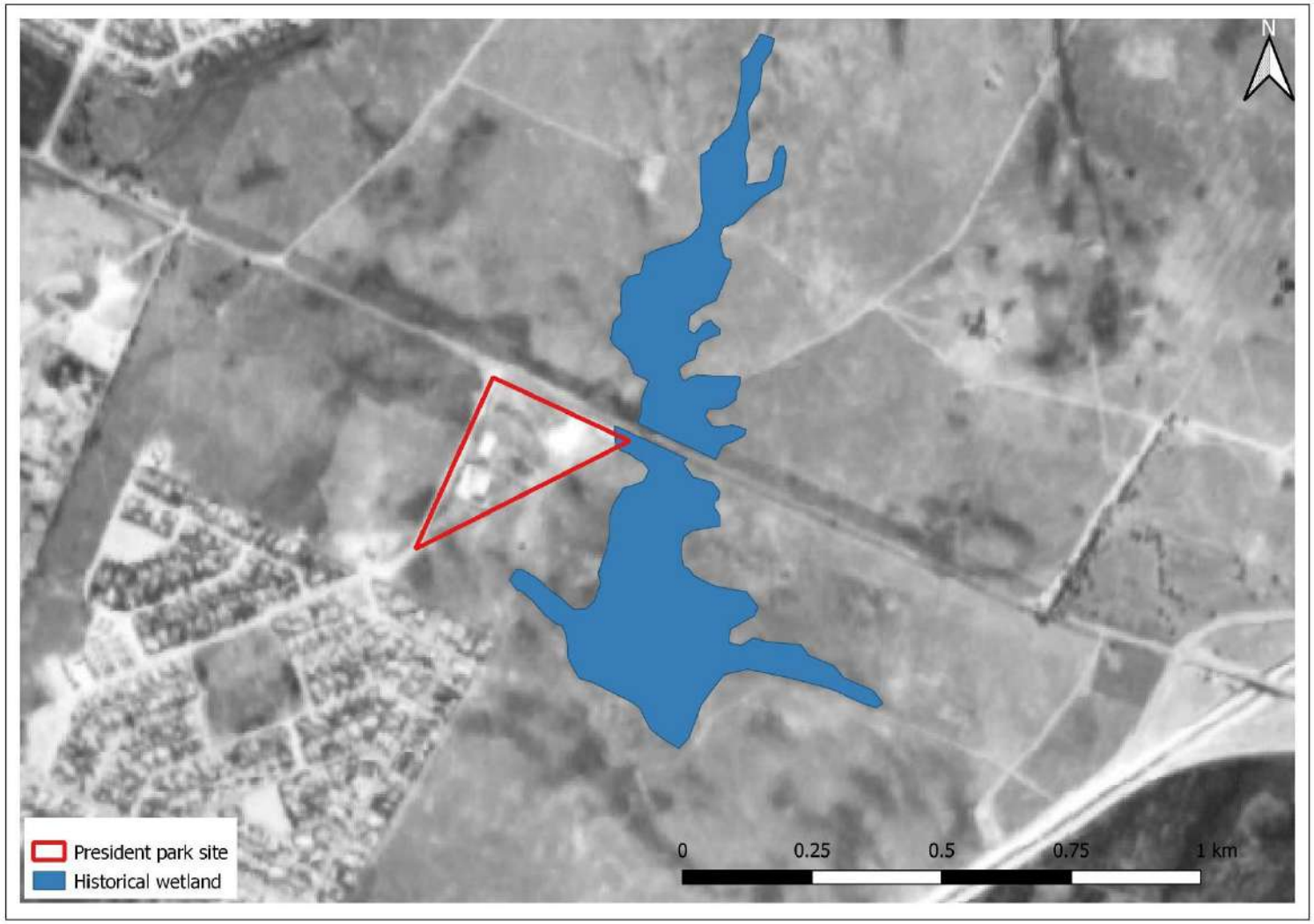

Figure 8: Desktop delineation of likely historical extent of the wetland to the east and north of the site on an aerial photograph from 1991.

Figure 9: Photographs of (a) and (b) the modified grassland unit on site, (c) the artificial ponding area, (d) informal harvesting of kikuyu on site, (e) the wetland unit on site and (f) the grey soil in the wetland unit.

The wetland unit on site has likely been modified by the various developments on site and adjacent to the site. Aerial photographs from 1991 were therefore investigated to determine the possible historical extent of the wetland. The aerial photographs are not very clear, but the only visible wetland area is to the east of the site, with only a small portion of the wetland present in the north-eastern corner of the site (Figure 8). It is therefore very likely that the current wetland area on site developed as a result of the various impacts on site, including the altered runoff from the surrounding developments which include residential and business areas as well as several roads. It also appears that some excavation took place in this area (Figure 6) which will result in altered hydrology of the site. This wetland unit cannot however be disregarded, since it is likely to perform some functions is this modified terrain. It is therefore recommended that a full wetland delineation and assessment

should be completed on site to address the wetland, impacts on the wetland and potential buffer zones.

At present, for the screening phase of the assessment it should be assumed that no development can take place in the wetland unit and that a buffer zone between 15 and 30m will likely be necessary.

Table 1: Plant species observed on site during the site visit.

Species	Indicator of	Alien / indigenous	Terrestrial	Artificial ponding	Wetland
Acacia karroo	Widespread	Indigenous	x		
Acacia mearnsii	Disturbance	Class 1b invader	x		
Acacia melanoxylon	Disturbance	Class 1b invader	x		
Agrostis lachnantha	Wetness	Indigenous		x	
Andropogon eucomis	Wetness	Indigenous		x	
Arundo donax	Disturbance	Class 1b invader	x		x
Bidens bipinnata	Disturbance	Alien	x		
Bidens pilosa	Disturbance	Alien	x		
Canna indica	Disturbance	Class 1b invader	x		
Chamaecrista mimosoides	Widespread	Indigenous	x		
Cymbopogon excavatus	Widespread	Indigenous		x	
Cymbopogon validus	Rocky areas	Indigenous	x		
Cynodon dactylon	Widespread	Cosmopolitan	x	x	
Cyperus congestus	Wetness	Indigenous		x	x
Datura stramonium	Disturbance	Class 1b invader	x	x	
Eragrostis gummiflua	Disturbance	Indigenous	x		
Eragrostis plana	Disturbance / wetness	Indigenous	x	x	
Fimbristylus complanata	Wetness	Indigenous			x
Grevillea robusta	Disturbance	Class 3 invader	x		
Hyparrhenia hirta	Disturbance	Indigenous	x		x
Hyparrhenia tamba	Moistness	Indigenous			x
Imperata cylindrica	Wetness	Indigenous			x
Melia azedarach	Disturbance	Class 1b invader	x		
Melinis repens	Disturbance	Indigenous	x		
Paspalum dilatatum	Disturbance	Alien	x	x	
Pennisetum clandestinum	Disturbance	Alien	x	x	
Pogonarthria squarrosa	Rocky areas	Indigenous	x		
Schizachyrium sanguinum	Rocky areas	Indigenous	x		
Searcia lancea	Widespread	Indigenous	x		
Solanum mauritianum	Disturbance	Class 1b invader	x		
Sporobolus africanus	Disturbance / wetness	Indigenous		x	x

Species	Indicator of	Alien / indigenous	Terrestrial	Artificial ponding	Wetland
Tagetus minuta	Disturbance	Alien	x		
Trifolium repens	Moistness	Alien		x	
Verbena bonariensis	Disturbance / wetness	Class 1b invader	x	x	

5. Conclusion

Three vegetation units are present on site: a modified grassland unit, artificial ponding unit and wetland unit. None of these units still represents the Rand Highveld Grassland vegetation type and the units are therefore of low conservation concern from a vegetation point of view.

All wetland areas are of conservation importance and require authorisation for development to take place within the wetland unit or within 500m of the wetland. The artificial ponding area is not a wetland area, although some wetland species are present in this unit. This unit is highly disturbed, dominated by alien vegetation and the ponding is the result of the modifications to the topography of the site. This unit is located on infill imported into the area to create a fairly level surface, thereby altering the natural hydrology of the site, which would have drained to the north-east.

A wetland unit, with very wet grey sandy soil is present in the northern portion of the site. This wetland is located between the infill and Mandela Street and several wetland species are present. From 1991 aerial photographs it appears that the size of the wetland to the east increased in size and is now present on site, likely due to various impacts on site. A full wetland delineation and assessment will be required for this unit should an application for development on site still be required. For planning purposes it should be assumed that no development may take place in the wetland unit and that a buffer zone of between 15 and 30m will be required around the wetland unit. Please note that the delineation included in this report is a desktop delineation, not a full site delineation.

6. References & further reading

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

DWAF. 2007. Manual for the assessment of a Wetland Index of Habitat Integrity for South African floodplain and channelled valley bottom wetland types by M. Rountree (ed); C.P. Todd, C. J. Kleynhans, A. L. Batchelor, M. D. Louw, D. Kotze, D. Walters, S. Schroeder, P. Illgner, M. Uys. and G.C. Marneweck. Report no. N/0000/00/WEI/0407. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa

Department of Water and Sanitation (DWS). 2015. PES, EI and ES Scores for sub-quaternary catchments in Secondary Catchment B1. Pretoria, South Africa.

Gerber, A.; Ciliers, C.J.; van Ginkel, C. & Glen, R. 2004. Easy identification of Aquatic Plants. A guide for the identification of water pants in and around South African impoundments. Department of Water Affairs.

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Nel, J.L., Driver, A., Strydom, W.F., Maherry, A., Petersen, C., Hill, L., Roux, D.J., Nienaber, S., van Deventer, H., Swartz, E., & Smith-Adao, L.B. 2011. Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11.

Kyllinga CONSULTING

Addendum A – CV

CURRICULUM VITAE

Name:	**Catharina Elizabeth Venter** trading as Kyllinga Consulting
Position:	Senior Ecologist and Wetland Scientist
Date of Birth:	29 December 1979
Nationality:	South African
Languages:	Afrikaans, English

EDUCATIONAL QUALIFICATIONS

- M.Sc (Botany), University of Pretoria (2003)
- B.Sc Hons (Botany), University of Pretoria (2001)
- B.Sc (Environmental Sciences), University of Pretoria (2000). Majored in Geography and Botany
- Matriculated, Sasolburg High School (1997)

Additional

- Introduction to ArcGIS 1 (2006)
- Bringing your data into ArcGIS (2006)
- Introduction to ArcView 3.x (2003).

FIELDS OF EXPERTISE

- **Ecological Assessment:**
  Ecological Assessments as part of the Environmental Impact Assessment Process
- **Wetland Assessment:**
  Wetland Assessments as part of the Environmental Impact Assessment Process and Water Use Applications, as well as rehabilitation plans for wetlands, including planning or the Working for Wetlands programme. Large scale wetland assessments (catchment scale).
- **GIS:**
  Compilation of maps for submission as part of Environmental Impact Assessment Process. Creating spatial databases and large scale wetland maps (catchment scale). Projection conversions and matching/overlaying different format GIS maps.
- **Environmental Impact Assessment**
  Undertaken numerous Environmental Scoping Reports, as required by the Environment Conservation Act, 1989 (Act 73 of 1989), the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Development Facilitation Act, 1995 (Act 67 of 1995). Project experience includes the establishment of various housing typologies, golf courses, commercial and industrial projects, infrastructure development (roads), resorts and/or game lodges as well as filling stations.
- **Public Participation:**
  Undertaken numerous public participation processes, ranging from basic to extensive, as required by relevant environmental legislation.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Professional Natural Scientist (Pr.Sci.Nat) in the field of Botanical Science (Reg no. 400048/08)
- Member of the Botanical Society of South Africa

EMPLOYMENT HISTORY EXPERIENCE

Kyllinga Consulting (July 2015 - present)

Senior Ecologist responsible for wetland and ecological specialist assessments.

Spatial Ecological Consulting (February 2010 – June 2015)

Senior Ecologist responsible for wetland and ecological specialist assessments.

- Wetland Related Assessments

More than 40 wetland assessments conducted between 2010 and 2015.

- Vegetation Assessments

Approximately 16 vegetation assessments between 2010 and 2015.

- Management Plans

Completed two ecological management plans.

MSA Group Services (previously Exigent Environmental CC) (August 2004 – January 2010)

Environmental Scientist responsible for ecological and wetland assessments and the compilation of maps. Also conducted various scoping and EIA applications and EMPRs.

- Ecological Assessments

In excess of 50 ecological assessments conducted between 2004 and 2010, including managing the inclusion of the fauna specialist assessments.

- Wetland Assessments

More than 60 wetland verification projects, wetland delineations and wetland assessments, completed between 2004 and 2010.

- As well as:

Rehabilitation Projects; Fatal Flaw / Screening Assessments; National Department of Agriculture Authorisations; Mining Related Assessments; Private, Public Partnership Projects; Resource Management Plans (RMP); Environmental Management Plans; Environmental Management Programme; Environmental Exemption Processes; Basic Assessments; Environmental Impact Assessments

Part-time employment (2002-2004)

Tutor for botany practicals; Assisting Wildlife management students with Braun-Blanquette analysis; Researcher for a project on the vegetation communities and ecology of the Kruger National Park; Research assistant for the analysis of street trees in Tshwane urban forest; Various part time projects related to vegetation and wetlands

COUNTRIES OF WORK EXPERIENCE

- South Africa
- Lesotho
- Botswana
- Mozambique

PAPERS AND PUBLICATIONS

Co-author and data contributor to: SIEBEN, E. *et al*. The vegetation of inland wetlands with salt-tolerant vegetation in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.

Co-author and data contributor to: SIEBEN, E. *et al.* The herbaceous vegetation of subtropical freshwater wetlands in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.

Co-author and data contributor to: SIEBEN, E. *et al*. The vegetation of grass lawn wetlands of floodplains and pans in semi-arid regions of South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Jan 2015.

Co-author of several vegetation descriptions in: MUCINA, L. & RUTHERFORD, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

VENTER, C.E. & BREDENKAMP, G.J. In prep. Major plant communities on the Mfabeni swamp, St Lucia. *Bothalia.*

VENTER, C.E.; BREDENKAMP, G.J. & GRUNDLING, P-L. 2003. Plant community types, and their association with habitat factors as ecosystem driving forces, of Mfabeni swamp. Proceedings of the congress: *Environment of the St Lucia Wetland: Processes of Change*, Cape Vidal, September 4th- 7th, 2003.

VENTER, C.E.; BREDENKAMP, G.J.; GRUNDLING P-L. 2002. Vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. *Kudu* 46(1):53-63.

PRESENTATIONS

Venter, C.E.; Bredenkamp, G.J. & Grundling, P-L. 2003. Plant community types, and their association with habitat factors as ecosystem driving forces, of Mfabeni Swamp. *Environment of the St Lucia Wetland: Processes of Change*, Cape Vidal, September 4th- 7th, 2003.

Poster Presentations

Venter, C.E.; Bredenkamp, G.J.; Grundling P-L. 2002. Baseline vegetation surveys of rehabilitated peatland on Rietvlei Nature Reserve. SAAB Converence. Grahamstown.

Venter, C.E.; Bredenkamp, G.J.; Grundling P-L. 2003. Vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. SAAB Converence. Pretoria.

Addendum B – Declaration of Independence

Specialist:	Ina Venter, trading as Kyllinga Consulting		
Nature of specialist study compiled:	Vegetation & Wetland Assessment		
Contact person:	Ina Venter		
Postal address:	53 Oakley street, Rayton		
Postal code:	1001	**Cell:**	083 370 0850
Telephone:	012 734 5642	**Fax:**	
E-mail:	i.venter@telkomsa.net		
Qualifications & relevant experience:	M.Sc. Botany		
Professional affiliation(s) (if any)	South African National Association of Scientific Professions		

I, CE Venter (Ina) , declare that -

General declaration:

- 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 will take into account, to the extent possible, the matters listed in Regulation 8;
- 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.

Signature of specialist:

Ina Venter, trading as Kyllinga Consulting

Name of company:

29 May 2020

Date:

Wetland assessment for the President Park x6 site

November 2020

Compiled by: Ina Venter

Pr.Sci.Nat Botanical Science (400048/08)

M.Sc. Botany

trading as Kyllinga Consulting

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Executive summary

Introduction

Kyllinga Consulting was approached by AdiEnvironmental to conduct a wetland assessment for the President Park x6 project.

Methods

The wetlands on site were delineated as per the DWA wetland and riparian delineation guidelines. The following indicators were used in the delineation:

- *Vegetation*
- *Topography*
- *Soil*

The Present Ecological State (PES) was determined using Wet-Health (Macfarlane et al. 2009) and the Ecological Importance and Sensitivity (EIS) were calculated as per the method developed by Rountree et al. (2008).

Results and Conclusion

A seep wetland is located to the east of the site and flows from the south to the north, passing through a culvert under Mandela Drive. In addition, an artificial wetland unit is present on the northern portion of the site and artificial ponding is taking place on the terrace below the Portuguese Club.

*The wetland to the east of the site, outside the site, is a seep wetland, which becomes a channelled valley bottom wetland to the north of Mandela Drive. Several disturbances are present in the wetland, including historical excavation and the wetland unit is dominated by alien and invasive species, including a high density of Kikuyu (*Pennisetum clandestinum*), Spanish Reed (*Arundo donax*) and Wattle (*Acacia mearnsii *and* Acacia dealbata*).* Hyparrhenia hirta *is also fairly dominant in the wetland unit. The wetland is currently Moderately Modified (PES class C). Based on aerial photographs from 1991 it appears that the size of the wetland to the east increased in size and extent close to the edge of the site, likely due to various impacts on site. A buffer zone of 28m is required around the wetland area located to the east of the site.*

An artificial wetland unit is present in the northern portion of the site, but no hydric soils are present in this area. This artificial wetland is located between the infill and Mandela Drive and several wetland species are present. This area has been subjected to several impacts in the past, including the past excavation activities and infill into the site. The depression where the artificial wetland is present is therefore artificial and not a naturally occurring feature of the site. The artificial wetland is of little conservation importance, but the incorporation of the artificial wetland unto the stormwater plan is recommended if feasible. No buffer zone is required around the artificial wetland.

Artificial ponding is taking place on the terrace below the Portuguese Club. Although a few sedges are present no hydromorphic features were observed in the soil, which is clearly disturbed and classified as the Johannesburg soil type. These areas are not considered to be wetland areas.

Two alternatives are provided for the site:

- *Site is only developed for business (retail) purposes;*

- *Site is developed for business purposes and includes a filling station in the north-western corner of the site.*

The proposed business development has a low risk. The development including business development and the filling station mainly have a low risk. The proposed business development encroach into the wetland buffer zone and the layout should be amended in the north-eastern corner of the site.

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Report Authors

Author	Aspect	Professional registration
Ina Venter	Wetland Assessment	Pr.Sci.Nat 400048/08 (Botanical and Ecological Science)
Mariné Pienaar	Soil Description	Pr.Sci.Nat 400274/10 (Agricultural and Soil Science)

1. Introduction

Kyllinga Consulting was approached by AdiEnvironmental to conduct a wetland assessment for the President Park x6 project. The following is included in the assessment:

- Field delineation of any watercourses on site according to the Department of Water Affairs (DWA) delineation guidelines (if applicable);
- Desktop delineation of the watercourses within 500m of the site on aerial photographs;
- Input by soil scientist;
- Buffer zone recommendations (if applicable);
- Risk assessment and proposed mitigation measures;
- Rehabilitation plan.

2. Site

2.1. Location

The site is located in the western portion of Emahlahleni, on the south-eastern corner of Mandela Drive and Nita Avenue (Figure 1). Nita Avenue is on the western border of the site and Mandela Drive is on the northern border of the site. Although some existing development is present on site the southern and northern portions of the site consists of open veld. The site is located to the east of Highveld View and west of Highveld Mall.

3. Existing information

3.1. Water resources and topographical maps

The site is located in quaternary catchment B11J. Watercourses are indicated to the north of the site on the topographical map of the site, north of Mandela Drive (Figure 2). The indicated watercourses enter a tributary of the Olifants River to the north of the site.

3.2. Mpumalanga Biodiversity Sector Plan

The site is indicated as an Ecological Support Area in the MBSP freshwater database, with Critical Biodiversity Areas located adjacent to the site to the east. The critical Biodiversity Areas coincide with the wetland areas indicated in the NFEPA database (Figure 4).

The development on site falls within the heavily or moderately modified unit of the MBSP terrestrial database while the remainder of the site is classified as other natural areas (Figure 5).

3.3. Vegetation

The site falls within the Rand Highveld Grassland vegetation type, which is classified as Endangered in Mucina & Rutherford (2006) and as Vulnerable in the Threatened Ecosystems regulations of the National Environmental Management: Biodiversity Act. The vegetation type is classified as Endangered in the National Biodiversity Assessment (2019). Any remaining vegetation that resembles the Ranch Highveld Grassland is of conservation importance. The northern portion of the site is indicated as diggings and is therefore expected to be transformed.

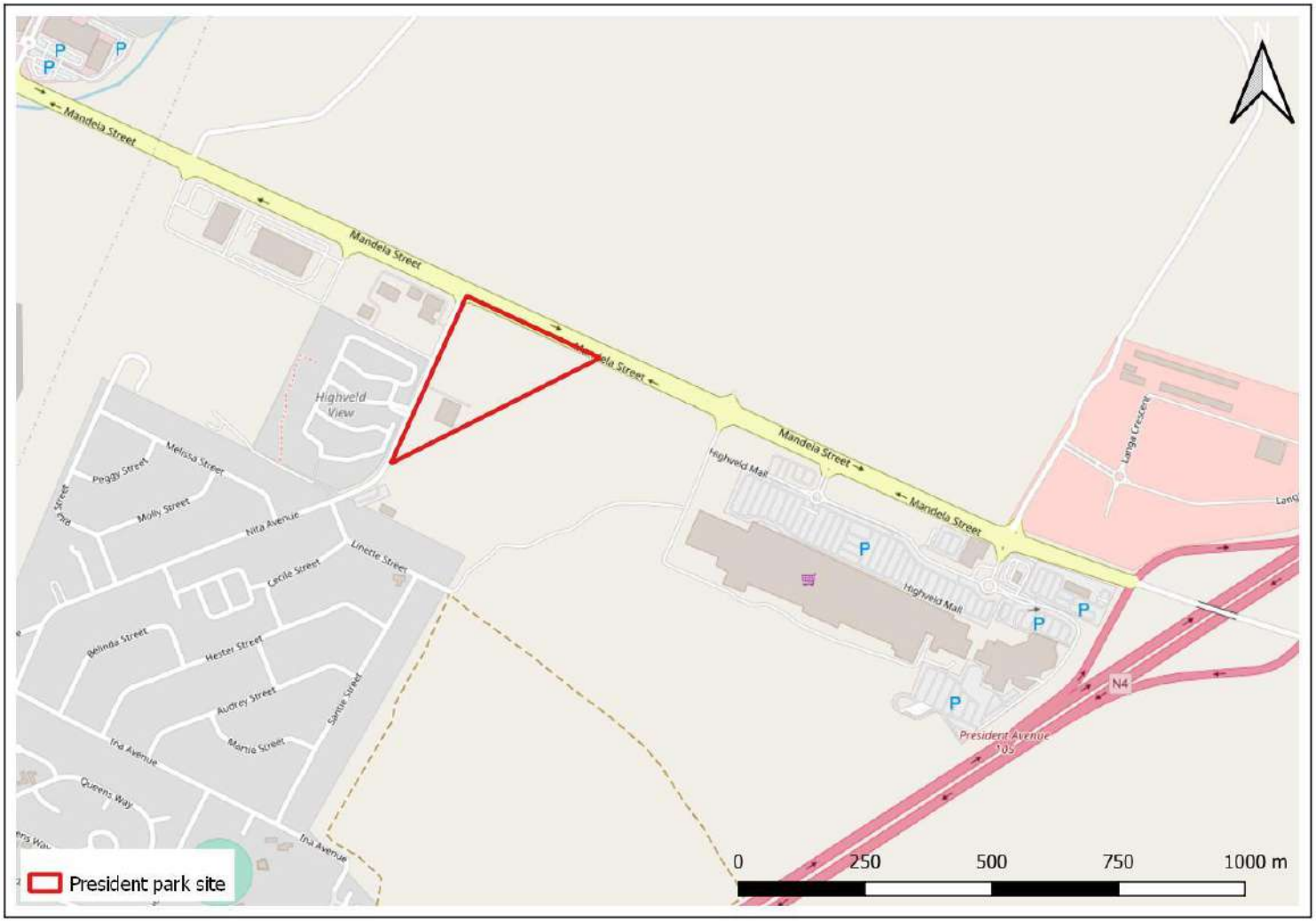

Figure 1: Location of the site.

Figure 2: Predicted watercourses according to the SAIIAE (2018).

Figure 3. Wetland areas identified in the NFEPA database around the sites.

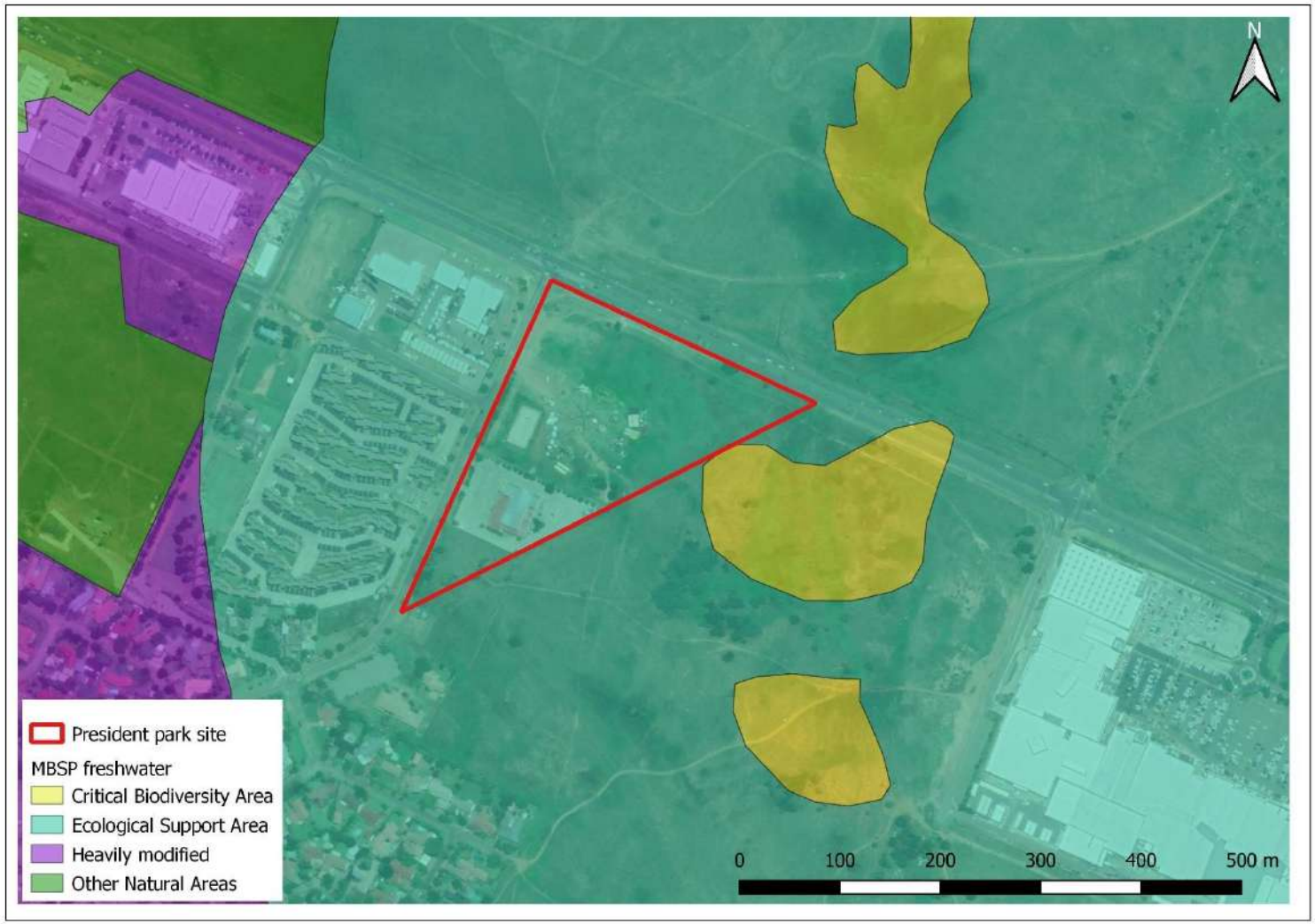

Figure 4: Ecological categories according the MBSP freshwater database.

Figure 5: Ecological categories according the MBSP terrestrial database.

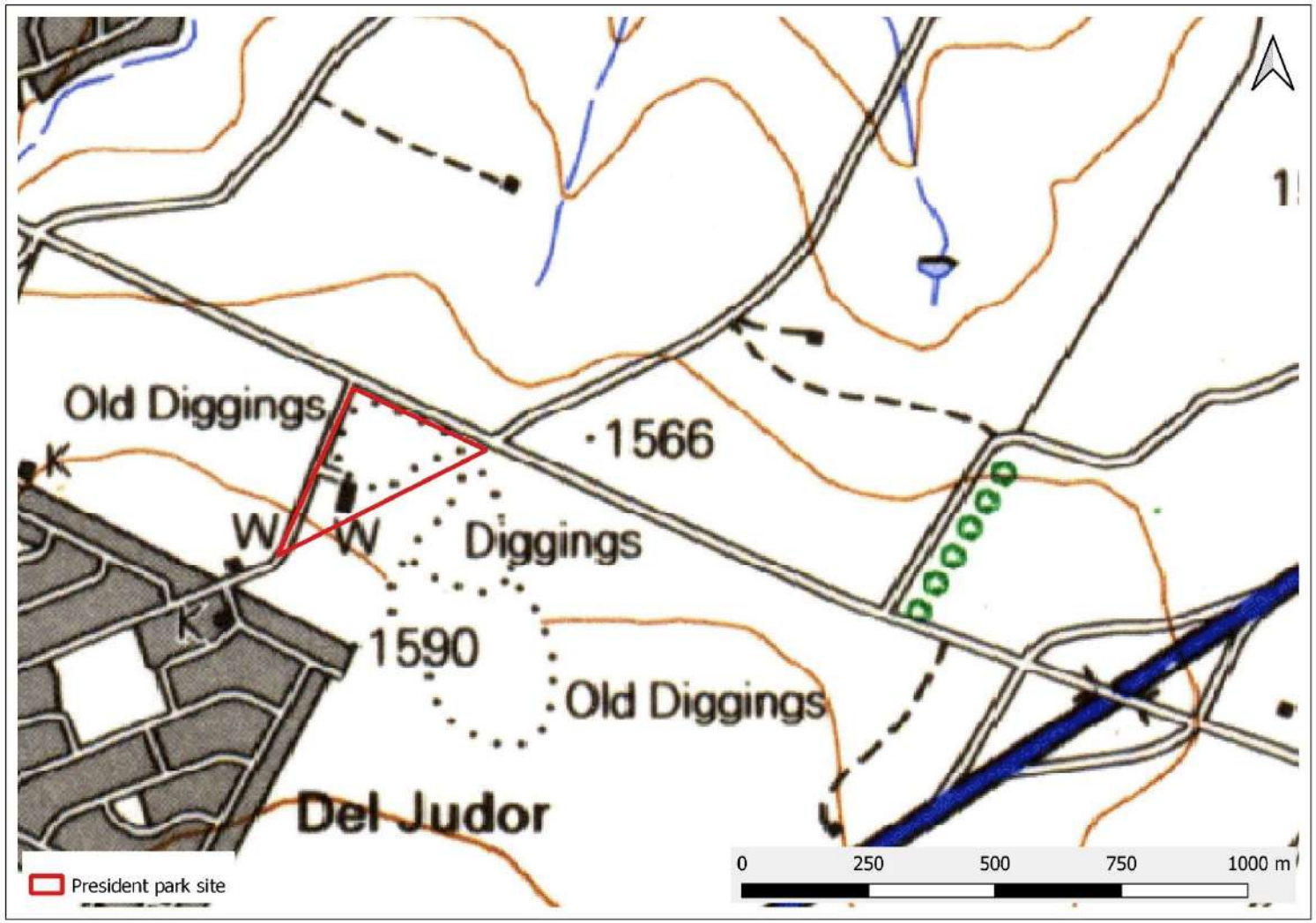

Figure 6: The site on a portion of the 1:50 000 topographical map (2529CD) of 1996.

3.4. NFEPA and wetland probability

According to the SAIIAE database (NBA 2018) wetland units are expected to the east and north of the site (Figure 2) and the NFEPA database also indicate wetland units to the east and north of the site (Figure 3). The NBA database mainly focus of valley bottom wetlands and streams and poorly represent other wetland systems. The NFEPA database are notoriously inaccurate and poorly represent temporary and seasonal wetness zones. Both of these databases indicate the possibility of wetlands to the east of the site, which may extent into the site.

4. Methods

4.1. Wetland Delineation

Aerial photographs of the site were investigated prior to the site visit. Google Earth images from 2020 were used. All the wetland areas within 500m of the site were delineated based on the aerial photographs.

Site visits took place on 27 May 2020, 5 November 2020 and 12 November 2020. The wetlands on site are delineated according to the Department of Water Affairs (DWA) wetland delineation guideline (DWAF, 2005). Several wetland indicators are used to delineate the wetland area. The wetland indicators used are the:

- Vegetation indicator;
- Terrain unit indicator; and
- Soil wetness indicator.

4.2. Present Ecological State

The Present Ecological State (PES) of the wetland was calculated using the WET-Health assessment (Macfarlane *et al.* 2009). This assessment evaluates the change from natural to the hydrology, geomorphology and vegetation of the wetland and gives a score for each of these assessments. From this, a PES class is assigned. A summary of the PES classes is attached in Table 1. A combined score of the three can be calculated for the wetland, although this is not recommended. For the purposes of this study, the level 1 assessment was used.

Table 1: PES categories (from Macfarlane et al. 2009).

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E

Description	Combined impact score	PES Category
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F

4.3. Ecological Importance and Sensitivity

A draft Ecological Importance and Sensitivity (EIS) tool has been developed for wetlands by Rountree *et al.* (2008). The EIS assessment tool gives a score between 0 and 4, with 0 a very low score and 4 very high. In general, most wetlands have a score between 1 and 2.5. Very disturbed wetlands have a low score. Wetlands with a score higher than 2.5 have some very special and distinctive features and are normally unique wetlands.

Table 2: Classification of the EIS categories based on score.

Ecological Importance and Sensitivity categories	EIS score
Very high: Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	**>3 and <=4**
High: Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	**>2 and <=3**
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	**>1 and <=2**
Low/marginal: Wetlands that is not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	**>0 and <=1**

4.4. Risk Assessment

The Risk Assessment took the consequence and likelihood of the impact into consideration to determine the risk. The risk assessment took place according to the DWS protocol (2014). The risk assessment is completed as per Notice of 509 of 2016 under the Department of Water and Sanitation with regards to General Authorisations for Section 21 (c) and (i) water uses. Scores were allocated as follows:

Consequence:

Consequence = Severity + Spatial scale + duration

Severity

- Insignificant / non-harmful: 1
- Small / potentially harmful: 2
- Significant / slightly harmful: 3
- Great / harmful: 4
- Disastrous / extremely harmful and/or wetland involved: 5

Spatial scale:

- Area specific: 1
- Whole site: 2
- Regional / neighbouring areas: 3
- National: 4
- Global: 5

Duration:

- One day a month, PES, EIS and REC not impacted: 1
- One month to a year, PES, EIS and REC impacted but no change in status: 2
- One to 10 years, PES, EIS and REC impacted to a lower status but can be improved over this period through mitigation: 3
- Life of the activity, PES, EIS and REC permanently lowered: 4
- More than life of the organisation / facility, PES and EIS scores a E or F: 5

Likelihood:

Likelihood = Frequency of the activity + Frequency of impact + Legal issues + Detection

Frequency of the incident / impact:

- Almost never / almost impossible / >20%: 1
- Very seldom / highly unlikely / >40%: 2
- Infrequent / unlikely / seldom / >60%: 3
- Often / regularly / likely / possible / >80%: 4
- Daily / highly likely / definitely / >100%: 5

Legal issues:

- No legislation: 1
- Fully covered by legislation: 5

Detection:

- Immediately: 1
- Without much effort: 2
- Need some effort: 3
- Remote and difficult to observe: 4
- Covered: 5

Frequency of the activity:

- Annually or less: 1
- 6 Monthly: 2
- Monthly: 3
- Weekly: 4
- Daily: 5

RISK:

Risk = Consequence x Likelyhood

The following significance ratings were assigned for risk classes based on the risk score:

- Low: 1 - 55
- Medium: 56 - 169
- High: 170 – 300

5. Results and discussion

5.1. Hydrogeomorphic type and description

A wetland unit is present to the east of the site and an artificial wetland is present in the northern portion of the site.

5.1.1. On site

The artificial wetland unit on site resulted due to the various disturbances on site and adjacent to the site. Aerial photographs from 1991 were investigated to determine the possible historical extent of the wetland to the east of the site. The aerial photographs are not very clear, but the only visible wetland area is to the east and north-east of the site, with only a small portion of the wetland extending into the north-eastern corner of the site (Figure 12). No wetland areas are visible on site where the artificial wetland area and the artificial ponding is taking place. Based on older 1:50 000 topographical maps excavation took place in this area, which were later filled with infill (Figure 6 & Figure 11) which resulted in the altered topography and hydrology of the site. The artificial wetland is entirely located in the historically excavated area. This is supported by the geotechnical assessment for the site (Engeolab 2010).

An area where water artificially ponds is present adjacent to the Portuguese Club to the north, on the existing infill on site. This has result in the establishment of some wetland species and the area is dominated by *Pennisetum clandestinum, Cyperus congestus* and *Trifolium repens.* Although some mottling is present in the soil, the soil is clearly imported to the site and the origin of the mottling is therefore unknown and not necessarily due to the ponding taking place on site. Although this area has some wetland species present the unit should not be considered a wetland area, since it is unlikely to provide any wetland function. The ponding taking place in this area is due to the artificial modifications to the topography of the site. Two closely spaced areas with artificial ponding are present. Artificial Ponding area 1 is located directly adjacent to the Portuguese Club and Artificial Ponding area 2 is located between Ponding area 1 and the artificial wetland (Figure 14).

1.1.1.1. Soils

The site is characterised by Technosols and Anthrosols. The area where the Portuguese Club and the paving around it is located as well as the nearby basketball court (Figure 7), falls within the Technosol group. Soil profiles are covered by concrete structures, cement and waste materials including building gravel (see Figure 7). These areas all classify as the Johannesburg soil form.

Figure 7: Basketball court and parking terrace classified as the Johannesburg soil form (left) and imported materials covering the soil surface of the Johannesburg soil form, Technosol Group (right).

The north-western corner of the site consists of the Grabouw soil form which represent soil profiles that may resemble some of the original horizon organisation but with degrees of disturbance that include significant compaction (Figure 8). Rainwater infiltration in these areas is very limited as a result of the compacted surfaces and will instead increase the stormwater volumes that will seep into the surfaces across Mandela Drive (further north and north-east).

Figure 8: Compacted soil of the Grabouw form (Anthrosol Group) located in the northern corner of the site (left) and (right) orthic topsoil with weathering imported gravel at 0.35m.

Although the vegetation of the middle as well as towards the eastern boundary of the site may indicate wetter conditions, there are no hydric soil forms in these areas. Soil in these areas consist of shallow orthic topsoil of between 0.1 and 0.35 m deep, without any mottling, gleying or the presence of a gleyed horizon underneath. The orthic topsoil is darkened as a result of weathered organic material (grass and other vegetation roots). The depth-limiting material consist of a mixture of hard plinthite and gravel (that was likely imported for previous construction activities).

During rainfall events, water infiltrates the shallow topsoil horizon but vertical movement is then limited by the presence of the rocky material and hard plinthite. This will create temporary wetness on these compacted surfaces before moving in a lateral direction towards the lower-lying landscape positions.

The site does not have any hydric soil forms that sustain temporary or permanent wetland systems. Any accumulation of water in the soils are as a result of historical disturbance that includes the removal of topsoil and subsoil to expose the underlying parent material, the import of gravel and other materials for construction purposes as well as the deliberate compaction of soils. All of these actions reduce deep percolation of water in soil and increase surface run-off that may likely seep into lower landscape positions (such as across Mandela Drive) and contribute water volumes to those areas. Any development within the President Park site will therefore have no impact on any potential wetland areas within the site.

5.1.2. Outside the site (east):

A wetland unit is present to the east of the site and flows from south to north, outside the site. The wetland area originates approximately 300m south of Mandela Drive. This wetland is a seep wetland unit adjacent to the site, but the downstream portion is a channelled valley bottom wetland. Several disturbances are present in the wetland area, including soil disturbances and various alien and invasive tree species. Mandela Road crosses the wetland unit and a culvert are present under the road.

Although the majority of the wetland south of Mandela Drive were also affected by excavations it is clear from the historical aerial images that a wetland was present in this location in the past.

Figure 9: Photographs of (a) the artificial ponding area, (b) informal harvesting of kikuyu on site around and in the ponding, (c) the artificial wetland unit on site and (d) the grey soil in the wetland unit.

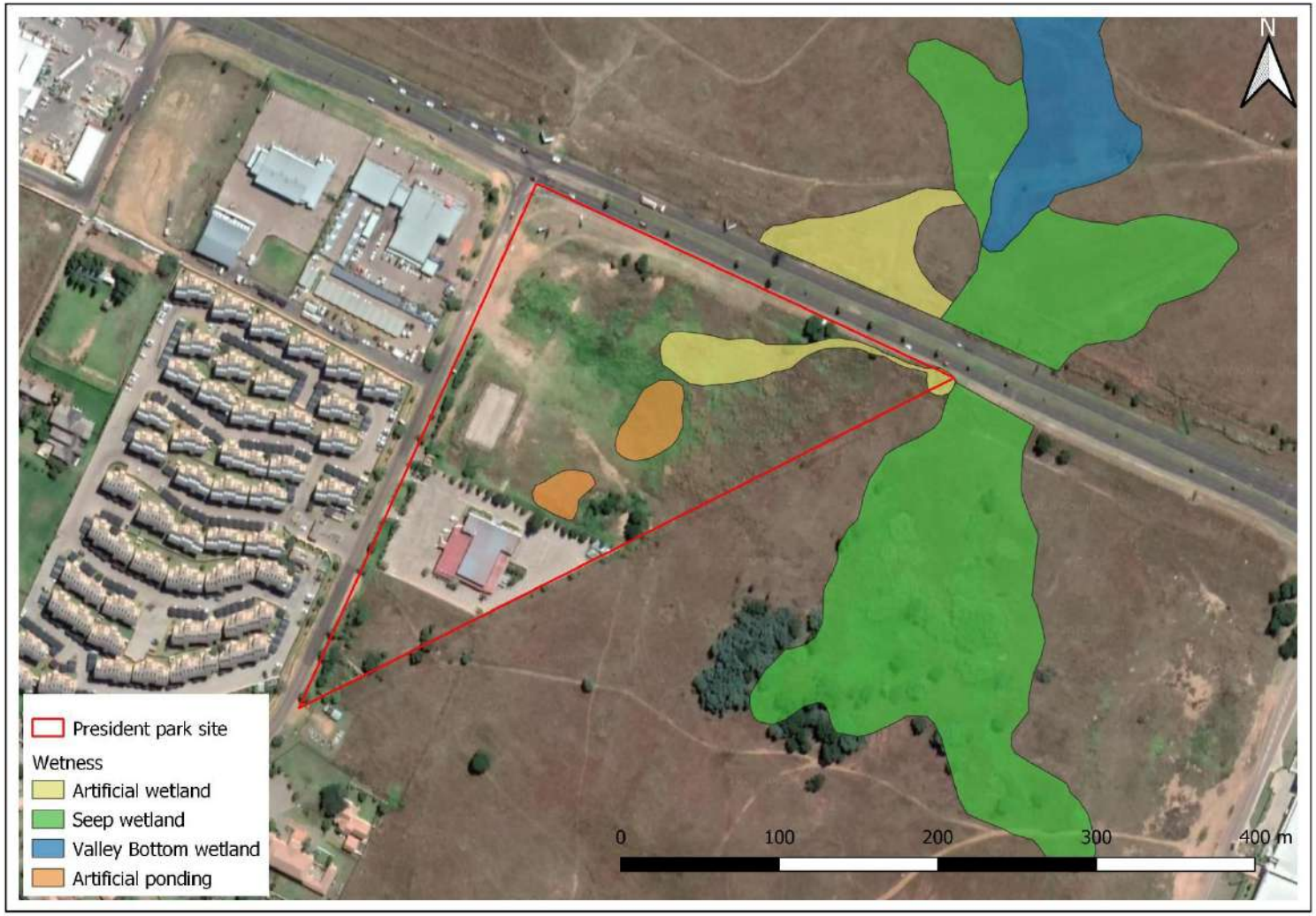

Figure 10: Delineation of the artificial wetland and artificial ponding of site and wetland units to the north and east of the site.

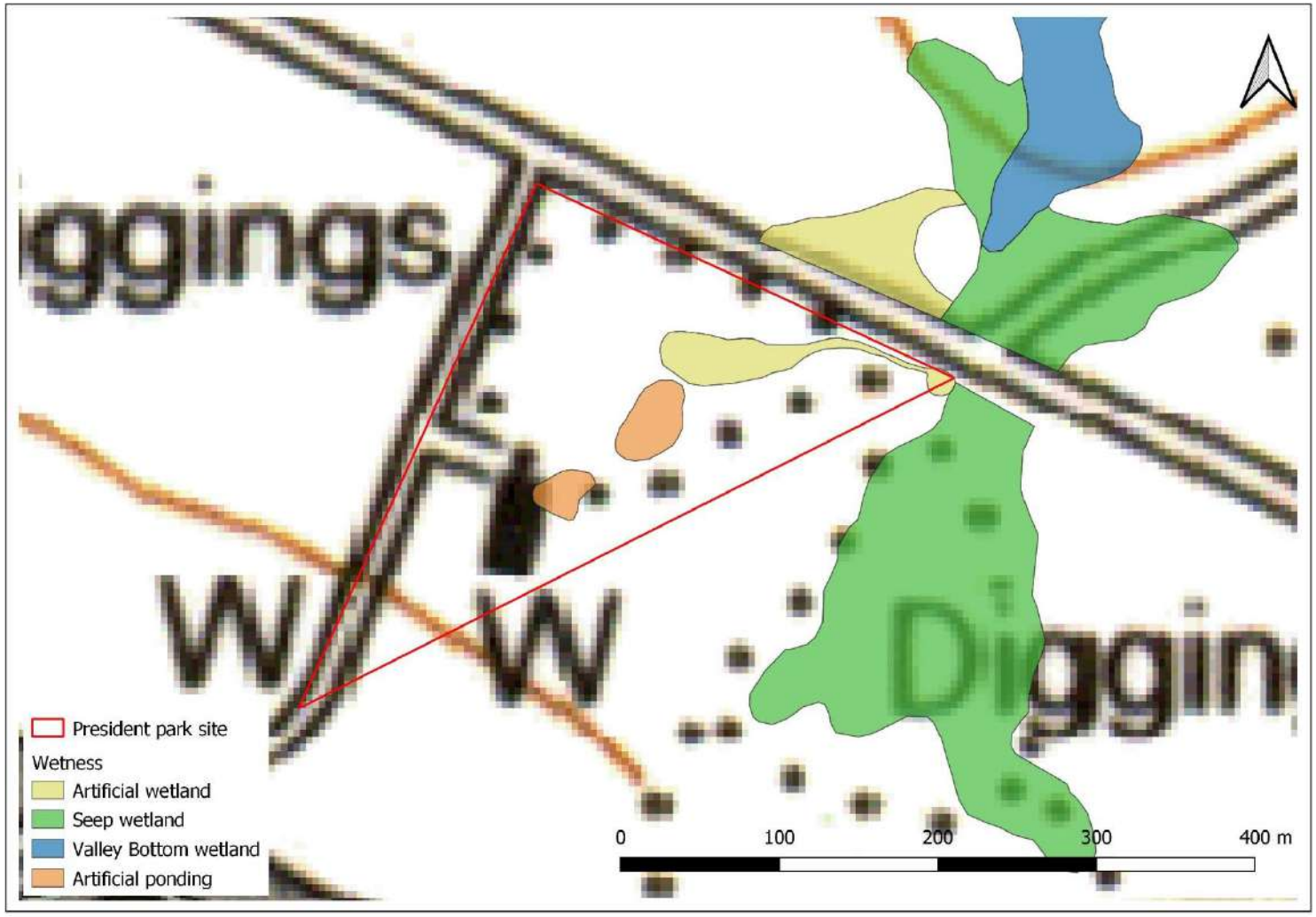

Figure 11: Location of the artificial wetland on site in relation to excavations indicated on the 1:50 000 topographical map of the site.

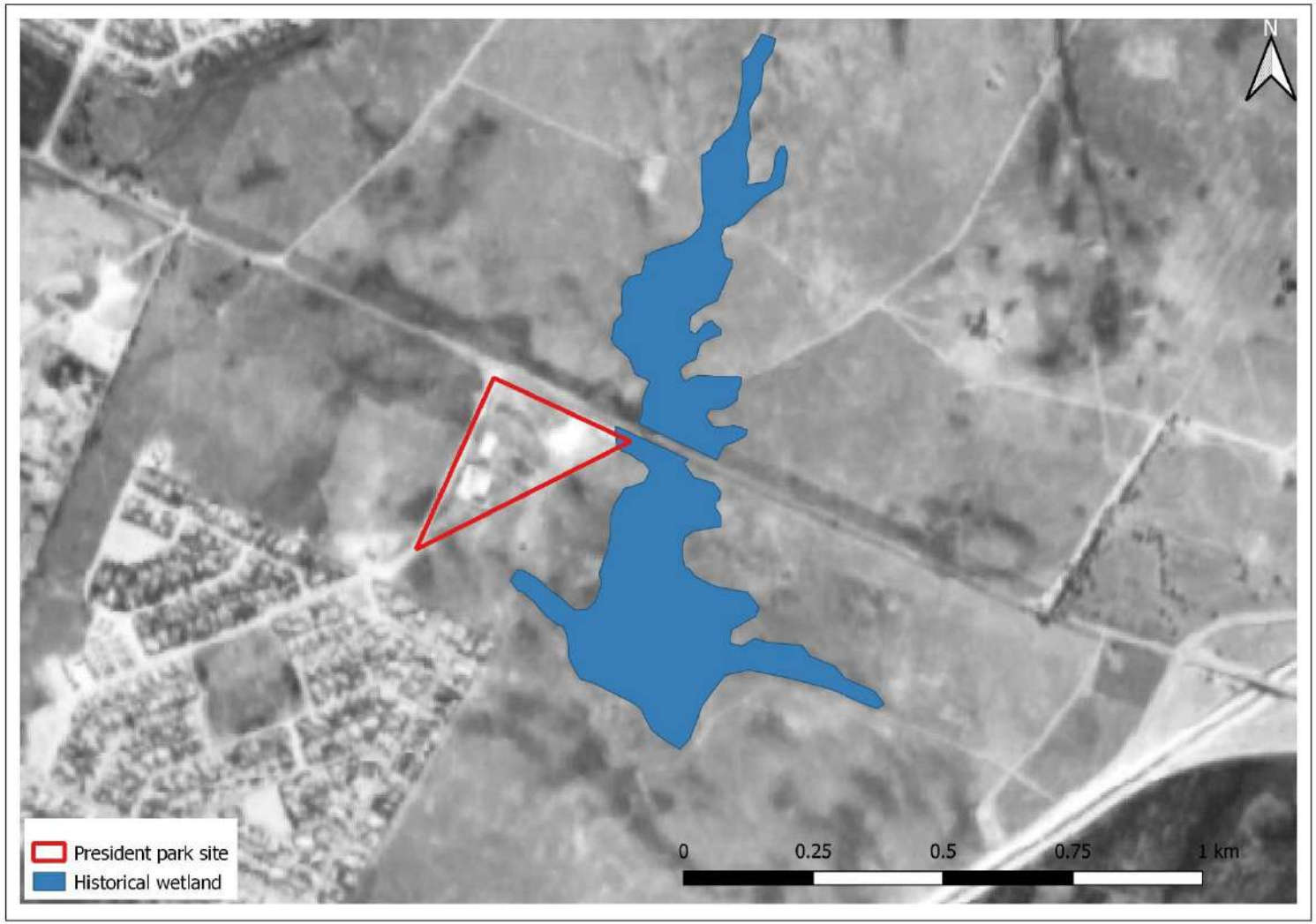

Figure 12: Desktop delineation of likely historical extent of the wetland to the east and north of the site on an aerial photograph from 1991.

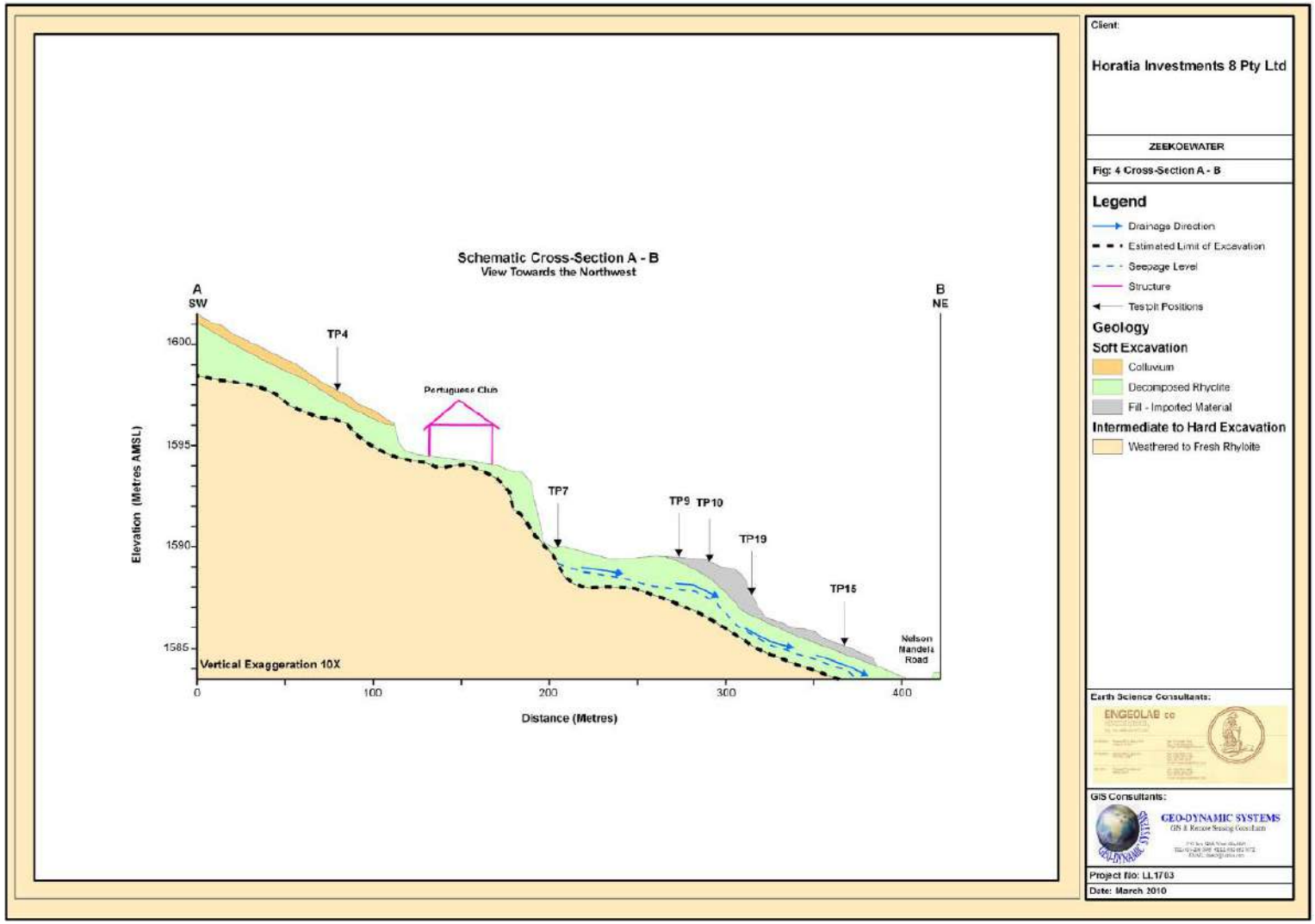

Figure 13: Cross-sectional profile included in the geotechnical report by Engeolab (2010) indicating the altered cut-and-fill profile of the site and the sub-surface water flow.

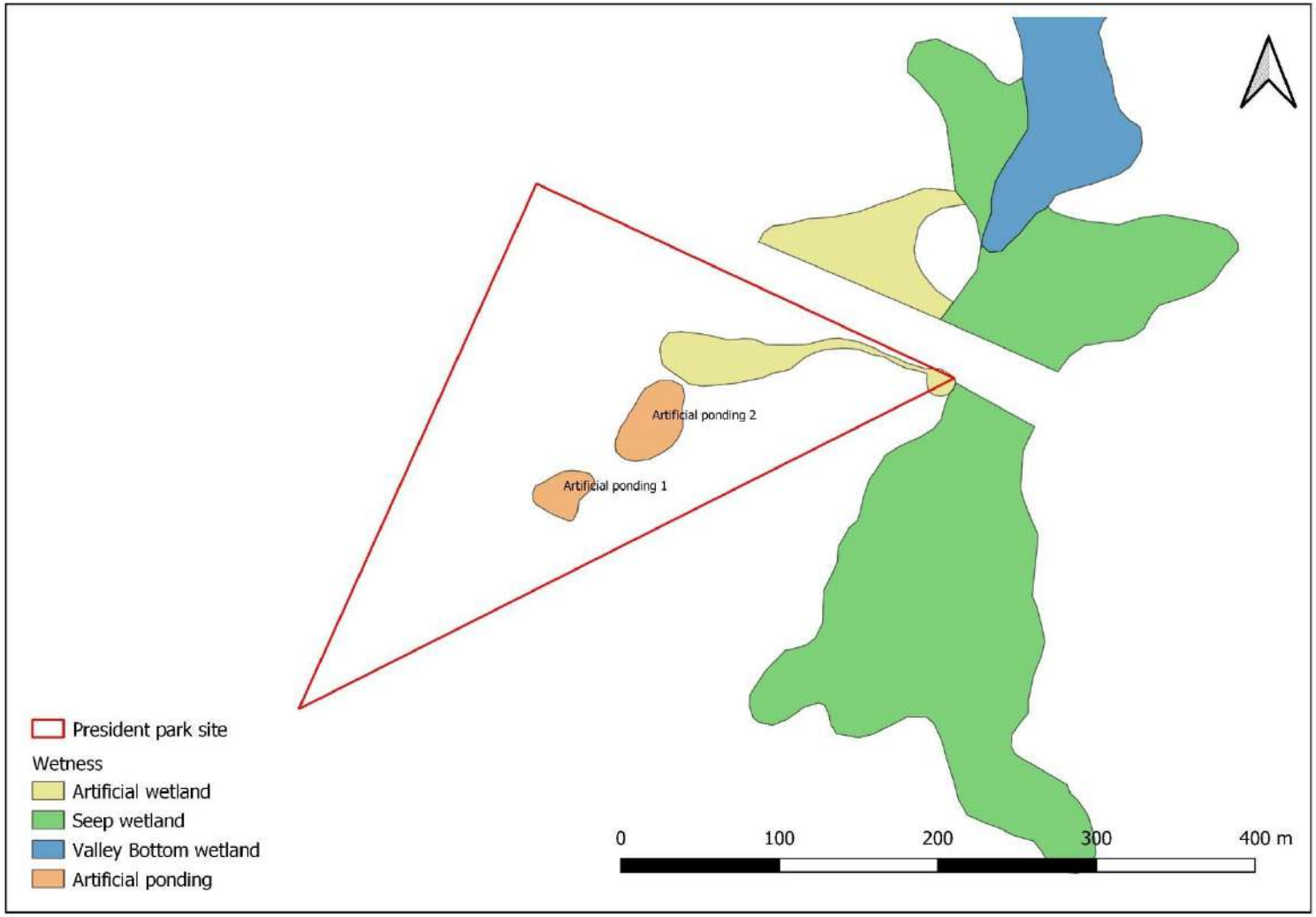

Figure 14: Artificial ponding areas on site.

5.2. Wetland delineation

The artificial wetland unit on site were delineated based on the characteristics as described below. The wetland unit to the east of the site was mainly delineated based on the aerial photographs of the site.

5.2.1. Artificial wetland

Vegetation: Although a number of alien species are present in the wetland unit, the vegetation in the wetland is dominated by *Hyparrhenia hirta, Imperata cylindrica, Fimbristylus complanata* and *Cyperus congestus.* The species composition indicate that the unit is wet for a significant period of time and is clearly affected by various impacts. Refer to Table 3 below.

Soil: Soil in these areas consist of shallow orthic topsoil of between 0.1 and 0.35 m deep, without any mottling, gleying or the presence of a gleyed horizon underneath. The orthic topsoil is darkened as a result of weathered organic material (grass and other vegetation roots). The depth-limiting material consist of a mixture of hard plinthite and gravel (that was likely imported for previous construction activities). There are no hydric soil forms in these areas.

During rainfall events, water infiltrates the shallow topsoil horizon but vertical movement is then limited by the presence of the rocky material and hard plinthite. This will create temporary wetness on these compacted surfaces before moving in a lateral direction towards the lower-lying landscape positions.

Topography: The topography of the site was modified by the past disturbances, resulting in an artificial depression on the northern portion of the site, adjacent to Mandela Road. An artificial wetland unit is therefore present on the northern portion of the site.

5.2.2. Artificial ponding

Vegetation: Although a number of alien species are present in the wetland unit, the vegetation in the wetland is dominated by *Pennisetum clandestinum, Hyparrhenia hirta* and *Cyperus congestus.* The species composition indicates wetness, as well as disturbances on site. Refer to Table 3 below.

Soil: The soil in this area falls within the Technosol group. Soil profiles are covered by concrete structures, cement and waste materials including building gravel. These areas all classify as the Johannesburg soil form. There are no hydric soil forms in these areas.

Topography: The northern portion of the site were excavated in the past (Figure 6 & Figure 11) and the site profile were changed by cut-and-fill activities to allow for the construction of the Portuguese Club and to fill the excavations on the northern portion of the site. A diagram of a cross profile of the site is included in Figure 13 below. The artificial ponding is taking place approximately at TP7 on the diagram and the artificial wetland is located between points TP19 and TP15. The modifications to the topography resulted in a shallower water table in these areas, as well as artificial ponding in depressions on the infill. The ponding is only taking place is slight depressions on site caused by the soil disturbances and only for short periods of time after a rainfall event. The soil removed from this area also result in the sub-surface flow being closer to the surface than it would have been in the past.

Table 3: Plant species observed on site during the site visits.

Species	Indicator of	Alien / indigenous	Artificial ponding	Artificial wetland
Agrostis lachnantha	Wetness	Indigenous	x	x
Andropogon eucomis	Wetness	Indigenous	x	
Arundo donax	Disturbance	Class 1b invader		x
Cymbopogon excavatus	Generalist	Indigenous	x	
Cynodon dactylon	Generalist	Cosmopolitan	x	
Cyperus congestus	Wetness	Indigenous	x	x
Cyperus species	Wetness	Indigenous	x	x
Datura stramonium	Disturbance	Class 1b invader	x	
Eragrostis curvula	Generalist	Indigenous		x
Eragrostis plana	Disturbance / wetness	Indigenous	x	
Fimbristylus complanata	Wetness	Indigenous		x
Fuirena species	Wetness	Indigenous	x	x
Hyparrhenia hirta	Disturbance	Indigenous		x
Hyparrhenia tamba	Moistness	Indigenous		x
Imperata cylindrica	Wetness	Indigenous		x
Indigophera species	Generalist	Indigenous		x
Mellilotis alba	Disturbance	Alien		x
Monopsis decipiens	Wetness	Indigenous		x
Paspalum dilatatum	Disturbance	Alien	x	
Pennisetum clandestinum	Disturbance	Alien	x	x
Pseudognaphalium luteo-alba	Disturbance	Alien	x	x
Schoenoplectus muriculata	Wetness	Indigenous	x	x
Senecio erubescens	Moistness	Indigenous		x
Sporobolus africanus	Disturbance / wetness	Indigenous	x	x
Trifolium repens	Moistness	Alien	x	
Typha capensis	Wetness	Indigenous		x
Verbena bonariensis	Disturbance / wetness	Class 1b invader	x	x
Total	**27**			
Indigenous	18			
Cosmopolitan	1			
Alien	5			
Class 1b invader	3			
Indicator of:				
Wetness	10			
Disturbance / wetness	3			
Moistness	3			
Disturbance	7			
Generalist	4			

5.3. Present Ecological State (PES) of the seep wetland to the east of the site

The Present Ecological State (PES) status of the wetland is a reflection of the change from the natural condition. The PES assessment is therefore not applicable to the artificial wetland unit on site, but the PES status is applicable to the wetland unit located to the east of the site. The wetland unit to the east of the site is in PES class C, which is Moderately Modified. The upper portion of the wetland unit is the most disturbed portion. Disturbances in the downstream portion of the wetland is much lower and the wetland is in a better condition.

Hydrology: The hydrological PES of the site is Class C, which is Moderately Modified. The hydrology of the site is mainly affected by the historical excavation activities in the wetland, the road crossing and the alteration in the species composition. Impacts from changed runoff is minimal, since the system originates at this point.

Geomorphology: The geomorphology is natural to largely natural (PES class A/B). The impact of the excavation activities on the topography of the wetland is likely underestimated. The geomorphology of the downstream portion of the wetland is however intact.

Vegetation: The vegetation in the upper portion of the wetland is in PES class E, with is Seriously Modified. The modification is mainly due to pas excavation activities in the wetland unit leading to a change in the species composition and the encroachment of alien and invasive species into the wetland unit. Large portions of the upper wetland unit are dominated by *Acacia dealbata* (Green Wattle) or *Pennisetum clandestinum* (Kikuyu). The modification to the species composition is confined to the upper portion of the wetland, upstream of Mandela Drive. The vegetation in the downstream portion of the wetland is in a significantly better condition and is in PES class B or C.

5.4. Ecological Importance and Sensitivity (EIS)

5.4.1. Seep

The upper portion of the wetland unit is disturbed by past activities and the vegetation is seriously modified. This limits the EIS of this portion of the wetland. The Giant Bullfrog were however observed in the artificial ponding area and can be assumed to use the seep wetland for migration and possibly foraging, which resulted in a Moderate to High EIS score.

The hydro-functional importance of the wetland unit is typical of the wetland type and location in the landscape. The downstream portion of the wetland, north of Mandela Drive, will contribute more to hydrological functions in the landscape.

No direct human benefits were observed in the wetland unit and none are expected.

Table 4: EIS scoring summary table for the seep wetland located to the east of the site.

	Importance	**Importance**
ECOLOGICAL IMPORTANCE & SENSITIVITY	2.0	Moderate to High
HYDRO-FUNCTIONAL IMPORTANCE	1.4	Moderate
DIRECT HUMAN BENEFITS	-	Low

6. Buffer zone recommendations

A buffer zone is intended as an area to mitigate the impact of the development on sensitive features on site. Several buffer sizes are recommended for wetland and river units is the various provinces. A buffer zone tool was developed by Macfarlane *et al.* (2014) to determine the buffer zones required based on the activity, as well as the wetland type and characteristics. Based on the buffer tool a buffer zone of 28m is required around the wetland unit. This buffer requirement does not take the buffer required for the Giant Bullfrogs into account.

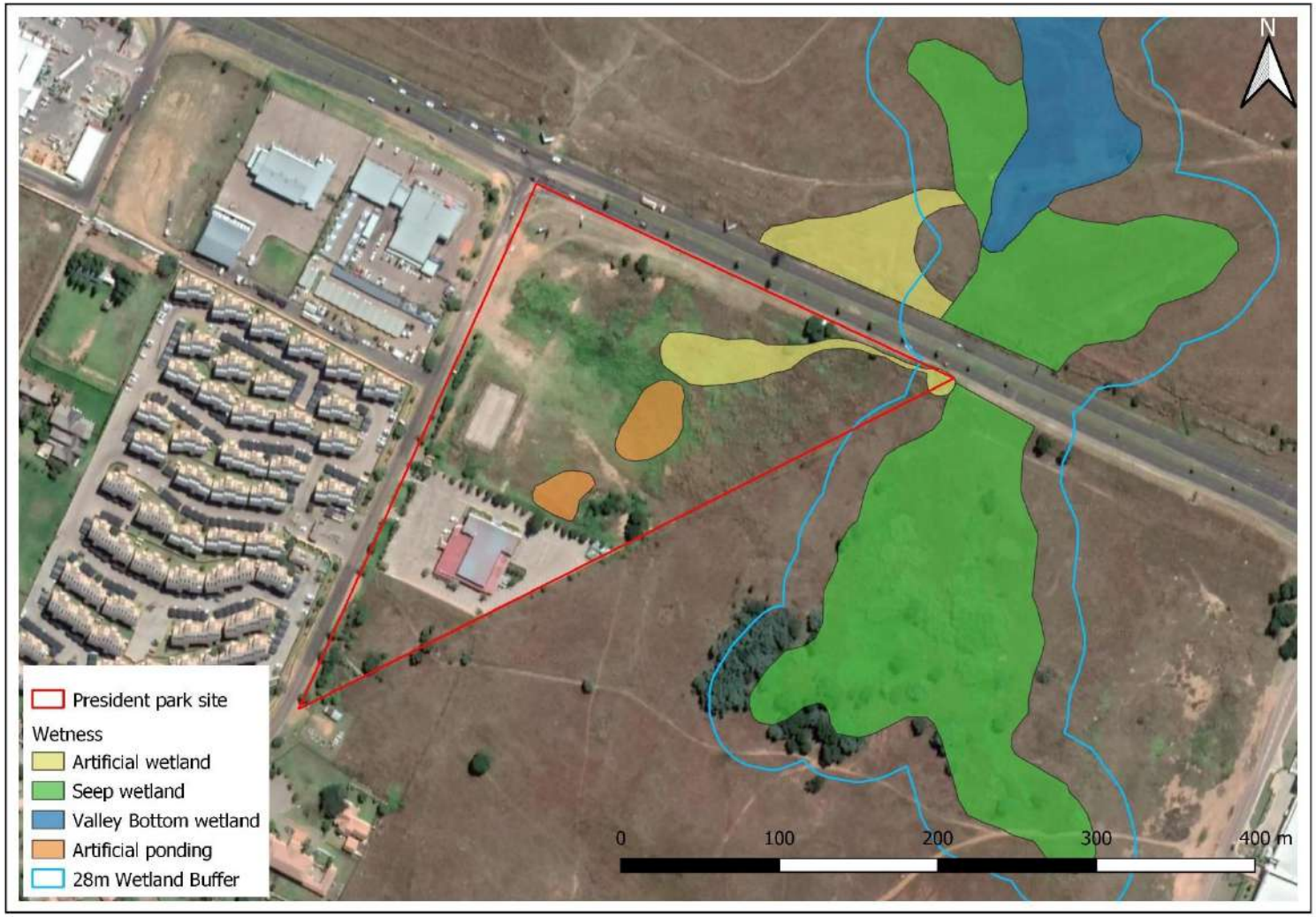

Figure 15: Recommended buffer area around the wetland unit.

Figure 16: Proposed layout plan for the site, excluding a proposed filling station in the north-western corner of the site.

7. Risk assessment and mitigation

Two alternatives are provided for the site:

- Site is only developed for business (retail) purposes (Figure 16);
- Site is developed for business purposes and includes a filling station in the north-western corner of the site.

Should the proposed landuse change, the below risk assessments (Table 5 and Table 6) and mitigation measures will have to be revised. The proposed filling station is at least 150m outside the seep wetland area.

Table 5: Risk assessment table for the proposed development of a filling station and commercial development on site.

Phase	Activity	Aspect	Impact	Severity				Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Specialist modification	Control Measures
				Flow Regime	Physico & Chemical	Habitat	Biota													
Construction	Site clearing	Vegetation clearing	Loss of wetland habitat and functions	1	1	1	1	1	1	2	4	2	2	5	1	10	40	L		Refer to the mitigation measures included in this report
		Erosion		1	2	2	1	1.5	2	1	4.5	2	2	5	2	11	50	L		
		Sedimentation		1	2	1	1	1.3	2	2	5.3	1	2	5	2	10	53	L		
		Soil compaction		1	1	1	1	1	1	1	3	1	1	5	3	10	30	L		
		Encroachment of invasive species		1	1	2	2	1.5	2	2	5.5	2	2	5	1	10	55	L		
Construction	Construction camp	Littering	Pollution of the wetland units	1	1	2	2	1.5	2	2	5.5	1	2	5	1	9	**50**	L		Refer to the mitigation measures included in this report
		Biological waste		1	2	2	1	1.5	2	2	5.5	1	2	5	2	10	**55**	L		
		Spillage of hydrocarbons		1	3	1	1	1.5	2	2	5.5	1	2	5	2	10	**55**	L		

Phase	Activity	Aspect	Impact	Severity				Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Specialist modification	Control Measures
				Flow Regime	Physico & Chemical	Habitat	Biota													
Operational	Management of a filling station	Spillage of hydrocarbons	Pollution of the water resources	1	2	2	3	2	2	3	7	2	2	5	2	11	**77**	**M**	**L**	Refer to the mitigation measures included in this report
		Biological waste		1	2	1	2	1.5	2	2	5.5	2	1	5	2	10	**55**	**L**		
		Littering		1	2	1	1	1.3	2	1	4.3	2	1	5	1	9	**38**	**L**		
Operational	Stormwater management	Erosion	Loss of wetland habitat and functions	1	1	1	2	1.3	1	1	3.3	1	1	5	1	8	**26**	**L**		Refer to the mitigation measures included in this report
		Sedimentation		1	2	1	2	1.5	1	1	3.5	1	1	5	2	9	**32**	**L**		
		Change in hydrology of the wetland		2	1	1	2	1.5	1	1	3.5	1	1	5	3	10	**35**	**L**		
		Geomorphology alteration		1	1	1	1	1	1	1	3	1	1	5	3	10	**30**	**L**		
		Vegetation change		1	1	2	2	1.5	1	1	3.5	1	1	5	3	10	**35**	**L**		
Operational	Management of open spaces	Infestation by alien and invasive species	Loss of wetland habitat and functions	1	1	2	2	1.5	1	2	4.5	2	2	5	2	11	**50**	**L**		Refer to the mitigation measures included in this report
		Alteration in species composition		2	1	2	2	1.8	1	2	4.8	1	2	5	2	10	**48**	**L**		
		Trampling and unauthorised vehicle access		2	1	2	1	1.5	1	1	3.5	1	2	5	1	9	**32**	**L**		

Table 6: Risk assessment table for the proposed development of commercial development on site.

Phase	Activity	Aspect	Impact	Severity				Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Physico & Chemical	Habitat	Biota												
Construction	Site clearing	Vegetation clearing	Loss of wetland habitat and functions	1	1	1	1	1	1	2	4	2	2	5	1	10	40	L	Refer to the mitigation measures included in this report
		Erosion		1	2	2	1	1.5	2	1	4.5	2	2	5	2	11	50	L	
		Sedimentation		1	2	1	1	1.3	2	2	5.3	1	2	5	2	10	53	L	
		Soil compaction		1	1	1	1	1	1	1	3	1	1	5	3	10	30	L	
		Encroachment of invasive species		1	1	2	2	1.5	2	2	5.5	2	2	5	1	10	55	L	
Construction	Construction camp	Littering	Pollution of the wetland units	1	1	2	2	1.5	2	2	5.5	1	2	5	1	9	**50**	L	Refer to the mitigation measures included in this report
		Biological waste		1	2	2	1	1.5	2	2	5.5	1	2	5	2	10	**55**	L	
		Spillage of hydrocarbons		1	3	1	1	1.5	2	2	5.5	1	2	5	2	10	**55**	L	
Operational	Management of a commercial development	Spillage of hydrocarbons	Pollution of the water resources	1	2	2	2	1.8	2	2	5.8	1	1	5	2	9	**52**	L	Refer to the mitigation measures included in this report
		Biological waste		1	2	1	2	1.5	2	2	5.5	2	1	5	2	10	**55**	L	
		Littering		1	2	1	1	1.3	2	1	4.3	2	1	5	1	9	**38**	L	

Phase	Activity	Aspect	Impact	Severity				Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Physico & Chemical	Habitat	Biota												
Operational	Stormwater management	Erosion	Loss of wetland habitat and functions	1	1	1	2	1.3	1	1	3.3	1	1	5	1	8	**26**	**L**	Refer to the mitigation measures included in this report
		Sedimentation		1	2	1	2	1.5	1	1	3.5	1	1	5	2	9	**32**	**L**	
		Change in hydrology of the wetland		2	1	1	2	1.5	1	1	3.5	1	1	5	3	10	**35**	**L**	
		Geomorphology alteration		1	1	1	1	1	1	1	3	1	1	5	3	10	**30**	**L**	
		Vegetation change		1	1	2	2	1.5	1	1	3.5	1	1	5	3	10	**35**	**L**	
Operational	Management of open spaces	Infestation by alien and invasive species	Loss of wetland habitat and functions	1	1	2	2	1.5	1	2	4.5	2	2	5	2	11	**50**	**L**	Refer to the mitigation measures included in this report
		Alteration in species composition		2	1	2	2	1.8	1	2	4.8	1	2	5	2	10	**48**	**L**	
		Trampling and unauthorised vehicle access		2	1	2	1	1.5	1	1	3.5	1	2	5	1	9	**32**	**L**	

Loss of wetland habitat and functions

A wetland is present to the east of the site and an artificial wetland unit is present in the northern portion of the wetland, adjacent to Mandela Road. The proposed activities on site are unlikely to affect the naturally occurring wetland to the east and the north-east of the site. An artificial wetland is present on the northern portion of the site. This wetland area developed as a result of past disturbances on the site, including the historical excavation activities on site and the topographical alterations to the site. Both the natural wetland area to the east of the site and the artificial wetland area on site is very disturbed and dominated by alien and invasive plant species. The species diversity is also poor. The only indigenous species present are common and widespread species.

The proposed filling station is located more than 150m away from the naturally occurring wetland unit. The flow from the site is however currently directed to the culvert under Mandela Drive, from where it enters the wetland unit to the north-east of the site. Although large spillages are rare occurrences at filling stations, the possibility exist that spillages will take place. The regulations relating to all filling stations and the presence of spill-kits on site significantly reduces the risk of spillages reaching the wetland unit. The potential for human error cannot be disregarded however, and some risk remain that spillages will reach the wetland. The calculated risk is therefore of medium significance but were reduced to low by specialist opinion. The likelihood of a large spill taking place and reaching the wetland unit before clean-up is low.

The proposed business development will take place on the artificial wetland unit and the artificial ponding units. The loss of the artificial wetland and artificial ponding units are not significant from a purely wetland point of view. African Bullfrogs were however observed in the artificial ponding area in the past and may utilise the seep to the east of the site for migration. Please refer to the bullfrog assessment report for the viability of the artificial ponding units as bullfrog habitat. The seep wetland unit is located outside the site, but the wetland buffer extends into the north-eastern corner of the site and must be avoided.

Mitigation:

- All development and construction activities must remain outside the seep wetland and its buffer zone.
- The access route and traffic circle in the north-eastern corner of the site must be moved outside the buffer zone and away from the culvert under the road.
- Clearly demarcate and fence the construction areas.
- No vehicle movement or clearing of vegetation may take place outside the construction area. Vegetation may only be removed as part of the invasive species control plan, and only targeted species may be removed.
- All mitigation measures included in this report must be adhered to.

Infestation by invasive plant species

Invasive plant species tend to establish in, and around disturbed areas and several invasive species have been recorded on site. These species may become established in higher densities and or spread from the site should additional disturbance take place.

Mitigation:

- Compile an alien and invasive species control and monitoring plan as required in the Alien and Invasive Species Regulations under the National Environmental Management Biodiversity Act (Act 10 of 2004).
- Populations of invasive species on site must be controlled according to the control plan.
- The spread of invasive and weedy species from the site must be prevented.
- Care must be taken not to control indigenous species.

Storm water management

Development on site will increase the impermeable surfaces on site and decrease the infiltration into the soil. Increased runoff is therefore expected from the site. If not managed properly, this may result in erosion on site and adjacent to the site, and sedimentation in the downstream areas.

Mitigation:

- Permeable surfaces should be used as far as possible for. Total sealing of the surface must be avoided. Areas where spillages may occur must however be sealed.
- An appropriate storm water management plan must be implemented on site.
- Storm water may not enter the watercourses directly, it must be attenuated before exiting the storm water system. The north-eastern corner of the site is suggested for the attenuation of stormwater.
- Storm water may not be concentrated into any wetland areas. The water must be spread over a wide area.
- The stormwater must be attenuated on site, prior to release into the natural system.

Erosion and Sedimentation

The clearing of vegetation from the site and other soil impacts may result in erosion on site and in erosion and sedimentation in the downstream areas. This may potentially cause damage to the soil and sedimentation downstream.

Mitigation:

- Monitor the entire site for signs of erosion throughout the construction phase of the project.
- All erosion features must be rehabilitated as soon as possible.
- Implement erosion control measures where necessary.
- Stabilise any bare soil as soon as possible.
- Implement sediment fences around areas with bare soil, especially on slopes.
- Include an erosion control section in the open space management plan for the site.

Pollution of the soil and downstream resources

Fuel is a hazardous material, and a spillage can cause significant damage to the environmental resources. Although major spillages are rare, small spills are common at filling stations. In addition, several vehicles have small oil leaks. Runoff from a filling station, even a very professionally managed filling station, may therefore contain pollutants.

The proposed commercial area is less likely to result in pollutants entering the wetland system. The most likely source of pollutants from commercial areas are poorly maintained or overloaded sewage systems.

General mitigation:

- The construction camp and all associated facilities must be located outside the seep wetland and its buffer.
- Adhere to all other mitigation measures in this report.

Mitigation for littering:

- Sufficient rubbish bins must be provided on site and cleared on a regular basis.
- Rubbish must be disposed of at a registered landfill.
- Rubbish may not be dumped on site or allowed to spread from the rubbish bins on site.

Mitigation for pollution by petrochemicals (construction phase):

- Refuelling and maintenance must take place off-site at a registered fuel depot.
- The vehicles must be inspected for oil leaks etc. regularly and any observed leaks must be repaired as soon as possible.
- Any spillages of hydrocarbon fuels must be cleaned up immediately.
- All regulations etc. included in the waste act must be adhered to.

Mitigation for pollution by petrochemicals (operation phase):

- Adhere to all legislation regarding the safe storage and distribution of hazardous materials.
- Spill response kits must be available on site at all times.
- All spillages must be cleaned up immediately.
- Runoff from the pump area should preferably pass through a filter to remove hydro-carbons from the water, prior to entering any natural systems.

Mitigation for temporary ablution facilities:

- The seep wetland and its buffer zone must be clearly demarcated on site and no construction activities may take place in these areas, including the temporary storage of materials and location of temporary ablution facilities.
- Sufficient temporary ablution facilities must be provided for the workers during the construction phase.
- The portable toilets must be cleaned regularly to prevent overflow and spillages.

Changes in the geomorphology and hydrology of the site

The geomorphology and hydrology of the site has already been altered by various activities in the past, including the historical borrow-pit activities on site, the infill into the borrow-pit and terracing on site and the construction of Mandela Drive to the north of the site. The runoff from the site and the

adjacent site is concentrated through a single culvert under Mandela Drive, which alter the runoff from the site.

Mitigation:

- Adhere to all recommendations in the geotechnical assessment.
- Install sub-surface drainage under the buildings where appropriate.
- Adhere to the recommendations regarding stormwater for the site.

8. Conclusion

A seep wetland is located to the east of the site and flows from the south to the north, passing through a culvert under Mandela Drive. In addition, an artificial wetland unit is present on the northern portion of the site and artificial ponding is taking place on the terrace below the Portuguese Club.

The wetland to the east of the site is a seep wetland, which becomes a channelled valley bottom wetland downstream of Mandela Drive. Several disturbances are present in the wetland, including some excavation and the wetland unit is dominated by alien and invasive species, including a high density of Kikuyu (*Pennisetum clandestinum*), Spanish Reed (*Arundo donax*) and Wattle (*Acacia mearnsii* and *Acacia dealbata*). *Hyparrhenia hirta* is also fairly dominant in the wetland unit. The wetland is currently Moderately Modified (PES class C). Based on aerial photographs from 1991 it appears that the wetland to the east increased in size, likely due to various impacts on site. A buffer zone of 28m is required around the wetland area located to the east of the site.

An artificial wetland unit is present in the northern portion of the site, but no hydric soils are present in this area. This artificial wetland is located between the infill and Mandela Drive and several wetland species are present. This area has been subjected to several impacts in the past, including the past excavation activities and infill into the site. The depression where the artificial wetland is present is therefore artificial and not a naturally occurring feature of the site. The artificial wetland is of little conservation importance, but the incorporation of the artificial wetland unto the stormwater plan is recommended if feasible. No buffer zone is required around the artificial wetland.

Artificial ponding is taking place on the terrace below the Portuguese Club. Although a few sedges are present no hydromorphic features were observed in the soil, which is clearly disturbed and classified as the Johannesburg soil type. These areas are not considered to be wetland areas.

Two alternatives are provided for the site:

- Site is only developed for business (retail) purposes;
- Site is developed for business purposes and includes a filling station in the north-western corner of the site.

The proposed business development has a low risk. The development including business development and the filling station mainly have a low risk. The proposed business development encroach into the wetland buffer zone and the layout should be amended in the north-eastern corner of the site.

9. References & further reading

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Kyllinga CONSULTING

Addendum A – CV

CURRICULUM VITAE

Name:	**Catharina Elizabeth Venter** trading as Kyllinga Consulting
Position:	Senior Ecologist and Wetland Scientist
Date of Birth:	29 December 1979
Nationality:	South African
Languages:	Afrikaans, English

EDUCATIONAL QUALIFICATIONS

- M.Sc (Botany), University of Pretoria (2003)
- B.Sc Hons (Botany), University of Pretoria (2001)
- B.Sc (Environmental Sciences), University of Pretoria (2000). Majored in Geography and Botany
- Matriculated, Sasolburg High School (1997)

Additional

- Introduction to ArcGIS 1 (2006)
- Bringing your data into ArcGIS (2006)
- Introduction to ArcView 3.x (2003).

FIELDS OF EXPERTISE

- **Ecological Assessment:**
  Ecological Assessments as part of the Environmental Impact Assessment Process
- **Wetland Assessment:**
  Wetland Assessments as part of the Environmental Impact Assessment Process and Water Use Applications, as well as rehabilitation plans for wetlands, including planning or the Working for Wetlands programme. Large scale wetland assessments (catchment scale).
- **GIS:**
  Compilation of maps for submission as part of Environmental Impact Assessment Process. Creating spatial databases and large scale wetland maps (catchment scale). Projection conversions and matching/overlaying different format GIS maps.
- **Environmental Impact Assessment**
  Undertaken numerous Environmental Scoping Reports, as required by the Environment Conservation Act, 1989 (Act 73 of 1989), the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Development Facilitation Act, 1995 (Act 67 of 1995). Project experience includes the establishment of various housing typologies, golf courses, commercial and industrial projects, infrastructure development (roads), resorts and/or game lodges as well as filling stations.
- **Public Participation:**
  Undertaken numerous public participation processes, ranging from basic to extensive, as required by relevant environmental legislation.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Professional Natural Scientist (Pr.Sci.Nat) in the field of Botanical Science (Reg no. 400048/08)
- Member of the Botanical Society of South Africa

EMPLOYMENT HISTORY EXPERIENCE

Kyllinga Consulting (July 2015 - present)

Senior Ecologist responsible for wetland and ecological specialist assessments.

Spatial Ecological Consulting (February 2010 – June 2015)

Senior Ecologist responsible for wetland and ecological specialist assessments.

- Wetland Related Assessments

More than 40 wetland assessments conducted between 2010 and 2015.

- Vegetation Assessments

Approximately 16 vegetation assessments between 2010 and 2015.

- Management Plans

Completed two ecological management plans.

MSA Group Services (previously Exigent Environmental CC) (August 2004 – January 2010)

Environmental Scientist responsible for ecological and wetland assessments and the compilation of maps. Also conducted various scoping and EIA applications and EMPRs.

- Ecological Assessments

In excess of 50 ecological assessments conducted between 2004 and 2010, including managing the inclusion of the fauna specialist assessments.

- Wetland Assessments

More than 60 wetland verification projects, wetland delineations and wetland assessments, completed between 2004 and 2010.

- As well as:

Rehabilitation Projects; Fatal Flaw / Screening Assessments; National Department of Agriculture Authorisations; Mining Related Assessments; Private, Public Partnership Projects; Resource Management Plans (RMP); Environmental Management Plans; Environmental Management Programme; Environmental Exemption Processes; Basic Assessments; Environmental Impact Assessments

Part-time employment (2002-2004)

Tutor for botany practicals; Assisting Wildlife management students with Braun-Blanquette analysis; Researcher for a project on the vegetation communities and ecology of the Kruger National Park; Research assistant for the analysis of street trees in Tshwane urban forest; Various part time projects related to vegetation and wetlands

COUNTRIES OF WORK EXPERIENCE

- South Africa
- Lesotho
- Botswana
- Mozambique

PAPERS AND PUBLICATIONS

Co-author and data contributor to: SIEBEN, E. *et al*. The vegetation of inland wetlands with salt-tolerant vegetation in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.

Co-author and data contributor to: SIEBEN, E. *et al*. The herbaceous vegetation of subtropical freshwater wetlands in South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Feb 2015.

Co-author and data contributor to: SIEBEN, E. *et al*. The vegetation of grass lawn wetlands of floodplains and pans in semi-arid regions of South Africa: description, classification and explanatory environmental factors, submitted to the South African Journal of Botany for review in Jan 2015.

Co-author of several vegetation descriptions in: MUCINA, L. & RUTHERFORD, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

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Poster Presentations

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Venter, C.E.; Bredenkamp, G.J.; Grundling P-L. 2003. Vegetation change on rehabilitated peatland on Rietvlei Nature Reserve. SAAB Converence. Pretoria.

Addendum B – Declaration of Independence

Specialist:	Ina Venter, trading as Kyllinga Consulting		
Nature of specialist study compiled:	Vegetation & Wetland Assessment		
Contact person:	Ina Venter		
Postal address:	53 Oakley street, Rayton		
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E-mail:	i.venter@telkomsa.net		
Qualifications & relevant experience:	M.Sc. Botany		
Professional affiliation(s) (if any)	South African National Association of Scientific Professions		

I, CE Venter (Ina) , declare that -

General declaration:

- 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 will take into account, to the extent possible, the matters listed in Regulation 8;
- 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.

Signature of specialist:

Ina Venter, trading as Kyllinga Consulting

Name of company:

29 November 2020

Date: