

shows the construction barrier line, however it seems like your Department got the BAR and Amendment process confused. Figure 12 in the BAR is in fact the Gauteng Provincial Environmental Management Framework and Figure 12 in the Final Impact Assessment Report (for the Amendment process) indicates the construction barrier line.

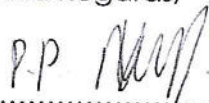
Nevertheless, a site visit was conducted in order to investigate the comments in the letter. It was confirmed that the construction of the boundary wall is outside of the construction barrier line and definitely not within the 32m buffer of the watercourse/wetland. As mentioned before, these construction activities have been discussed with GDARD.

Based on the above, the current construction activities are not deemed illegal.

Trust you will find this in order.

*Please do not hesitate to contact us should you need any additional information.*

Kind Regards,



.....  
Lizelle Gregory

**Bokamoso Landscape Architects and  
Environmental Consultants CC**



## Environmental Management Services Department

Room 200 | 2<sup>nd</sup> Floor | Old Mercedes Benz Building | 11 Francis Baard Street | Pretoria | 0002  
PO Box 1454 | Pretoria | 0001  
Tel: 012 358 2449 / 012 358 1351 | Fax: 012 358 4999  
Email: [mthobelik@tshwane.gov.za](mailto:mthobelik@tshwane.gov.za) | [www.tshwane.gov.za](http://www.tshwane.gov.za) | [www.facebook.com/CityOfTshwane](http://www.facebook.com/CityOfTshwane)

My ref: 8/4/R/6  
Your ref: Gaut 006/16-17/E0028  
Contact person: K. Mofela  
Section: Environmental Planning & Open Space Management Section

Tel: 012 358 7334  
Fax: 012 358 8934  
Email: [TshinyadzoM@tshwane.gov.za](mailto:TshinyadzoM@tshwane.gov.za)  
Date: 05 December 2016

Bokamoso Landscape Architects & Environmental Consultants (Pty) Ltd  
P O Box 11375  
Maroelana  
0161

Attention: Lizette Gregory  
Tel: (012) 346 3810  
Fax: 086 570 5659  
E-mail: [lizelleq@mweb.co.za](mailto:lizelleq@mweb.co.za)

Dear Madam,

**DRAFT BASIC ASSESSMENT REPORT FOR THE RIVERWALK EXTERNAL SERVICES AND OPEN SPACE AREA ON THE REMAINDER OF PORTIONS 6 & 241 AND PORTION 138 OF THE FARM ZWARTKOPPIES 364-JR, CITY OF TSHWANE.**

Your Report dated September 2016 refers,

### 1. INTRODUCTION

The Environmental Management Services Department (the Department) has considered the Draft Basic Assessment Report in respect of the above-mentioned application. The Draft Basic Assessment Report is submitted to the Environmental Management Services Department of the City of Tshwane, hereafter referred to as "the City", as a commenting authority in terms of the National Environmental Management Act (NEMA) and EIA Regulations of August 2014.

### 2. PROJECT LOCATION AND DESCRIPTION

Bokamoso Landscape Architects & Environmental Consultants (Pty) Ltd has been appointed by the Balwin Properties Limited as an independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Riverwalk external services and open space area on the Remainder of Portions 6 & 241 and Portion 138 of the farm Zwartkoppies 364-JR. The proposed development site is bordered by Pienaars River traversing the site on the northwest-south road, road R104 on the north, road N4 on south and existing Savannah Country Estate on the west.

Zelphy 2883 (Pty) Ltd had previously been granted an environmental authorization (002/05-06/1543) initially on 22 July-2008 for original layout and later on 03 September 2010 for layout



amendment. An application is currently being lodged with GDARD for the amendment of the environmental authorization to substitute the 2010 approved golf course with lower residential (gentleman's estate) development and the preservation of environmental sensitivities on the proposed development site.

The proposed development entails the installation of bridge, water pipeline, sewer pipeline, cycling track, storm water infrastructure in the areas below the floodline and within the wetland buffer at the proposed Riverwalk development.

The activity triggers listed activity in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Assessment Regulation, 2014 under

Listing Notice 1 GN 983 Activity 12, 19, 27, 48

Listing Notice 3 GN 985 Activity 12, 14, 23

## 2. DISCUSSION

In reviewing the application the Department made the following findings:

- a) The construction of a perimeter wall (parallel to road R104) as well as temporary fence within floodlines associated with the Pienaars River is being implemented without prior authorisation and adherence to an approved EMP. The mentioned construction activities were observed during site inspections conducted on the 15 September 2016 and 18 November 2016 towards the reviewing of the Draft and Final Basic Assessment Report, respectively.

*The Draft Basic Assessment report for the proposed Riverwalk Estate had indicated that the construction barrier line prohibiting development within the sensitive areas will be developed. However, it is not the case because the construction of the periphery wall along road R104 within the 1:100 year floodline was observed taking place without supervision by the Environmental Compliance Officer on the 18 November 2016. The activity is not following the proposed building line indicated below the 1:100 year floodline on Figure 12 of the Basic Assessment Report for the proposed Riverwalk Estate. Therefore, the Riverwalk construction activities are currently degrading the identified sensitive areas further as observed during inspection conducted on the 18 November 2016.*

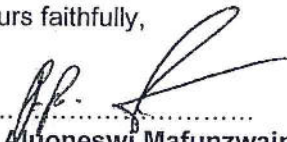
According to the Tshwane Open Space Framework, any development within the 1:50 or 1: 100 year floodline or 32m wetland buffer ( whichever is the greatest) is prohibited to avoid further degradation of the sensitive watercourse areas. The Department is of the view that the temporary fence and perimeter wall along floodlines was not supposed to be erected until approval for the proposed construction barrier line in the Basic Assessment Reporting process has been granted. Therefore, the current construction activities are deemed illegal subject to clarity from GDARD is obtained.

In view of the above, the Department cannot provide comments on the Draft Basic Assessment report for the Riverwalk external services and open space area until the identified non-compliance issues mentioned above are addressed.

### 3. CONCLUSION

The Department cannot review and provide comments on the abovementioned application until issues raised above are addressed.

Yours faithfully,

  
.....  
Mr Mafunzwaini

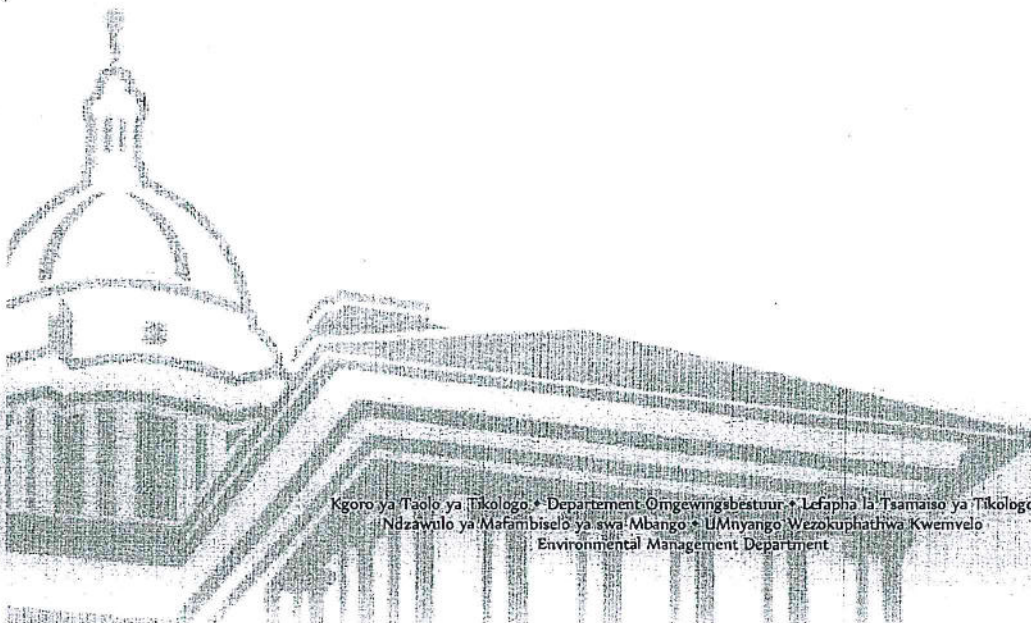
*20/12/06*  
.....  
Date:

**EXECUTIVE DIRECTOR: ENVIRONMENTAL MANAGEMENT AND PARKS DIVISION**  
Letter signed by: Leloko Puling  
Designation: Director: Environmental Planning & Open Space Management

CC Gauteng Department of Agriculture and Rural Development Attn:

Mr. Steven Mukhola

Tel: (011) 240 2572  
Fax: (011) 240 2700



Kgoro ya Taolo ya Tikologo • Departement Omgewingsbestuur • Lefapha la Tsamaiso ya Tikologo  
Indzawulo ya Mafambiselo ya swa Mbango • UMnyango Wezokuphathwa Kwemvelo  
Environmental Management Department

**IT'S MY RESPONSIBILITY**  
TO PAY MY MUNICIPAL ACCOUNT  
IN FULL - ON TIME.



**From:** juanita@bokamoso.net  
**Sent:** 27 May 2016 02:36 PM  
**To:** 'jgrobler@geoscience.org.za'; 'asalomon@sahra.org.za';  
'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za';  
'keetm@dwaf.gov.za'; 'siwelanel@dwa.gov.za'; 'Siwelane Lilian (GAU)';  
'tshifaror@dwa.gov.za'; 'mathebet@dwa.gov.za'; 'central@eskom.co.za';  
'paia@eskom.co.za'; schmidk; kumen govender; 'mmpshe@randwater.co.za';  
'nkoneigh@randwater.co.za'; RudzaniM; 'loveous.tampane@transnet.net';  
andre@ward101.co.za; 'degoede@mweb.co.za'  
**Subject:** Riverwalk External Services - BA - Public Participation Process  
**Attachments:** Public Notice BA.pdf; Landowner & Tenants Letter.pdf; image001.jpg

Dear Interested and/or Affected Parties,

Please refer to the attached Public Notice & Landowner and Tenant Letter regarding the proposed **Riverwalk External Services and Open Space Area** Project.

Kind Regards/Vriendelike Groete

**Juanita De Beer**

**Senior Public Participation Consultant & EAP in training**



**Landscape Architects &  
Environmental Consultants**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [juanita@bokamoso.net](mailto:juanita@bokamoso.net) | [www.bokamoso.net](http://www.bokamoso.net)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

**From:** juanita@bokamoso.net  
**Sent:** 10 October 2016 02:03 PM  
**To:** 'jgrobler@geoscience.org.za'; 'asalomon@sahra.org.za'; 'nndobochani@sahra.org.za'; 'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za'; 'keetm@dwaf.gov.za'; 'SiwelaneL@dws.gov.za'; 'tshifaror@dwa.gov.za'; 'mathebet@dwa.gov.za'; 'central@eskom.co.za'; 'paia@eskom.co.za'; schmidk; kumen govender; mmpshe; nkoneigh; RudzaniM; 'loveous.tampane@transnet.net'; 'mike@ward101.co.za'; 'degoede@mweb.co.za'; wilma@trafalgar.co.za; adeleo@trafalgar.co.za; Tebogo Molokomme(GPSPORTS) (Tebogo.Molokomme@gauteng.gov.za); Stephan Joubert Weyers (weyerss@polka.co.za); masangug@yahoo.com; Mario Pretorius | TeleMasters (mario@masters.co.za)  
**Subject:** Riverwalk External Services and Open Space Area - Errata Public Notice  
**Attachments:** Errata - Public Notice BA\_Riverwalk.pdf; image001.jpg

Dear Interested and/or Affected Parties,

Please refer to the attached Errata Public Notice regarding the proposed **Riverwalk External Services and Open Space Area** Project.

Kind Regards/Vriendelike Groete

**Juanita De Beer**

**Senior Public Participation Consultant & EAP in training**



**Landscape Architects & Environmental Consultants**

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36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161



**From:** juanita@bokamoso.net  
**Sent:** 22 November 2016 02:44 PM  
**To:** 'jgrobler@geoscience.org.za'; 'asalomon@sahra.org.za'; 'nndobochani@sahra.org.za'; 'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za'; 'keetm@dwaf.gov.za'; 'Siwelane Lilian (GAU)'; 'tshifaror@dwa.gov.za'; 'mathebet@dwa.gov.za'; 'central@eskom.co.za'; 'paia@eskom.co.za'; schmidk; 'Victoria Bota (HO)'; kumen govender; mmpshe; nkoneigh; RudzaniM; 'kemmonem@tshwane.gov.za'; tshunyadzom@tshwane.gov.za; 'loveous.tampane@transnet.net'; 'mike@ward101.co.za'; 'degoede@mweb.co.za'; wilma@trafalgar.co.za; adeleo@trafalgar.co.za; Tebogo Molokomme(GPSPTS) (Tebogo.Molokomme@gauteng.gov.za); Stephan Joubert Weyers (weyerss@polka.co.za); masangug@yahoo.com; Mario Pretorius | TeleMasters (mario@masters.co.za)  
**Subject:** Riverwalk External Services and Open Space Area - Review Notice  
**Attachments:** image001.jpg; Riverwalk External Services and Open Space Area - Final Review Notice.pdf

Dear Interested and/or Affected Parties,

Please refer to the attached Review Notice regarding the Final Basic Assessment Report for the proposed **Riverwalk External Services and Open Space Area** Project.

A period of 30 days will be allowed for review and comments on the Final Basic Assessment Report for the proposed Riverwalk External Services and Open Space Area from **22 November 2016 – 13 January 2017 (Excluding 15 December 2016 – 5 January 2017, due to departmental shutdown)**.

Your comments should be sent directly to GDARD, Att: Dan Motaung (email: [dan.motaung@gauteng.gov.za](mailto:dan.motaung@gauteng.gov.za)) as well as to cc our office at Bokamoso Attention: Mary-Lee van Zyl or Juanita De Beer ([reception@bokamoso.net](mailto:reception@bokamoso.net) or fax: 086 570 5659).

**Kind Regards/Vriendelike Groete**

*Juanita De Beer*

*Senior Public Participation Consultant & EAP in training*



**Landscape Architects & Environmental Consultants**

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36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

**From:** juanita@bokamoso.net  
**Sent:** 15 September 2016 08:32 AM  
**To:** 'jgrobler@geoscience.org.za'; 'asalomon@sahra.org.za'; nndobochani@sahra.org.za; 'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za'; 'keetm@dwaf.gov.za'; 'SiwelaneL@dws.gov.za'; 'tshifaror@dwa.gov.za'; 'mathebet@dwa.gov.za'; 'central@eskom.co.za'; 'paia@eskom.co.za'; schmidk; kumen govender; mmpshe; nkoneigh; RudzaniM; 'loveous.tampane@transnet.net'; 'mike@ward101.co.za'; 'degoede@mweb.co.za'; wilma@trafalgar.co.za; adeleo@trafalgar.co.za; Tebogo Molokomme(GPSPORTS) (Tebogo.Molokomme@gauteng.gov.za); Stephan Joubert Weyers (weyerss@polka.co.za); masangug@yahoo.com  
**Subject:** Riverwalk External Services and Open Space Area - Review Invitation Notice  
**Attachments:** Riverwalk BAR Review Notice.pdf; image001.jpg

Dear Interested and/or Affected Parties,

Please refer to the attached Review Invitation Notice for the Draft Basic Assessment Report regarding the proposed **Riverwalk External Services and Open Space Area** Project.

A period of 30 days will be allowed for your review and comments on the document from **15 September – 17 October 2016**. Your comments should be sent directly to Bokamoso Environmental Attention: Mary-Lee van Zyl or Juanita De Beer ([reception@bokamoso.net](mailto:reception@bokamoso.net) or fax: 086 570 5659).

Kind Regards/Vriendelike Groete

**Juanita De Beer**

**Senior Public Participation Consultant & EAP in training**



**Landscape Architects & Environmental Consultants**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [juanita@bokamoso.net](mailto:juanita@bokamoso.net) | [www.bokamoso.net](http://www.bokamoso.net)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161



**juanita@bokamoso.net**

---

**From:** juanita@bokamoso.net  
**Sent:** 14 September 2016 08:42 AM  
**To:** 'jgrobler@geoscience.org.za'; 'asalomon@sahra.org.za'; nndobochani@sahra.org.za; 'maphata.ramphele@gauteng.gov.za'; 'justicem@dwaf.gov.za'; 'keetm@dwaf.gov.za'; 'SiwelaneL@dws.gov.za'; 'tshifaror@dwa.gov.za'; 'mathebet@dwa.gov.za'; 'central@eskom.co.za'; 'paia@eskom.co.za'; schmidk; kumen govender; mmpshe; nkoneigh; RudzaniM; 'loveous.tampane@transnet.net'; andre@ward101.co.za; 'degoede@mweb.co.za'; wilma@trafalgar.co.za; adeleo@trafalgar.co.za; Tebogo Molokomme(GPSPORTS) (Tebogo.Molokomme@gauteng.gov.za); Stephan Joubert Weyers (weyerss@polka.co.za); masangug@yahoo.com  
**Subject:** Riverwalk External Services and Open Space Area - BID  
**Attachments:** BID\_Riverwalk\_Sept 2016.pdf; image001.jpg

Dear Interested and/or Affected Parties,

Please refer to the attached Background Information Document (BID) for the proposed **Riverwalk External Services and Open Space Area** Project.

Kind Regards/Vriendelike Groete

**Juanita De Beer**

**Senior Public Participation Consultant & EAP in training**



**Landscape Architects & Environmental Consultants**

T: (+27)12 346 3810 | F: (+27) 86 570 5659 | E: [juanita@bokamoso.net](mailto:juanita@bokamoso.net) | [www.bokamoso.net](http://www.bokamoso.net)  
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

**juanita@bokamoso.net**

---

**From:** juanita@bokamoso.net  
**Sent:** 14 September 2016 04:34 PM  
**To:** 'mike@ward101.co.za'  
**Subject:** Riverwalk External Services and Open Space Area - BID  
**Attachments:** BID\_Riverwalk\_Sept 2016.pdf; image001.jpg

Dear Interested and/or Affected Parties,

Please refer to the attached Background Information Document (BID) for the proposed ***Riverwalk External Services and Open Space Area*** Project.

Kind Regards/Vriendelike Groete

**Juanita De Beer**

**Senior Public Participation Consultant & EAP in training**



**Landscape Architects &  
Environmental Consultants**

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Our Ref: 9648



an agency of the  
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: [info@sahra.org.za](mailto:info@sahra.org.za)  
South African Heritage Resources Agency | 111 Harrington Street | Cape Town  
P.O. Box 4637 | Cape Town | 8001  
[www.sahra.org.za](http://www.sahra.org.za)

Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 9648

Date: Thursday June 23, 2016  
Page No: 1

## Letter

### In terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)

Attention: Balwin Properties Limited.

### **On the Remainder of Portion 6 of the Farm Zwartkoppies No 364 JR, Portion 241 of the Farm Zwartkoppies No 364 JR, Portion 138 of the Farm Zwartkoppies No 364 JR.**

Thank you for your notification regarding this development.

In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a **Heritage Impact Assessment** is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.

The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists [www.asapa.org.za](http://www.asapa.org.za)) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.

The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.

Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full

Our Ref: 9648



an agency of the  
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: [info@sahra.org.za](mailto:info@sahra.org.za)  
South African Heritage Resources Agency | 111 Harrington Street | Cape Town  
P.O. Box 4637 | Cape Town | 8001  
[www.sahra.org.za](http://www.sahra.org.za)

Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 9648

Date: Thursday June 23, 2016  
Page No: 2

Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. **Please note that a nationwide fossil sensitivity map is now available on SAHRIS to assist with this.**

If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for exemption from having to undertake further heritage assessments.

Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

---

Andrew Salomon  
Heritage Officer: Archaeology  
South African Heritage Resources Agency

---

**ADMIN:**

Direct URL to case: <http://www.sahra.org.za/node/364038>  
(GDARD, Ref: )

Our Ref: 9648



an agency of the  
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: [info@sahra.org.za](mailto:info@sahra.org.za)  
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[www.sahra.org.za](http://www.sahra.org.za)

Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 9648

Date: Thursday June 23, 2016  
Page No: 3

**Minutes of Any Public and/or  
Stakeholders Meetings**

**(Not available)**

Appendix E5



# **Comments and Responses Report**

Appendix E6

**COMMENT AND RESPONSE REPORT-  
FOR THE PROPOSED RIVERWALK EXTERNAL SERVICES - BAR**

Issue	Commentator	Response
<p>Please remember to send us the Heritage Impact Assessment (HIA) report once it is ready. Just send us one hard copy plus a CD of the HIA Report only. Do not include other reports but only the HIA report will do.</p>	<p>Tebogo Molokomme  <a href="mailto:Tebogo.Molokomme@gauteng.gov.za">Tebogo.Molokomme@gauteng.gov.za</a>  <b>Provincial Heritage Resources Authority – Gauteng (PHRA-G) Department of Sport, Arts, Culture and Recreation</b></p>	<p>Thank you for your response, we have noted your comments on our Issues and Comments Register.   A copy of the Heritage Impact Assessment will be delivered to your offices as requested.</p>
<p>Please find attached a letter for your urgent attention and records from the Directors of Savannah Country Estate Home Owners Association.</p> <p><b>Letter</b>  We act on instructions of the Directors of the abovementioned Home Owners Association and wish to inform you of the following:</p> <p>As per the attached notification received dated 27 May 2016, the Directors of Savannah Country Estate Home Owners Association hereby request more information regarding the environmental assessment to enable them to make a meaningful engagement regarding same.</p> <p>If you require any further information, please do not hesitate to contact the writer hereof.</p>	<p>Wilma Bezuidenhout  <b>Savannah Country Estate Home Owners Association</b>  <a href="mailto:Wilma@trafalgar.co.za">Wilma@trafalgar.co.za</a>  Adele Olivier  <a href="mailto:adeleo@trafalgar.co.za">adeleo@trafalgar.co.za</a></p>	<p>Thank you for your response, we have registered Savannah Country Estate Home Owners Association as an Interested and/or Affected Party for the proposed Riverwalk External Services and Open Space Area – Basic Assessment Project and for the Amendment of Authorization for the proposed change of land use on the Remaining extent of Portion 6 and Portion 138 of the Farm Zwartkoppies 364 JR Project.</p>
<p>Please register me as an Interested and/or Affected Party for the abovementioned project. We have spoken Wednesday telephonically with you and Mary-Lee, thank you for your outstanding assistance.</p>	<p>Stephan Joubert  <a href="mailto:weverss@polka.co.za">weverss@polka.co.za</a></p>	<p>Thank you for your response, we have registered you as an Interested and/or Affected Party for the proposed Riverwalk BA and Riverwalk Amendment Project. We will keep you updated regarding the process in the future.</p>
<p>I am concerned about the above development and would like to find out about the type of residential development at the site. Thokozile Masangu; 401 Savannah Country Estate; 082 370 2616;</p>	<p>Thokozile Masangu  <a href="mailto:masangug@yahoo.com">masangug@yahoo.com</a></p>	<p>Thank you for your response, we have registered you as an Interested and/or Affected Party for the proposed</p>

<p><a href="mailto:masangu@yahoo.com">masangu@yahoo.com</a></p>		<p>Riverwalk BA and Riverwalk Amendment Project.</p> <p>Our Project Consultant, Mary-Lee van Zyl will give feedback to you as soon as possible.</p> <p><i>This I&amp;AP was contacted telephonically and more detail was given regarding the type of residential development. It was also said to the I&amp;AP that the Impact Assessment Report will contain the application form and plans which will provide clarity on the type of development.</i></p>
<p>Thank you for your notification regarding this development.</p> <p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components .Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.</p> <p>The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologist <a href="http://www.asapa.org.za">www.asapa.org.za</a>) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.</p> <p>The Phase 1 Impact Assessment Report will identify the</p>	<p>Andrew Salomon  <a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a>  <b>Sahra</b></p>	<p>Noted.</p> <p>A Heritage Impact Assessment was done for this project and the report is included in the annexures.</p>

<p>archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.</p> <p>Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources – or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. Please note that a nationwide fossil sensitivity map is now available on SAHRIS to assist with this.</p> <p>If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for exemption from having to undertake further heritage assessments.</p> <p>Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves of victims of conflict, and cultural landscapes or viewscapes must also be assessed.</p>		
	<p>Refilwe from Savannah Country Estate 14 September 2016</p>	<p>Telephonic conversation: Refilwe wanted more information on what the activities in the open space area will entail. It was explained the services connections, installations and upgrades as well as a cycling track will be within the open space area and wetland buffer. There will also be a bridge (road) that crosses the wetland.</p>



<p>I wish to buy a portion of land from your property at River Walk near Mamelodi for a small business.</p>	<p>Dr Botlalo Thibedi  <a href="mailto:drbotlalo.thibedi@gmail.com">drbotlalo.thibedi@gmail.com</a>  14 September 2016</p>	<p>Please contact the Developer, Balwin Properties, with regards to sales.  Tei: 011 450 2818</p>
<b>After Draft BA Review Process</b>		
<p>Snowy Owl 90 Pty Ltd is an interested party which you have failed to contact. We are the immediate neighbours on 720 ha to the North of the proposed development and share the river frontage with you. It is inconceivable that you have not noticed this</p> <p>Please send us a COMPLETE list of notices so that we can respond on the same and we reserve our rights to act on matters that affect us on which we did not receive timely notices required by law.</p> <p>Please send your acknowledgement of this communication as well as all notices and your response to the emails above.</p>	<p>Mario Pretorius  <a href="mailto:Mario@masters.co.za">Mario@masters.co.za</a>  19 September 2016</p>	<p>Thank you for your email, we really appreciate this.</p> <p>Firstly, please note that no Public Participation is needed for a Part 1 Amendment as it is small changes that do not impact on the environment.</p> <p>Secondly, you should note that there is a Part 2 Amendment Application as well as a Basic Assessment Application Process. These processes include a public participation process. Intensive public participation was undertaken and notices were put up at the site and all surrounding land owners were either sent registered email or delivered notices by hand. The projects were also advertised in the newspaper. If no one is present on the site, the notices are left in the gate or on the fence. Our public participation consultant have also used Windeed, town planners and attorneys to get more information on the property and landowners of the site without any success. Therefore we are grateful that you contacted us. Please note that both these processes are still within the comment period and you are therefore welcome to review the information and send your comments as detailed on the</p>

		<p>review notices (attached).</p> <p>With the Basic Assessment Process the Draft report is available for review and therefore you are still in the process and will be notified of any development on this project in future.</p> <p>With the Part 2 Amendment Application the Final Report is available for a 30 day review period since 9 September 2016. Should you wish to have a full 30 day comment period we can extend this for you from 21 September 2016 (today's notification) – 21 October 2016. Please let us know if you wish to have the extension. The authorities (GDARD) will also be notified of this extension as well as your interest on the project.</p> <p>You are now registered as an Interested and Affected Party Member on both these processes and will be kept updated.</p> <p>Attached are all the notices with links where the reports can be viewed. Please let us know if you have any queries.</p>
<p>The Draft Basic Assessment Report (DBAR) regarding the above-mentioned activity by the Department on 15 September 2016 has reference.</p> <p>The proposal entails installation of a water pipeline, storm water infrastructure, sewer pipeline and the construction of a road, a bridge and a cycling track. The activities will occur below the flood line and in the wetland buffer. The cycling track within the wetland buffer will run for approximately 3km, the sewer line will run approximately for</p>	<p>Dan Motaung  <a href="mailto:Dan.Motaung@gauteng.gov.za">Dan.Motaung@gauteng.gov.za</a>  <b>GDARD</b>  20 October 2016</p>	

<p>1,5 km, the storm water and water line will be small sections that will run for approximately 100m. The proposed activity falls under 12(ii)(iii)(vi)(xii)(a), Activity 19(i), Activity 27 and Activity 48(ii)(a) in Listing Notice 1 of GNR 983, Activity 4 (c)(iv), Activity 12(a)(ii), Activity 14 (j)(iii)(vi)(xii)(b) and Activity 23 (ii)(d)(xvi) in Listing Notice 3 of GNR 985.</p> <p><b>A. Alignment of the activity with applicable legislation and policies</b></p> <p>All relevant National, Provincial and Local legislation, policies and guidelines are mentioned in the DBAR.</p> <p><b>B. Findings of Departmental Geographical Information Systems (GIS)</b></p> <p>The Department's comments are as follows:</p> <ul style="list-style-type: none"> <li>• The proposed site is classified as Ecological Support Area in terms of the Conservation Plan Version 3.3 of 2015.</li> <li>• According to the Gauteng Environmental Management Framework of 2015, majority of the proposed site is classified as Zone 1 (An Urban Development Zone) and small portions are classified as Zone 2 (a High Control Zone).</li> <li>• The site is a confirmed habitat for Red Listed Mammal species (Spotted-necked otter) and contains suitable habitat for Orange Listed Plant species (<i>Argyrobium campicola</i>).</li> <li>• A perennial river and several tributaries run through the site with a wetland at the eastern portion of the site.</li> <li>• Majority of the proposed site is covered by primary vegetation in the form of Marikana Thornveld.</li> </ul> <p><b>C. Alternatives</b></p>		<p>A. Noted.</p> <p>B. Noted.</p> <p>C. Even though this is a new application,</p>
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<p>No route alternatives were investigated and the motivation behind it is unclear. Even though a previous development on the study area and layout has already been approved this is a new application and route alternatives should be investigated to determine the route that would have the least impact on the environmental sensitivities on site.</p>		<p>it is only an application for the services and associated activities below the floodline and within the wetland and wetland buffer. Therefore, the layout and routes of this BA application need to take in consideration the layout of the approved development. Due this the alternatives are minimal. This matter has been discussed with the engineers and this was their response:</p> <ol style="list-style-type: none"><li>1. Sewerage: The existing outfall sewer is located inside a registered servitude for the specific purpose. We intend to upgrade the existing sewer pipeline and therefore propose to use the same servitude rather than following a new alignment which could adversely affect the environment. No alternative is proposed as an affected area already exists and adding another is not promoted.</li><li>2. Water: The water pipeline follows the inside of the road reserve boundary as per City of Tshwane Metropolitan Municipality requirements, therefore no alternatives can be considered for the alignment. The water pipe will also cross over the river by means of the planned bridge and not affect the watercourse or wetland.</li><li>3. Stormwater outlets: We can investigate alternative positions, and also reduce the amount of outlets. This will lead to higher concentrations of stormwater at the outlets, but fewer areas will be affected. Also note that stormwater harvesting will take place prior to discharging into the</li></ol>
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river system which will reduce peak runoff generated due to development.

4. We proposed two alternatives for the road bridge, the one being much wider than the other. The wider alternative will result in lower concentration of water but will affect a larger area, while the narrower alternative will increase concentration but reduce the affected area. Energy breaking structures proposed downstream of the bridge will negate both alternatives' concentration effects. Please find these comments in Appendix L.

Based on the above, No alternatives were assessed as there will not be any alternatives for the sewer and water, as mentioned by the engineer. There will also not be an alternative for the upgrade of the R104. The cycling track alignment is not yet definite but the final alignment will be drawn up for the area where there will be the least environmental impacts. The storm water structures are not within the wetland, only within the wetland buffer, and the current layout is therefore considered best. The impact of having fewer outlets with a higher concentration of storm water being released is considered to be a much more negative impact as it will impact on the wetland itself. The two options of the bridge, from an environmental point of view, are similar as each design has its own negative and positive impacts. It is suggested that the engineer should get

<p>the go-ahead for whichever is the best option from an engineering point of view as this will limit negative impacts during the lifespan/operational phase of the bridge.</p> <p>D. Noted.</p> <p>E. Noted.</p> <p>F. Please note that the studies were done for the entire development site and therefore the same studies were used for both applications. The specialists were however aware of the various activities that is proposed on the study site and the reports were compiled accordingly. Due to the aforementioned it does not seem necessary to amend the specialist reports. HOWEVER, it was requested that the Flora Specialist amend the Flora Assessment in order to exclude the areas that are not being applied for and provide recommendations for the specific activities. This amended report will also address the other comment on the sensitive areas.</p>	
<p><b>D. Locality map and layout plans or facility illustrations</b></p> <p>Facility illustrations, site photographs and site layout plans were provided for the proposal.</p> <p><b>E. Significant rating of impacts</b></p> <p>The impacts are adequate and cover all aspects in all phases of the activity with relevant and effective mitigation measures.</p> <p><b>F. Specialist inputs</b></p> <p>The following specialist reports are attached:</p> <ul style="list-style-type: none"> <li>• Geotechnical Report.</li> <li>• Fauna and Flora Assessment.</li> <li>• Hydroponology Wetland Impact Assessment and Management Report.</li> <li>• Heritage Impact Assessment.</li> <li>• The Flora Assessment Report dated January 2016 states that the sensitive areas such as the rocky woodland, the closed woodland, and the riverine vegetation be excluded from the construction for the transforming activities (Page 21). From the proposed layout plans, the recommendation by the Specialists was not adhered to.</li> <li>• The specialist studies provided are from the previous</li> </ul>	

<p>application sent through the Department (Gaut 006/16-17/E0028) and do not take into consideration the new activities applied for. The Department requests that the specialist comment on the current activities proposed on the site be specific in the FBAR.</p> <p><b>G. Environmental Management Programme (EMPr)</b></p> <p>The EMPr includes must include the specific mitigation measures for impacts related to the activity. The mitigation measures recommended in the specialists' reports must be integrated into the EMPr. In the FBAR the additional following documents should be attached in the EMPr:</p> <ul style="list-style-type: none"> <li>• A Rehabilitation Plan.</li> <li>• An Alien and Invasive Plant Species Management Plan.</li> <li>• Storm water management plan.</li> </ul> <p><b>H. Public Participation process</b></p> <p>All comments from interested and affected parties received must be included and responded to in the FBAR. The issues raised by the interested and affected parties must be addressed and integrated into the impact and mitigation measures in the EMPr. In the FBAR, the following should be attached as part of the public participation process:</p> <ul style="list-style-type: none"> <li>• Comments from the City of Tshwane on the project.</li> <li>• A letter of confirmation of services from the City of Tshwane.</li> <li>• A comment and Response report.</li> <li>• A water use licence.</li> </ul>	<p>G. Noted. These have been added to the EMPr. During a telephonic conversation with Mr. Dan Motaung he suggested that the storm water management measures given by the engineer need to be incorporated in to the EMPr. This has been done and all storm water related mitigation measures have been given in bold text.</p> <p>H. Please note that the Water Use License is still being compiled, however, a pre-application meeting with DWS has been held. Comments from City of Tshwane have been requested on the DBAR and copies have been submitted to CoT. The FBAR will also be submitted to CoT and such comments will be requested once again. The comments and issues report has again been added to the Public Participation appendices. The township has already been approved and attached as Appendix M is the approval together with the comments from the various sections. These documents serves as confirmation of services as the township would have not</p>
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<p>1. This serves to confirm that the abovementioned application was discussed by the PHRA-G Heritage Impact Assessment (HIA) Committee on Thursday, 29 September 2016.</p> <p>2. <u>After reviewing your application, the Committee has made the following recommendations:</u></p> <p>a) Provide proof of the Public Participation process conducted during the survey process. Therefore the proof of site notice/s, the newspaper advertisement and public meetings that might have taken place. Please do also include any positive or negative comments received during the process.</p> <p>b) If there was no Public Participation process conducted, please do so and provide the PHRA-G with the report after the 30 day comment period. Please do include the PHRA-H details in the site notice and newspaper advertisement (<a href="mailto:tebogo.molokomme@gauteng.gov.za">tebogo.molokomme@gauteng.gov.za</a>).</p> <p>3. The requested information will assist the Committee in making an informed decision.</p>	<p>Tebogo Molokomme  <a href="mailto:Tebogo.Molokomme@gauteng.gov.za">Tebogo.Molokomme@gauteng.gov.za</a>  <b>PHRAG</b>  11 November 2016</p>	<p>been approved if services are not available.</p> <p>Your letter requesting the Public Participation information on this project has reference.</p> <p>Please note that all this information has been included in our Final Basic Assessment Report. You have been notified in the attached email of the review period that commenced and the availability of the report on our website as well as the site where a hard copy is available for review.</p> <p>Due to project costs and limiting the environmental impact, we will not be able to send you a hard copy of the report. Should you wish to have an electronic copy we can submit one to your Department.</p>
<b>After Final BAR Review Process</b>		
<p>Your Report dated September 2016 refers.</p> <p><b>1. INTRODUCTION</b></p> <p>The Environmental Management Services Department (the Department) has considered the Draft Basic Assessment Report in respect of the above-mentioned application. The Draft Basic Assessment Report is submitted to the Environmental Management Services Department of the City of Tshwane, hereafter referred to as "the City", as a commenting authority in terms of the National Environmental Management Act (NEMA) and EIA Regulations of August 2014.</p>	<p>K. Mofela  <a href="mailto:TshinyadzoM@tshwane.gov.za">TshinyadzoM@tshwane.gov.za</a>  <b>City of Tshwane</b>  5 December 2016</p>	<p>Your letter dated 6 December 2016 regarding the abovementioned project has reference.</p> <p>For ease of reference, please make sure that the reference number on your letter refers to the correct project. The reference number on the mentioned letter by your Department states the reference number for the Environmental Authorisation (EA) Amendment process which was already granted in October</p>



<p><b>2. PROJECT LOCATION AND DESCRIPTION</b></p> <p>Bokamoso Landscape Architects &amp; Environmental Consultants CC has been appointed by the Balwin Properties Limited as an independent Environmental Assessment for the proposed Riverwalk external services and open space area on the Remainder of Portions 6 &amp; 241 and Portion 138 of the farm Zwartkoppies 364 JR. The proposed development site is bordered by Pienaars River traversing the site on the northwest – south road, road R104 on the north, road N4 on south and existing Savannah Country Estate on the west.</p> <p>Zelphy 2883 (Pty) Ltd had previously been granted an environmental authorisation (002/05-06/1543) initially on 22 July 2008 for original layout and later on 03 September 2010 for layout amendment. An application is currently being lodged with GDARD for the amendment of the environmental authorisation to substitute the 2010 approved golf course with lower residential (gentleman's estate) development and the preservation of environmental sensitivities on the proposed development site.</p> <p>The proposed development entails the installation of bridge, water pipeline, sewer pipeline, cycling track, storm water infrastructure in the areas below the floodline and within the wetland buffer at the proposed Riverwalk development.</p> <p>The activity triggers listed activity in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Assessment Regulation, 2014 under Listing Notice 1 GNR 983 Activity 12, 19, 27, 48 Listing Notice 3 GNR 985 Activity 12, 14, 23</p>	<p>2016. Your Department was informed of this decision together with the other Stakeholders and Registered interested and Affected Parties. The Basic Assessment Process has the following GDARD reference number: 002/16-17/E0152.</p> <p>In your letter you mention that site inspections were held on two different dates in order to review the Draft and the Final Basic Assessment Report (BAR). Your letter states that current construction activities are deemed illegal. Please note that the construction of the boundary wall was discussed with GDARD during the EA Amendment process. The letter also mentions Figure 12 of the BAR which shows the construction barrier line, however it seems like your Department got the BAR and Amendment process confused. Figure 12 in the BAR is in fact the Gauteng Provincial Environmental Management Framework and Figure 12 in the Final Impact Assessment Report (for the Amendment process) indicates the construction barrier line.</p> <p>Nevertheless, a site visit was conducted in order to investigate the comments in the letter. It was confirmed that the construction of the boundary wall is outside of the construction barrier line and definitely not within the 32m buffer of the watercourse/wetland. As mentioned before, these construction activities have been discussed with GDARD.</p>
<p><b>3. DISCUSSION</b></p> <p>In reviewing the application the Department made the following findings:</p>	

<p>a) The construction of a perimeter wall (parallel to road R104) as well as temporary fence within floodlines associated with the Pienaars River is being implemented without prior authorisation and adherence to an approved EMPr. The mentioned construction activities were observed during site inspections conducted on the 15 September 2016 and 18 November 2016 towards the reviewing of the Draft and Final Basic Assessment Report, respectively.</p> <p>The Draft Basic Assessment report for the proposed Riverwalk Estate had indicated that the construction barrier line prohibiting development within the sensitive areas will be developed. However, it is not the case because the construction of the periphery wall along road R104 within the 1:100 year floodline was observed taking place without supervision by the Environmental Compliance Officer on the 1 November 2016. The activity is not following the proposed building line indicated below the 1:100 year floodline on Figure 12 of the Basic Assessment Report for the proposed Riverwalk Estate. Therefore, the Riverwalk construction activities are currently degrading the identified sensitive areas further as observed during inspection conducted on the 18 November 2016.</p> <p>According to the Tshwane Open Space Framework, any development within the 1:50 or 1:100 year floodline or 32m wetland buffer (whichever is the greatest) is prohibited to avoid further degradation of the sensitive watercourse areas. The Department is of the view that the temporary fence and perimeter wall along floodlines was not supposed to be erected until approval for the proposed construction barrier line in the Basic Assessment Reporting process has been granted. Therefore, the current construction activities are deemed illegal subject to clarity from GDARD is obtained.</p>	<p>Based on the above, the current construction activities are not deemed illegal.</p>
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<p>In view of the above, the Department cannot provide comments on the Draft Basic Assessment report for the Riverwalk external services and open space until the identified non-compliance issues mentioned above are addressed.</p> <p><b>4. CONCLUSION</b></p> <p>The Department cannot review and provide comments on the abovementioned application until issues raised above are addressed.</p>		
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**Comments from I&Ap's on  
Basic Assessment (BA) Report**

**(Not Available)**

Appendix E7

**Comments from I&Ap's on  
Amendments to the BA Report**

**(Not yet available)**

Appendix E8

# **Copy of the Register of I&AP's**

Appendix E9



<b>Nr</b>	<b>Registered Parties</b>	<b>Contact details</b>
<b>Stakeholders</b>		
1	Council Geo-Science	<a href="mailto:jgrobler@geoscience.org.za">jgrobler@geoscience.org.za</a>
2	SAHRA Gauteng	<a href="mailto:asalomon@sahra.org.za">asalomon@sahra.org.za</a> <a href="mailto:nndobochani@sahra.org.za">nndobochani@sahra.org.za</a>
3	PHRAG	<a href="mailto:maphata.ramphele@gauteng.gov.za">maphata.ramphele@gauteng.gov.za</a>
4	DWS	<a href="mailto:justicem@dwaf.gov.za">justicem@dwaf.gov.za</a> <a href="mailto:keetm@dwaf.gov.za">keetm@dwaf.gov.za</a> <a href="mailto:siwelanel@dwa.gov.za">siwelanel@dwa.gov.za</a> <a href="mailto:tshifaror@dwa.gov.za">tshifaror@dwa.gov.za</a> <a href="mailto:mathebet@dwa.gov.za">mathebet@dwa.gov.za</a>
5	Eskom	<a href="mailto:central@eskom.co.za">central@eskom.co.za</a> <a href="mailto:paia@eskom.co.za">paia@eskom.co.za</a>
6	SANRAL Victoria Bota	<a href="mailto:schmidk@nra.co.za">schmidk@nra.co.za</a> <a href="mailto:botav@nra.co.za">botav@nra.co.za</a>
7	GDRT	<a href="mailto:kumen.govender@gauteng.gov.za">kumen.govender@gauteng.gov.za</a>
8	Randwater	<a href="mailto:mmpshe@randwater.co.za">mmpshe@randwater.co.za</a> <a href="mailto:nkoneigh@randwater.co.za">nkoneigh@randwater.co.za</a>
9	City Of Tshwane	<a href="mailto:RudzaniM@tshwane.gov.za">RudzaniM@tshwane.gov.za</a> <a href="mailto:kemmonem@tshwane.gov.za">kemmonem@tshwane.gov.za</a> or <a href="mailto:tshinyadzom@tshwane.gov.za">tshinyadzom@tshwane.gov.za</a>
10	Spoornet	<a href="mailto:loveous.tampane@transnet.net">loveous.tampane@transnet.net</a>
11	<b>Ward Councillor - Ward 101</b> <b>City of Tshwane</b> Mike Strange	<a href="mailto:mike@ward101.co.za">mike@ward101.co.za</a>
12	<b>Constituency head Old East</b> Justus De Goede	<a href="mailto:degoede@mweb.co.za">degoede@mweb.co.za</a> Cell: 083 733 2557
<b>Interested and Affected Parties</b>		



**Comments from I&AP's  
on the Application  
(Not available)**

Appendix E10

**Water Use Licence(s), SAHRA Information,  
Service Letters from Municipalities &  
Water Supply Information**

Appendix F

Our Ref: 9648



an agency of the  
Department of Arts and Culture

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South African Heritage Resources Agency | 111 Harrington Street | Cape Town  
P.O. Box 4637 | Cape Town | 8001  
[www.sahra.org.za](http://www.sahra.org.za)

Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 9648

Date: Thursday June 23, 2016  
Page No: 1

## Letter

### In terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)

Attention: Balwin Properties Limited.

### **On the Remainder of Portion 6 of the Farm Zwartkoppies No 364 JR, Portion 241 of the Farm Zwartkoppies No 364 JR, Portion 138 of the Farm Zwartkoppies No 364 JR.**

Thank you for your notification regarding this development.

In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a **Heritage Impact Assessment** is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.

The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists [www.asapa.org.za](http://www.asapa.org.za)) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.

The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.

Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full

Our Ref: 9648



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Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: [info@sahra.org.za](mailto:info@sahra.org.za)  
South African Heritage Resources Agency | 111 Harrington Street | Cape Town  
P.O. Box 4637 | Cape Town | 8001  
[www.sahra.org.za](http://www.sahra.org.za)

Enquiries: Andrew Salomon  
Tel: 021 462 4502  
Email: [asalomon@sahra.org.za](mailto:asalomon@sahra.org.za)  
CaseID: 9648

Date: Thursday June 23, 2016  
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Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary. **Please note that a nationwide fossil sensitivity map is now available on SAHRIS to assist with this.**

If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority motivating for exemption from having to undertake further heritage assessments.

Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

---

Andrew Salomon  
Heritage Officer: Archaeology  
South African Heritage Resources Agency

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**ADMIN:**

Direct URL to case: <http://www.sahra.org.za/node/364038>  
(GDARD, Ref: )



Our Ref: 9648



an agency of the  
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CaseID: 9648

Date: Thursday June 23, 2016  
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## **Specialist Reports**

Appendix G

# **Fauna and Flora Assessment**

## Appendix G1

# Flora Assessment for Portion 6 and Portion 138 of the farm Zwartkoppies 364 JR



**November 2016**

**Landscape Architects & Environmental Consultants: Specialist Division**

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### Declaration of independence:

The specialist investigator responsible for conducting this particular specialist vegetation study declare that:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, we will not be affected in any manner by the outcome of any environmental process of which this report may form a part;
- I declare that there are no circumstances that may compromise our objectivity in performing this specialist investigation. We do not necessarily object to or endorse the proposed development, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
- I have the necessary qualifications and guidance from professional experts (registered Pr. Nat. Sci.) in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein is and will remain the intellectual property of Bokamoso Environmental: Specialist Division. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- I will comply with the Act, regulations and all other applicable legislation.



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Corné Niemandt

## Verification statement

### ECOLOGICAL REVIEW: FLORA HABITAT ASSESSMENT FOR PORTION 6 AND PORTION 138 OF THE FARM ZWARTKOPPIES 364 JR, GAUTENG PROVINCE

#### Findings of the review

- The report contains details of the expertise of the persons who prepared the report and a declaration that the person who prepared the report is acting independently.
- The aims of the report are clear.
- The report provides references and descriptions of the principles and guidelines to be taken into account for fauna habitat assessment.
- Acceptable methods and limitations have been given in detail to reach the goal of the assessment.
- Relevant laws and guidelines have been mentioned and integrated.
- The report gives a clear assessment of the status flora at the site and existing knowledge survey.
- The recommendations and the conclusion are consistent with the aims of the report.
- It is to be commended that the report is economical and practical so that it adds value to the team effort of addressing the management and future of the habitats at the site.

Overall the report appears to be relevant, detailed enough for the purposes of this study, and complete and finally addressing the key issues at stake.



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Reinier F. Terblanche (M.Sc. Ecology; Pr.Sci.Nat, Reg. No. 400244/05)



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## 1. INTRODUCTION

Bokamoso Environmental: Specialist Division was appointed to conduct an ecological assessment of a proposed development on the farm Zwartkoppies 364JR north of the N4 in Tshwane. The residential development has been approved, but not all activities. This report focuses specifically on services and activities that are triggered within a watercourse. The objective was to conduct a plant species survey to determine which species occur in the study site. Special attention was given to possible habitats of Red and Orange List plant species that may occur in the surrounding area that might be affected by the proposed development. Furthermore, the ecological status of the vegetation and sensitive habitats of the site were investigated.

## 2. OBJECTIVES OF STUDY

- To assess the habitat component of the study site and ecological status of the vegetation;
- To identify and list the plant species occurring on the site and indicate whether they are Red or Orange List species;
- Make recommendations if any Red and Orange List species are found;
- To identify medicinal plant species;
- To indicate the ecological sensitive areas and connectivity of the study site;
- To highlight the impacts on the vegetation of the study site; and
- Provide recommendations to mitigate negative impacts and enhance positive impacts on the vegetation within the watercourse.

## 3. SCOPE OF STUDY

This report:

- Lists all plant species, including alien species, recorded during the vegetation survey;
- Provides recommendations on Red and Orange List plant species;
- Lists the medicinal plant species recorded;
- Comments on ecological sensitive areas and connectivity;
- Comments on impacts affecting the vegetation of the site;
- Evaluates the conservation importance and significance of the study site with special emphasis on the status of threatened species; and
- Provides recommendations to mitigate negative impacts within the watercourse.

## 4. STUDY AREA

### 4.1 Regional vegetation

The study site lies in the quarter degree square (QDS) 2528CD. The site falls within the Vulnerable Marikana Thornveld vegetation unit according to Mucina and Rutherford (2006). The authors described this vegetation type as *Vachellia karroo* open woodland, which naturally occurs in valleys and slightly undulating plains. Shrubs are more dense along drainage lines, on termatia and rock outcrops or in other habitat protected from fire. This area is underlain by mafic intrusive rocks of the Rustenburg Layered Suit of Bushveld Igneous Complex. The conservation target is 19% of which less than 1% is statutorily protected in Nature Reserves and the Magaliesberg Nature Area. Land transformation include agriculture, industrial and residential development. Alien invasive species occur especially alongside watercourses, localised in high densities (Mucina and Rutherford, 2006).

### 4.2 The study site

The study site lies on Portion 6 and Portion 138 of the farm Zwartkoppies 364 JR between the R104 (towards the north) and north of the N4 highway (towards the south) in Tshwane (Figure 1). Approximately 18ha of the proposed 117ha development is affected. Towards the west are residential areas and towards the east mixed land uses including natural vegetation.

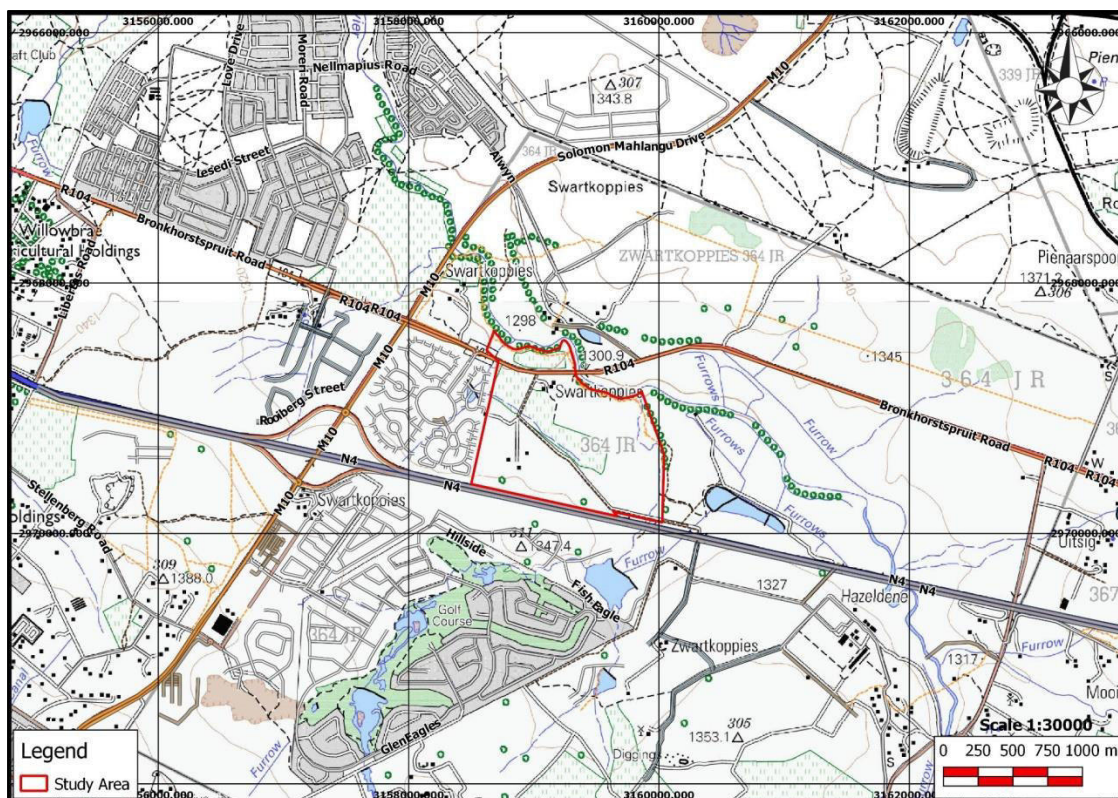


Figure 1: Locality map of the study area.

## 5. METHODS

The study site was visited on the 19, 20 and 28 January 2016. For each study unit identified, a species list was compiled for all plants recorded, using the adequate amount of sampling plots (100 m by 25 m). Field guides such as those by Germishuizen and Meyer (2003), Koekemoer *et al.* (2014), Pooley (1998), van Ginkel *et al.* (2011), van Oudtshoorn *et al.* (2014), van Wyk and Malan (1998) and van Wyk (2013) were used to identify the species. The H.G.W.J. Schweickerdt Herbarium, University of Pretoria, was also visited to confirm the correct identification of species.

The survey also included information about the occurrence of Red and Orange List plant species obtained from GDARD (Pfab, 2002; Pfab and Victor, 2002; Annexure A). The Red List Plant Species Guidelines and Requirements for Biodiversity Assessments v3. issued by GDARD (2014) was consulted. A desktop study was done to identify suitable habitats for the Red and Orange List plant species known to occur in the QDS 2527DD. The plant species list for this QDS obtained from SANBI (Plants of Southern Africa: an online checklist) was consulted to verify the record of occurrence of the plant species recorded at the site. The Gauteng Conservation Plan (C-plan v3.3) was also consulted to evaluate ecologically sensitive areas.

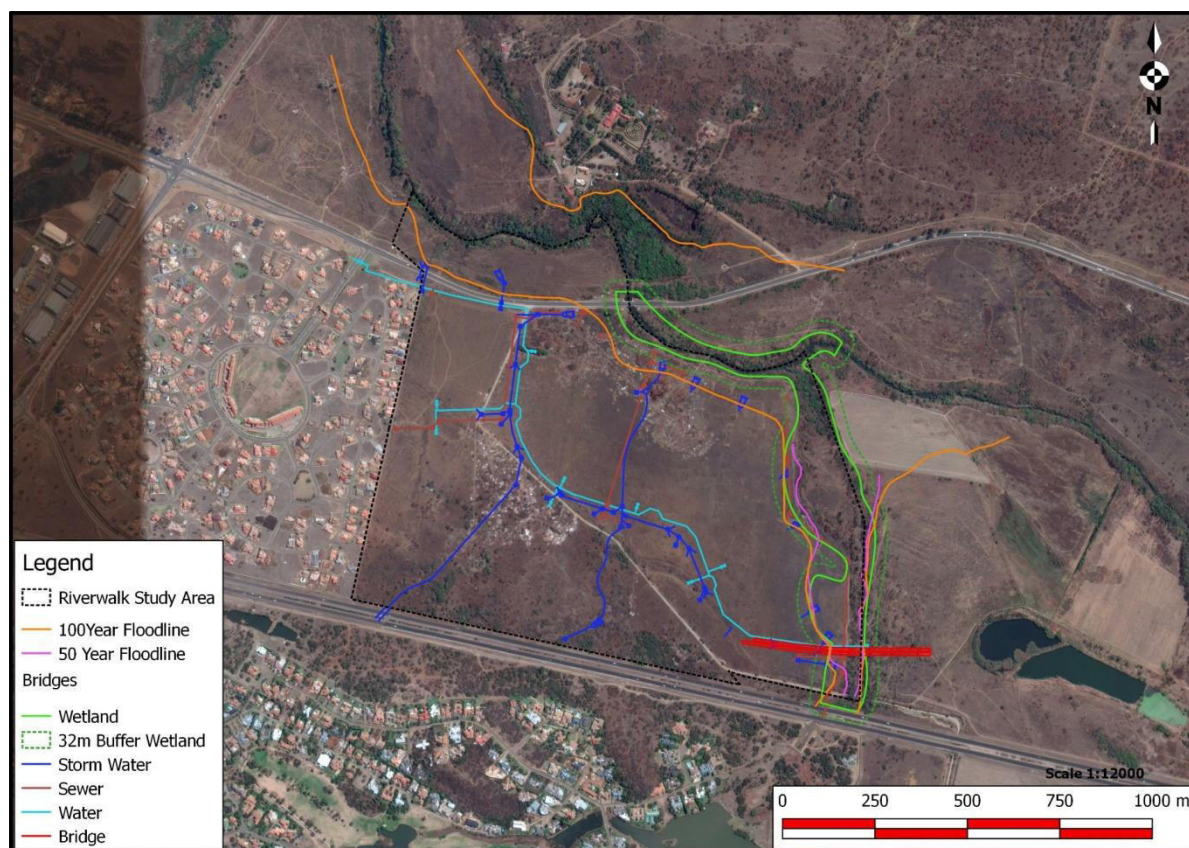
Each study unit was further assessed for the occurrence of alien plant species (Bromilow, 2010) and any form of disturbance. Alien species are included in the species lists (indicated in bold in the relevant tables) as they suggest the particular state of each study unit. For each alien species the Category is indicated according to the *Alien and Invasive species lists* (2014) amended in NEMBA (National Environmental Management: Biodiversity Act (ACT NO, 10 OF 2004)). For each plant species, the medicinal properties were assessed (van Wyk *et al.*, 2013). Medicinal plants are marked with an asterisk (\*) in Table 2. Harvesting of medicinal plants causes a decline in numbers of the particular species and, therefore, threatens the conservation of these species.

## 6. RESULTS

### 6.1 Study unit

Only one study unit was identified, namely *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation (**Figure 2**). The services associated with the approved residential development is also indicated on the map.





**Figure 2** *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation (indicated as Wetland) and the associated services.

## 6.2 Medicinal and Alien Species

Medicinal and alien plant species are listed in **Table 1**. For each study unit the medicinal and alien plant species are discussed. Medicinal species are marked with an asterisk (\*) and alien species are indicated in bold in Table 2. For each alien species the Category is indicated according to the Alien and Invasive species lists (2014) amended in NEMBA (National Environmental Management: Biodiversity Act (ACT NO, 10 OF 2004).

For **Category 1a** declared weeds removal is compulsory in terms of the regulations formulated under “The Conservation of Agricultural Resources Act” (Act No. 43 of 1983), as amended. Alien invasive species in this Category may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway.

**Category 1b** alien species are major invaders that may need government assistance to remove (Act No. 43 of 1983), as amended. These alien species must be contained, and in many cases they already fall under a government sponsored management programme such as Working for Water. Alien invasive species in this Category may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway.

All **Category 2** declared weeds should likewise be removed (Act No. 43 of 1983), as amended, unless a permit is obtained to control it in a demarcated area or a biological control reserve.

**Category 3** declared weeds may not occur on any land or inland water surface other than in a biological control reserve. However, these provisions shall not apply if plants listed in Category 3

are already in existence at the time of the commencement of said regulations. In such cases, a land user must take all reasonable steps to restrict the spreading of propagating material of Category 3 plants.

**Table 1:** The number of plant species recorded per study unit, including the total number of medicinal and exotic plants.

Vegetation study unit	Total number of species per unit	No. of medicinal species per unit	No. of alien species per unit
<i>Combretum erythrophyllum</i> – <i>Searsia lancea</i> riverine vegetation	48	8	13

### 6.3 Red and Orange List species

Twenty species are known to occur in the QDS 2528CD, of which four species, namely *Argyrobium campicola*, *Ceropegia decidua* subsp. *pretoriensis*, *Searsia gracillima* and *Stenostelma umbelluliferum*, have been recorded on the mentioned property previously (Annexure A for a list of the Red and Orange List species known to occur in the QDS). Of these four species none were observed in the current study, although there is suitable habitat in the study site. We recommend, therefore, that an in-depth investigation be launched to identify these species. An Orange List species occurring in the QDSs, *Hypoxis hemerocallidea*, was found throughout the site in the various vegetation units (see for each vegetation unit discussed above). This species is declining in Gauteng Province.

### 6.4 *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation

This site is along the Pienaarsrivier and a tributary stream along the eastern border which is generally supported by indigenous riverine vegetation. Common tree species recorded include *Combretum erythrophyllum*, *Celtis africana*, *Searsia lancea*, *Buddleja salviifolia* and the shrub *Asparagus suaveolens* (**Figure 3**). Common herbaceous and grass species include *Aloe zebrine*, *Panicum maximum*, and *Hyparrhenia tamba*.

The eastern end of the tributary is dominated by alien species such as *Eucalyptus camaldulensis*, *Melia azedarach* and *Sorghum bicolor*. The Orange List species *Hypoxis hemerocallidea* was recorded for this site. This site is considered ecologically sensitive.





**Figure 3** The riverine vegetation unit. *Combretum erythrophyllum* occurs on the right bank with *Eucalyptus camaldulensis* invading this ecological sensitive area.

**Table 2:** Species recorded in the *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation

TREES / SHRUBS	Invasive category
<i>Asparagus suaveolens</i>	
<i>Buddleja salviifolia</i>	
<i>Celtis africana</i>	
<i>Combretum erythrophyllum</i>	
<i>Ehretia rigida</i>	
<b><i>Eucalyptus camaldulensis</i></b>	1b
<i>Grewia occidentalis</i> *	
<i>Gymnosporia buxifolia</i>	
<b><i>Melia azedarach</i>*</b>	3
<b><i>Morus alba</i></b>	3
<i>Populus</i> sp.	
<b><i>Salix babylonica</i></b>	
<i>Searsia lancea</i>	
<i>Solanum panduriforme</i>	
<b><i>Solanum sisymbriifolium</i></b>	1b
<i>Vachellia karroo</i> *	
<i>Ziziphus mucronata</i> *	
<b>GRASSES</b>	
<i>Brachiaria nigropedata</i>	
<i>Cyndodon dactylon</i>	
<i>Digitaria eriantha</i>	
<i>Hyparrhenia tamba</i>	
<i>Melinis repens</i>	
<i>Panicum maximum</i>	

***Paspalum dilatatum****Phragmites sp.**Setaria sphacelata**Sorghum bicolor**Urochloa mossambicensis*

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**FORBS**

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*Aloe zebrina**Berkheya radula****Campuloclinium macrocephalum*** 1b*Clematis brachiata**Crabbea hirsute**Crinum bulbispermum\***Cyperus sp.**Galdiolus sp.****Gomphrena celosioides****Hypoxis hemerocallidea\***Ledebouria revolute**Polygala amatymbica**Senecio inornatus**Senecio sp.****Tagetes minuta******Tribulus terrestris\*******Verbena bonariensis*** 1b*Vernonia oligocephala\*****Xanthium sp.*** 1b***Zinnia peruviana***

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## 7. FINDINGS AND POTENTIAL IMPLICATIONS

The *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation is considered sensitive (**Figure 4**). It should be conserved and protected during the development phase. The study site has suitable habitat for Red and Orange List species, of which only one Orange List plant species was recorded during the survey. However, it is possible that one Red List species might occur in the study site. Several alien plant species were recorded, of which *five* are listed as Category 1b declared invaders in South Africa. The removal of these species is compulsory and should be included in a Environmental Management Plan.

## 8. DISCUSSION, RECOMMENDATIONS AND MITIGATION MEASURES

An Ecological Management Plan (EMP) must be compiled for the proposed development and should take into consideration the following:

- Before construction is initiated, the watercourse area (indicated on **Figure 4**) should be fenced-off from the proposed residential development, and all construction-related impacts must be contained within the fenced-off development areas;
- However, services (such as storm water management and sewer treatment) as well as a proposed off-road cycling track may be authorised in the demarcated area. The activities triggered within the watercourse should ensure minimum impact on the environment and should be carefully monitored by an appointed Environmental Control Officer. Removal of vegetation in the watercourse due to the mentioned services and proposed off-road cycling track should be kept to a minimum;
- A pre- and post-construction alien invasive control, monitoring and eradication programme must be implemented along with an on-going programme to ensure persistence of indigenous species. A qualified botanist/ecologist should compile and supervise the implementation of this programme.;
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science;
- Engineering measures are recommended to lower the risk of spillages into any watercourses located in and surrounding the proposed development;
- Where active rehabilitation or restoration is mandatory, it should make use of indigenous plant species native to the study area. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction. As far as possible, indigenous plants naturally growing within the vicinity of the study area, but would otherwise be destroyed during construction, should be used for re-vegetation/landscaping purposes;
- Minimize artificial edge effects (e.g. water runoff from developed areas and application of chemicals);
- Construction activities at or close to wetlands, drainage lines and water bodies should be limited. A wetland specialist should be consulted with regards to a suitable buffer if deemed necessary;
- Where a road is to traverse a wetland, measures are required to ensure that the road has minimal effect on the flow of water through the wetland, e.g. by using a high level clearspan bridge or box culverts rather than pipes;
- A rescue plan for the Orange List species, *Hypoxis hemerocallidea* needs to be incorporated into the EMP prior to construction. This species should be relocated if affected by the proposed activities in the watercourse;

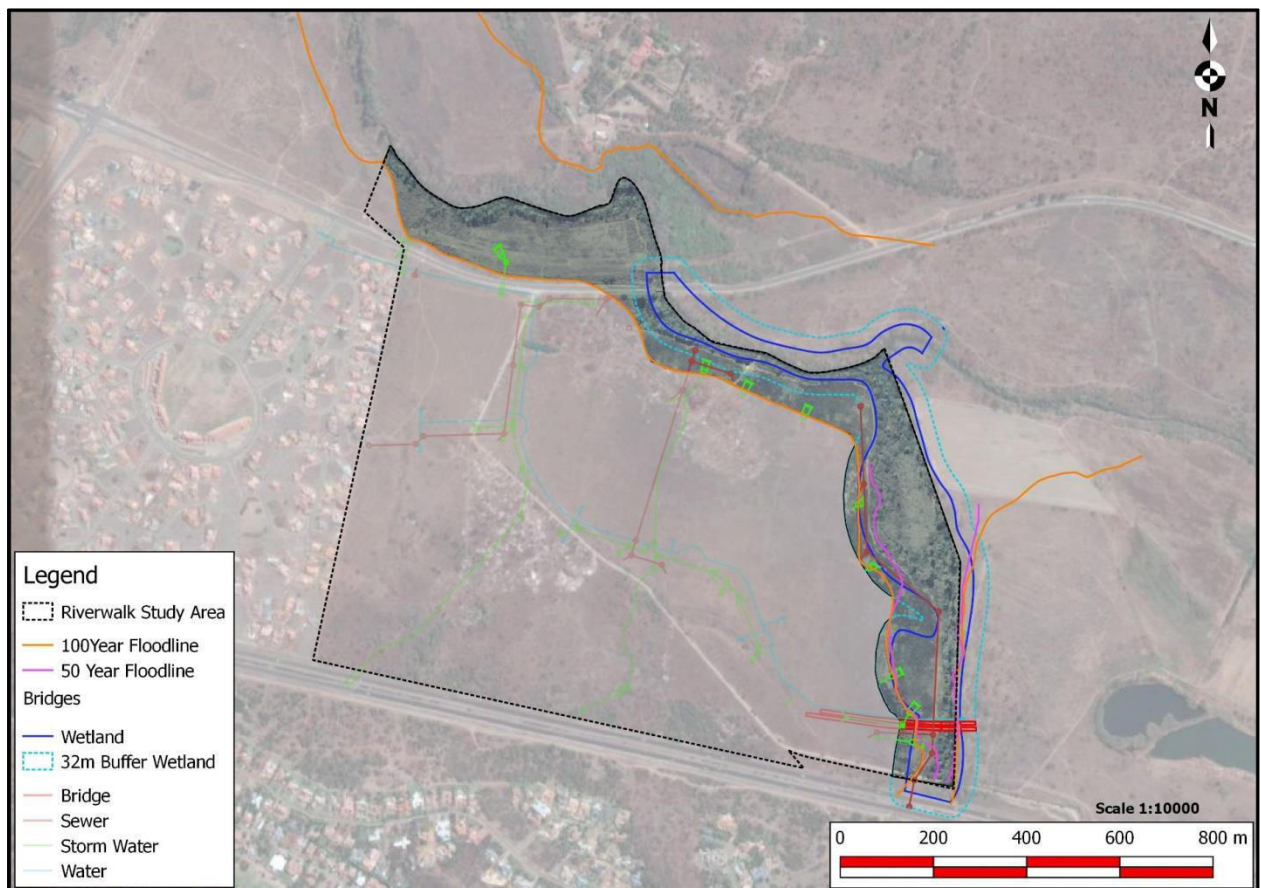
- No vehicles should be allowed to move in or through the watercourse and associated buffer zone. The area should be demarcated prior to construction;
- It is recommended that all concrete and cement works be restricted to areas of low ecological sensitivity and defined on site and clearly demarcated. Cement powder has a high alkalinity pH rating, which can contaminate and affect both soil and water pH dramatically. A shift in the pH can have serious consequences on the functioning of soil, vegetation and fauna;
- A comprehensive surface runoff and stormwater management plan should be compiled, indicating how all surface runoff generated as a result of the road development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / stormwater and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMP;
- Where roads traverse streams/rivers, an underpass should provide for the movement of aquatic as well as terrestrial species through the inclusion of appropriate buffer zones within the underpass (a 32m buffer zone from the edge of the riparian zone recommended for rivers within urban areas and a 100m buffer zone from the edge of the riparian zone recommended for rivers outside urban areas);
- Where roads traverse natural corridors such as streams/rivers and ridges, traffic control measures are recommended (appropriate speed limits, speed traps, rumble strips and speed bumps); and
- Sealing of surfaces under a bridge or gabion construction should be avoided.

## 9. CONCLUSIONS

The proposed activities within the watercourse should not have a significant negative effect on the watercourse and its associated ecological processes if the above-mentioned recommendations and mitigation measures are implemented. It is recommended that the *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation study unit be demarcated and excluded from construction for the proposed residential development. However, the above-mentioned services and the proposed cycling track within the demarcated area may be allowed. The activities triggered within the watercourse should ensure minimum impact on the environment and should be carefully monitored by an appointed Environmental Control Officer. Removal of vegetation in the watercourse due to services and proposed cycling track should be kept to a minimum. Planning of services and proposed cycling track should try to exclude areas where *Hypoxis hemerocallidea* occur. If not possible to do so, a relocation plan for this species should be implemented. Refer to **Figure 4**.



The above-mentioned recommendations and mitigation measures should be followed carefully to ensure minimal impacts on the surrounding environment, especially sensitive areas. If the proposed development is approved, dumping of builders’ rubble and other waste must be prevented in the *Combretum erythrophyllum* – *Searsia lancea* riverine vegetation. Alien plant species, especially in Category 1 and 2 must be eradicated as a matter of urgency to preclude their spreading during the construction phase in addition to a clean-up programme after construction.



**Figure 4** Layout of services overlaid with the watercourse area. The approved residential development should be excluded from this area, however services (such as storm water management and sewer treatment) and a proposed off-road cycling track may take place in the demarcated area.

## 10. LITERATURE SOURCES

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### Annexure A: Red List Species (confidential)

The following Red List Species are listed for the QDS 2528CD. An indication is also provided if such species will potentially occur on the proposed site.

Species	Habitat description	Conservation status	Possibility of occurring on site (High; medium; low)
<i>Adromischus umbraticola</i> subsp. <i>umbraticola</i>	Rock crevices on rocky ridges, usually south-facing, or in shallow gravel on top of rocks, but often in shade of other vegetation.	Near threatened	Low
<i>Argyrolobium campicola</i>	Highveld grassland.	Near threatened	Low
<i>Boophane disticha</i>	Dry grassland and rocky areas.	Declining	Low
<i>Boweia volubilis</i> subsp. <i>volubilis</i>	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	Vulnerable	Low
<i>Brachycorythis conica</i> subsp. <i>transvaalensis</i>	Short grasslands, hillsides, on sandy gravel overlying dolomite, sometimes also on quartzites; occasionally open woodland; 1000 - 1705m.	Endangered	Low
<i>Callilepis leptophylla</i>	Grassland or open woodland, often on rocky outcrops or rocky hillslopes.	Declining	Low
<i>Ceropegia decidua</i> subsp. <i>pretoriensis</i>	Direct sunshine or shaded situations, rocky outcrops of the quartzitic Magaliesberg mountain series, in pockets of soil among rocks, in shade of shrubs and low trees, can be seen twining around grass spikes.	Vulnerable	Low
<i>Cheilanthes deltoidea</i> subsp. <i>silicicola</i>	Southwest-facing soil pockets and rock crevices in chert rock.	Vulnerable	Low
<i>Crinum macowanii</i>	Grassland, along rivers, in gravelly soil or on sandy flats.	Declining	Medium
<i>Delosperma leendertziae</i>	Rocky ridges; on rather steep south facing slopes of quartzite in mountain grassveld.	Near threatened	Low
<i>Eucomis autumnalis</i>	Damp, open grassland and sheltered places.	Declining	Medium
<i>Eulophia coddii</i>	Steep hillsides on soil derived from sandstone, grassland or mixed bush.	Vulnerable	Low
<i>Gunnera purpensa</i>	In cold or cool, continually moist localities, mainly along upland streambanks.	Declining	Low

<i>Habenaria barbertoni</i>	In grassland on rocky hillsides.	Near threatened	Low
<i>Habenaria bicolor</i>	Well-drained grasslands at around 1600m.	Near threatened	Low
<i>Habenaria kraenzliniana</i>	Terrestrial in stony, grassy hillsides, recorded from 1000 to 1400m.	Near threatened	Low
<i>Habenaria mossii</i>	Open grassland on dolomite or in black sandy soil.	Endangered	Low
<i>Hypoxis hemerocallidea</i>	<b>Occurs in a wide range of habitats, from sandy hills on the margins of dune forests to open rocky grassland; also grows on dry, stony, grassy slopes, mountain slopes and plateaux; appears to be drought and fire tolerant.</b>	<b>Declining</b>	<b>High (Found on site)</b>
<i>Miraglossum leave</i>	Terrestrial	Critically endangered	Low
<i>Searsia gracillima</i>	Rocky quartzitic outcrops in bushveld.	Near threatened	Low
<i>Stenostelma umbelluliferum</i>	Deep black turf in open woodland mainly in the vicinity of drainage lines.	Near threatened	Medium (Suitable habitat)

## Riverwalk Proposed Road Expansion: Ecological Implications on Drainage and Riverine Area



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**November 2016**



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- I do not have any influence over decisions made by the governing authorities;
- I have the necessary qualifications and guidance from professional experts (registered Pr. Nat. Sci.) in conducting specialist reports relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein are and will remain the intellectual property of Bokamoso Environmental: Specialist Division. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigator.
- I will comply with the Act, regulations and all other applicable legislation.



Corné Niemandt

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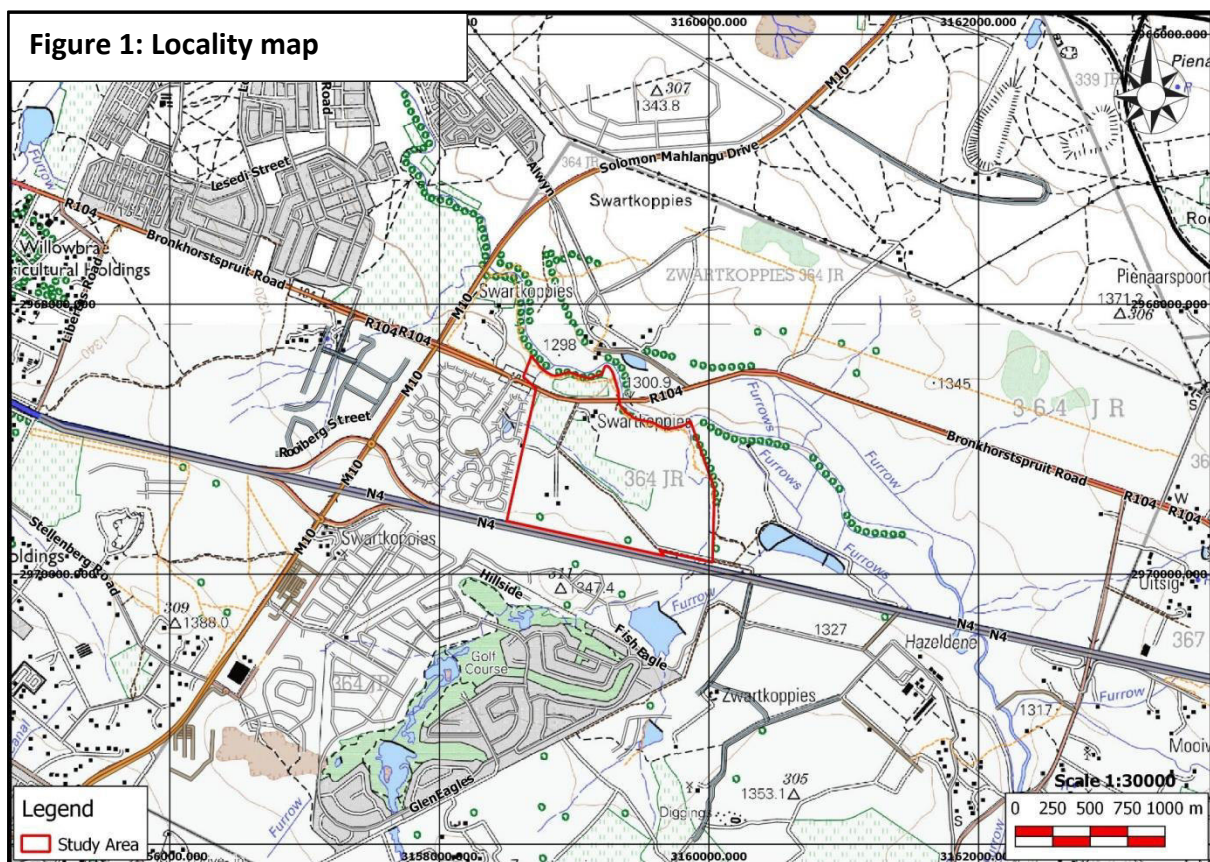
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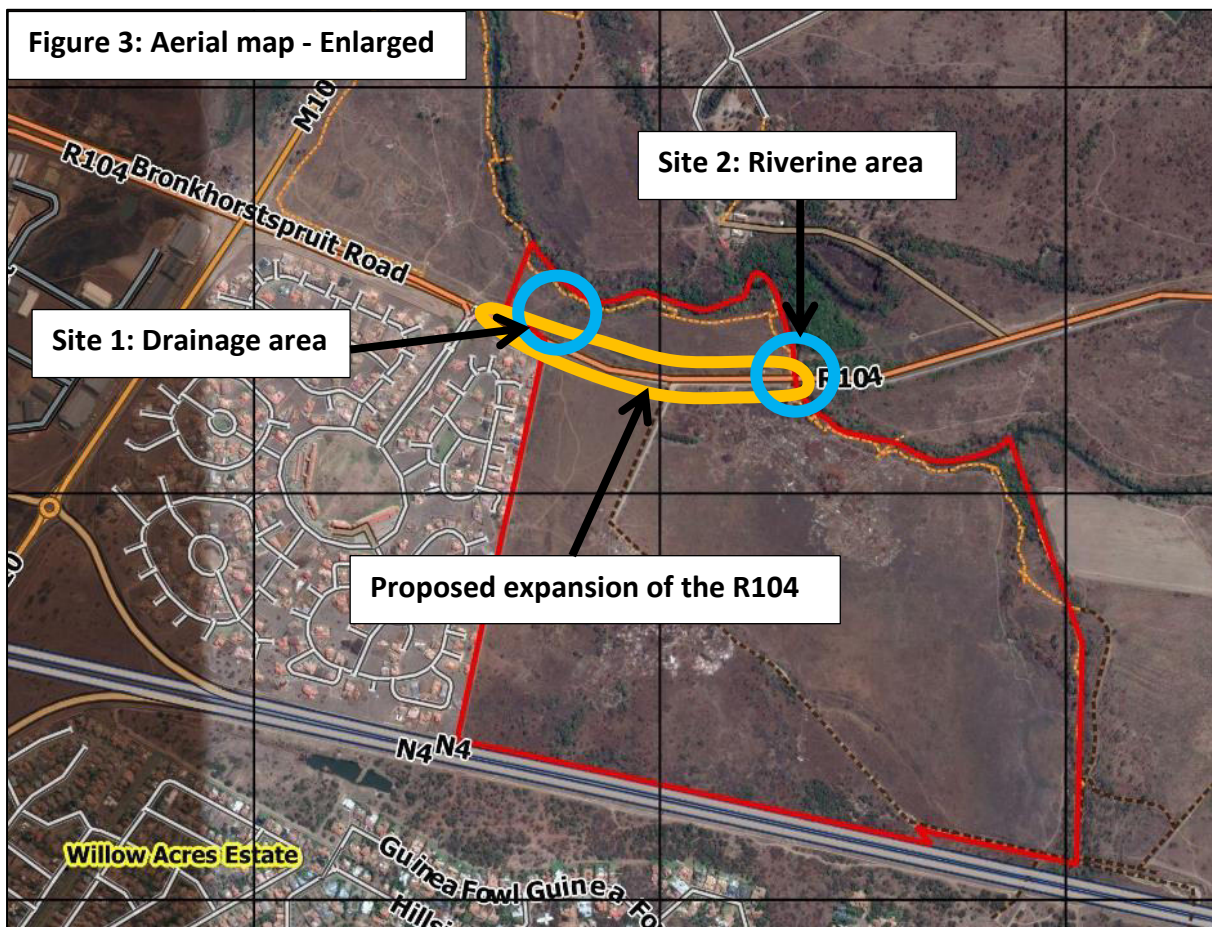
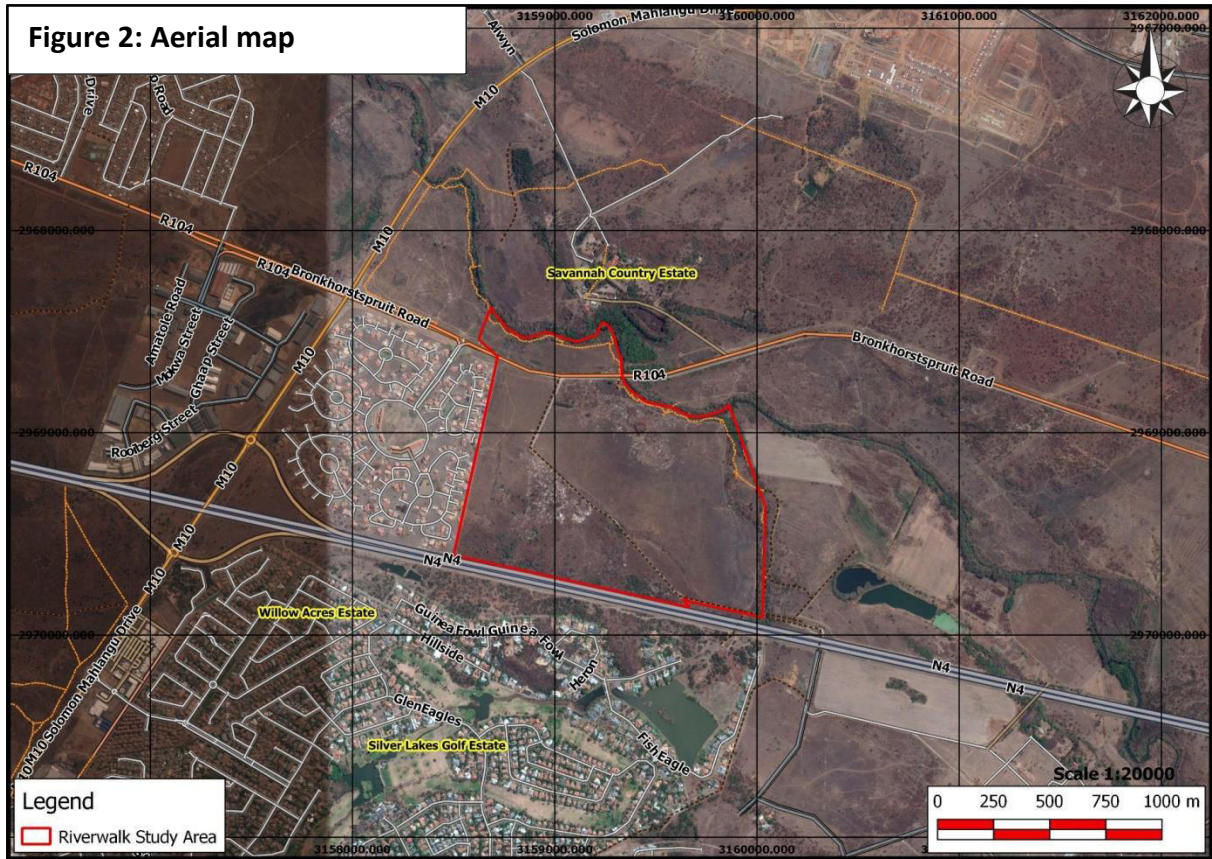
# 1. Introduction and Objectives

The proposed development is for the expansion of the existing R104 Bronkhorstspuit road for the development known as Riverwalk situated on Portion 6 and Portion 138 of the farm Zwartkoppies 364-JR, Gauteng Province. The proposed road expansion development is situated between the N4 and the Bronkhorstspuit road (R104) east of Pretoria. The Pienaars River borders the north-eastern section of the proposed site. The Silver Lakes Golf Estate is situated to the south of the proposed development (just to the south of the N4 Freeway). **Refer to Figure 1 and Figure 2.**

The proposed expansion of the Bronkhorstspuit road (R104) triggers activities as it crosses a drainage area (hereafter **site 1**) and ends at a riverine area (hereafter **site 2**) (Refer to Figure 3). The objectives of this report are to highlight sensitive areas, give a broad description of the vegetation being influenced and provide recommendations if the proposed road development is approved.









## 2. Methods

The study site was visited on the 27 October 2016. Dominant species were identified for each study site. Field guides such as those by Bromilow (2010), Germishuizen and Meyer (2003), Koekemoer *et al.* (2014), Pooley (1998), van Ginkel *et al.* (2011), van Oudtshoorn *et al.* (2014), van Wyk and Malan (1998), van Wyk *et al.*, (2013), and van Wyk (2013) were used to identify the species. If necessary, the H.G.W.J. Schweickerdt Herbarium, University of Pretoria, was visited to confirm the correct identification of species.

The following legislation was consulted:

- National Environmental Management: Biodiversity Act (10/2004): National list of ecosystems that are threatened and in need of protection (2011)
- National Environmental Management: Biodiversity Act (2004)
- Technical report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3), GDARD (2014)
- Requirements for Biodiversity Assessments. Version 3. (2014)

## 3. Results

### 3.1. Drainage area (Site 1)

A stormwater outlet was identified on the southern section of the R104 road, and a drainage area on the northern side of the R104 road. The southern section seems to be completely affected as the road expansion will cover the southern section of site 1 completely. Accordingly, indigenous vegetation within this drainage area will be removed, and the ecological functioning will be altered. Vegetation identified in the drainage area includes *Typha capensis* and *Veronica anagallis-aquatica* instream, and on the outer banks *Berkheya radula* as the dominant species (**Figures 4-7**). These species are typical of drainage areas, which provide essential ecological functions such as water quality, habitat creation for fauna species, maintaining ecological and biodiversity functioning of the system etc.

On the northern section of the R104, the drainage area connects with the Pienaars River. The proposed road expansion will also impact the northern section, causing removal of indigenous vegetation and destroying habitat for fauna species. Dominant species include *Typha capensis*, *Berkheya radula*, *Hillierdiella oligocephala*, *Combretum cf. erythrophyllum*, *Vachellia karroo* and *Imperata cylindrica*. **Refer to Figure 8 and 9.**





**Figure 4:** Stormwater channel with *Typha capensis* and *Veronica anagallis-aquatica* instream. On the outerbanks *Berkheya radula* thrive as the dominant species.



**Figure 5:** *Typha capensis* instream of stormwater outlet.





**Figure 6:** *Veronica anagallis-aquatica* occurring instream.



**Figure 7:** *Berkheya radula* occurring on outer banks.





**Figure 8:** Drainage area on northern section of the R104 with dominant species *Hillierdiella oligocephala*, *Imperata cylindrica* and *Berkheya radula*.



**Figure 9:** Drainage area on northern section of the R104.



### 3.2. Riverine habitat (Site 2)

The R104 crosses the Pienaars River with an existing bridge crossing (Refer to Figure 10). The proposed R104 road expansion will not include the expansion of the bridge but will stop right before the existing bridge crossing. However, construction vehicles and personnel could still have an influence on the riverine habitat. Dominant species include *Phragmites australis*, *Combretum erythrohyllum*, *Celtis africana*, *Typha capensis*, *Sesbania punicea*, *Morus alba*, *Melia azedarach*, *Eucalyptus* sp., *Tagetes minuta*, *Schoenoplectus* sp., and *Xanthium strumarium*.



Figure 10: R104 crossing the Pienaars River (25°45'17.02"S, 28°22'50.66"E)





**Figure 11: Downstream of the bridge**



**Figure 12: Upstream of the bridge**

## 4. Recommendations and Mitigation Measures

If the proposed road expansion takes place, the following mitigation measures are recommended:

- A pre- and post-construction alien and invasive control, monitoring and eradication programme must be implemented along with an on-going programme to ensure persistence of indigenous species. A qualified botanist/ecologist should compile and supervise the implementation of this programme;
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science;
- Where active rehabilitation or restoration is mandatory, it should make use of indigenous plant species native to the study area. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction. As far as possible, indigenous plants naturally growing within the vicinity of the study area, but would otherwise be destroyed during construction, should be used for re-vegetation/landscaping purposes;
- Construction activities at or close to wetlands, drainage lines and water bodies should be limited. A wetland specialist should be consulted with regards to a suitable buffer if deemed necessary;
- Where a road is to traverse a wetland, measures are required to ensure that the road has minimal effect on the flow of water through the wetland, e.g. by using a high level clearspan bridge or box culverts rather than pipes;
- Prior to construction, fences should be erected in such a manner to prevent access and damage to any sensitive areas identified in a sensitivity mapping exercise, preferably overlaid with the layout plan;
- Engineering measures are recommended to lower the risk of spillages into any watercourses located in and surrounding the proposed development;
- A plan for the immediate rehabilitation of damage caused to wetlands should be compiled by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science. This rehabilitation plan should form part of the EMP and a record book should be maintained on site to monitor and report on the implementation of the plan;
- No vehicles should be allowed to move in or through the watercourse and associated buffer zone. The area should be demarcated prior to construction;
- It is recommended that all concrete and cement works be restricted to areas of low ecological sensitivity and defined on site and clearly demarcated. Cement powder has a high alkalinity pH rating, which can contaminate and affect both soil and water pH dramatically. A shift in the pH can have serious consequences on the functioning of soil, vegetation and fauna;
- Appropriate road design and traffic control measures are recommended to reduce environmental pollution and animal mortality;
- All stormwater structures should be designed so as to block amphibian and reptile access to the road surface;



- A comprehensive surface runoff and stormwater management plan should be compiled, indicating how all surface runoff generated as a result of the road development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / stormwater and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions. This plan should form part of the EMPr;
- Where roads traverse streams/rivers, an underpass should provide for the movement of aquatic as well as terrestrial species through the inclusion of appropriate buffer zones within the underpass (a 32m buffer zone from the edge of the riparian zone recommended for rivers within urban areas and a 100m buffer zone from the edge of the riparian zone recommended for rivers outside urban areas);
- A barrier (either prefab concrete wall or galvanized sheeting that extends as a continuous sheet above ground for at least 40cm and below ground for at least 30cm) that will physically block animals from accessing the road surface should be constructed for a distance of 200m on either side of all aquatic and terrestrial underpasses. Holes under barriers should be routinely filled in and areas directly adjacent to the barrier should be kept free of vegetation;
- Where roads traverse natural corridors such as streams/rivers and ridges, traffic control measures are recommended (appropriate speed limits, speed traps, rumble strips and speed bumps);
- Sealing of surfaces under a bridge or gabion construction should be avoided.

## 5. Conclusions

Should the proposed road upgrade be approved, it is strongly recommended that an appropriate stormwater management plan be implemented, and rehabilitation takes place to ensure the creation of natural habitat lost and for the continuation of ecological functions of the drainage area. All above recommended mitigation measures should be implemented into the EMPr to ensure minimal impacts on the receiving environment. It is the responsibility of the Environmental Control Officer to ensure that these recommendations are followed and that no unlawful activities take place. Working within the drainage area or riverine area and its associated buffer areas (as determined by a qualified wetland specialist) are strongly prohibited. This area should be fenced-off and no unauthorised personnel should enter the site without permission.

Furthermore, all alien vegetation, especially in Category 1 and 2 should be eradicated prior and after construction. No building rubble may be left on site or disposed of in the drainage or riverine area.

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# **Wetland Report**

Appendix G2



## **REPORT**

# **HYDROPEDOLOGY WETLAND IMPACT ASSESSMENT AND MANAGEMENT REPORT:**

## **RIVER WALK DEVELOPMENT, GAUTENG PROVINCE**

15 January, 2016  
(Maps Amended: 8 November, 2016)

**Compiled by:**  
**J.H. van der Waals**  
**(PhD Soil Science, Pr.Sci.Nat.)**

Member of:  
Soil Science Society of South Africa (SSSSA)

Accredited member of:  
South African Soil Surveyors Organisation (SASSO)

Registered with:  
The South African Council for Natural Scientific Professions  
Registration number: 400106/08

## Declaration

I, Johan Hilgard van der Waals, declare that:

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



**J.H. VAN DER WAALS**  
**TERRA SOIL SCIENCE**

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# HYDROPEDOLOGY WETLAND IMPACT ASSESSMENT AND MANAGEMENT REPORT: RIVER WALK DEVELOPMENT, GAUTENG PROVINCE

## 1. INTRODUCTION

### 1.1 TERMS OF REFERENCE

Terra Soil Science was appointed by the **Bokamoso** to conduct a hydroponology based wetland delineation, status and functional assessment of the wetland/watercourse on the River Walk development site in the Gauteng Province. The focus of the investigation is to address aspects that include wetland distribution and functioning, landscape hydroponology and impacts of the urban and site development on the hydrological functioning of the wetland.

### 1.2 AIM OF THIS REPORT

The aim of this report is to provide a perspective on the distribution, status and functioning of the wetland/watercourse on the River Walk development site, provide a description and contextualisation of the hydroponology of the site, describe the historical impacts and to provide specific management recommendations regarding the hydrology of the wetland and site post development.

### 1.3 DISCLAIMER

This report was generated under the regulations of NEMA (National Environmental Management Act) that guides the appointment of specialists. The essence of the regulations are 1) independence, 2) specialisation and 3) duty to the regulator. The independent specialist has, in accordance with the regulations, a duty to the competent authority to disclose all matters related to the specific investigation should he be requested to do such (refer to declaration above).

It is accepted that this report can be submitted for peer review (as the regulations also allow for such). However, the intention of this report is not to function as one of several attempts by applicants or competent authorities to obtain favourable delineation outcomes. Rather, the report is aimed at addressing specific site conditions in the context of current legislation, guidelines and best practice with the ultimate aim of ensuring the conservation and adequate management of the water resource on the specific site.

Due to the specific legal liabilities wetland specialists face when conducting wetland delineations and assessments this author reserves the right to, in the event that this report becomes part of a delineation comparison exercise between specialists, submit the report to the competent authorities, without entering into protracted correspondence with the client, as an independent report.

## 1.4 METHODOLOGY

The report was generated through:

1. The collection and presentation of baseline land type and topographic data for the site;
2. The thorough consideration of the statutory context of wetlands assessment and the process of wetland delineation;
3. The identification of water related landscape parameters (conceptual and real) for the site;
4. Aerial photograph interpretation of the site;
5. Assessment of historical impacts and changes on the site through the accessing of various historical aerial photographs and topographic maps;
6. Focused soil and site survey in terms of soil properties as well as drainage feature properties;
7. Assessment of the functioning, status and hydrology of the wetlands on the site; and
8. Presentation of the findings of the various components of the investigation.

## 2. SITE LOCALITY AND DESCRIPTION

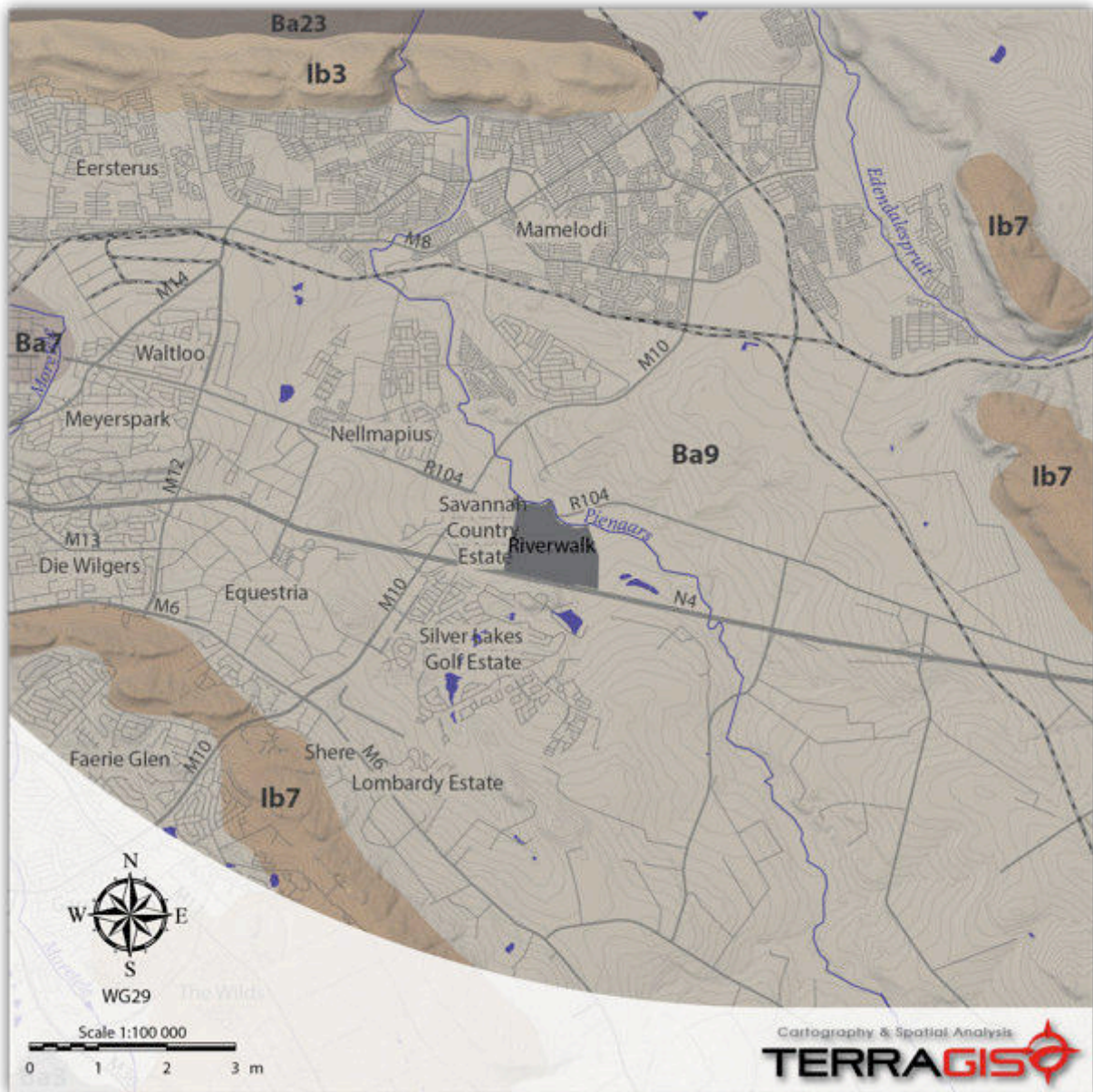
### 2.1 SURVEY AREA BOUNDARY

The site lies between 25° 45' 11" and 25° 45' 56" south and 28° 22' 25" and 28° 23' 15" east approximately 10 km east of Pretoria city centre in the Gauteng Province (**Figure 1**).

### 2.2 LAND TYPE DATA

Land type data for the site was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System (MacVicar et al., 1977). The soil data was interpreted and re-classified according to the Taxonomic System (Soil Classification Working Group, 1991).

The site falls into the **Ba9** land type (Land Type Survey Staff, 1972 - 2006). **Figure 1** also provides the land type distribution around the site. **Ba** land types denote areas with dominantly plinthic catena where red soils occur frequently. Following on the field survey it is evident that the broad land type data (**Ba9**) is not representative of the survey area and that the site consists predominantly of soil derived from shale and andesite (no plinthic character). A dedicated discussion of the specific site conditions will be provided later in the report.

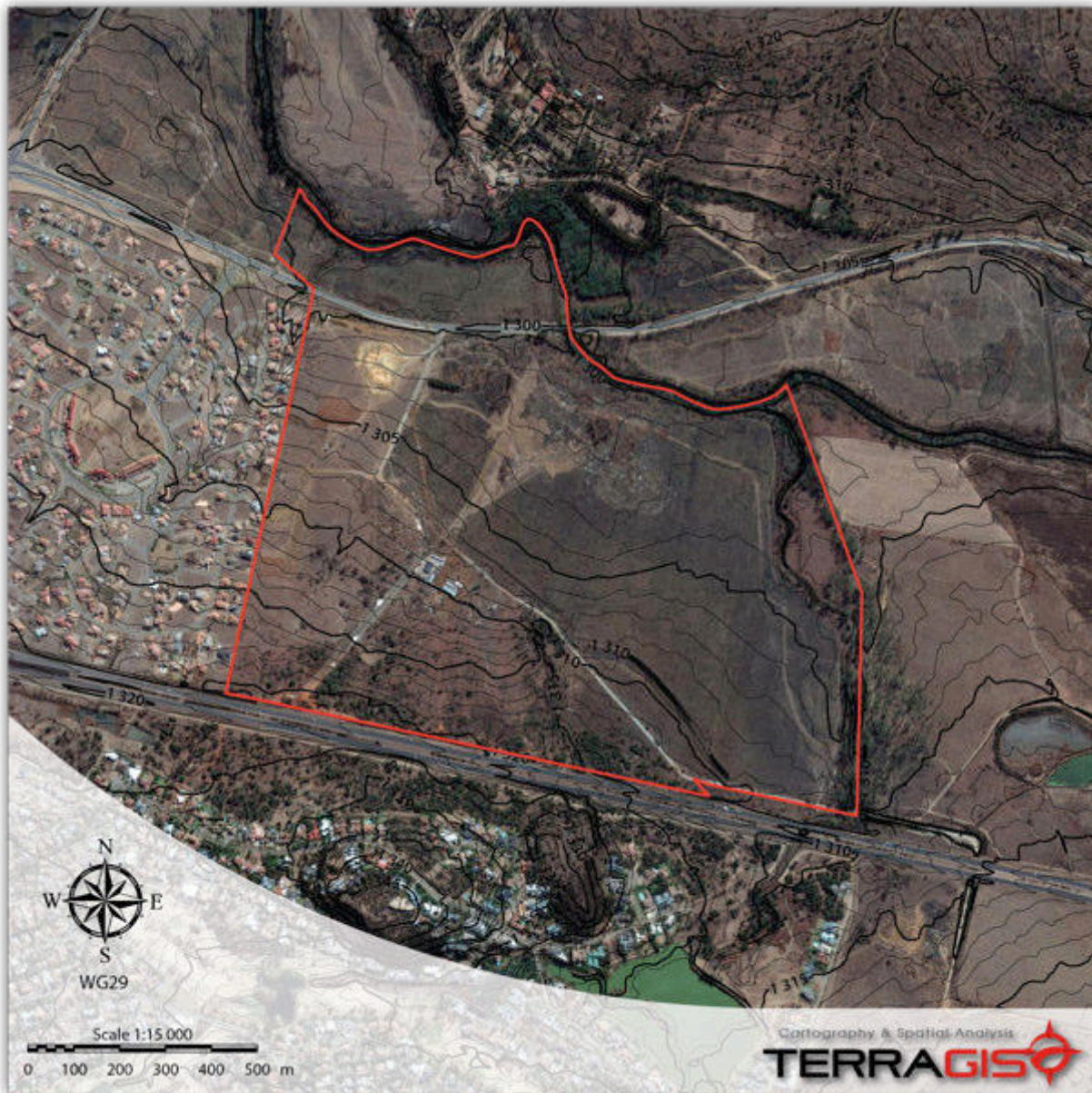


**Figure 1** Locality of the survey site with the land types indicated in colour shaded areas

### 2.3 TOPOGRAPHY

The topography of the site is generally flat with a distinct small rocky hill in the south. The contour map for the site is provided in **Figure 2**. From the contour data a digital elevation model (DEM) was generated (**Figure 3**). The topographic data was further interpreted and the approaches and results are discussed later in the report.





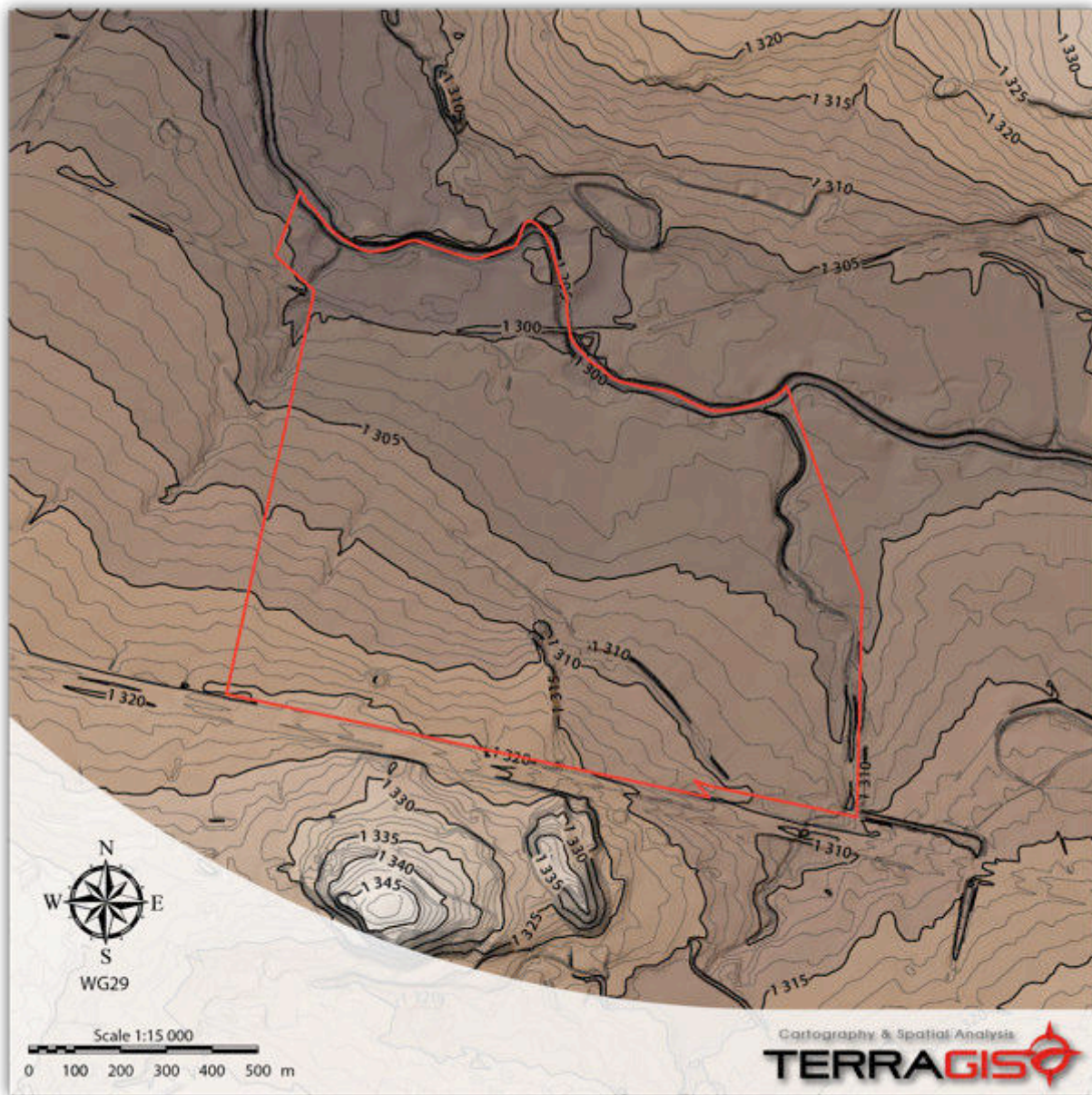
**Figure 2** Contours of the survey area superimposed on an aerial photograph

### **3. PROBLEM STATEMENT**

The wetland / watercourse on the River Walk site is part of a landscape dominated by shale and diabase/andesite with distinct signs of old colluvial transportation of material. The complex nature of the geology as well as the dominance of basic igneous rock leads to the expression of soil properties that are sometimes incorrectly interpreted in the wetland delineation guidelines (DWAf, 2005). Within this context extent of the wetland and impacts have to be determined to plan for development surrounding the wetland as well as mitigate impacts from the historical activities. The description and assessment of wetlands in urban environments, both by specialists and the regulator, pose several problems within the context of legislation that pertains to wetlands. This investigation will focus on the delineation of the wetland features based on soil hydromorphy,



landscape hydrology as well as various historical modifiers through a dedicated assessment and elucidation of hydro-pedological processes experienced in the catchment and on the site.



**Figure 3** DEM of the survey site

#### **4. STATUTORY CONTEXT**

The following is a brief summary of the statutory context of wetland delineation and assessment. Where necessary, additional comment is provided on problematic aspects or aspects that, according to this author, require specific emphasis.

##### **4.1 WETLAND DEFINITION**

Wetlands are defined, in terms of the National Water Act (Act no 36 of 1998) (NWA), 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.”*

#### **4.2 WATERCOURSE DEFINITION**

“Catchment” is defined, in terms of the National Water Act (Act no 36 of 1998) (NWA), as:

“..., in relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points;”

“Watercourse” is defined, in terms of the National Water Act (Act no 36 of 1998) (NWA), 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 a water course,
- and a reference to a watercourse includes, where relevant, its bed and banks;”

#### **4.3 THE WETLAND DELINEATION GUIDELINES**

In 2005 the Department of Water Affairs and Forestry published a manual entitled “A practical field procedure for identification and delineation of wetland and riparian areas” (DWAF, 2005). The “...manual describes field indicators and methods for determining whether an area is a wetland or riparian area, and for finding its boundaries.” The definition of a wetland in the guidelines is that of the NWA and it states that wetlands must have one or more of the following attributes:

- “**Wetland (hydromorphic) soils** that display characteristics resulting from prolonged saturation”
- “The presence, at least occasionally, of **water loving plants (hydrophytes)**”
- “A **high water table** that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50cm of the soil.”

The guidelines further list four indicators to be used for the finding of the outer edge of a wetland. These are:

- Terrain Unit Indicator. The terrain unit indicator does not only identify valley bottom wetlands but also wetlands on steep and mild slopes in crest, midslope and footslope positions.

- Soil Form Indicator. A number of soil forms (as defined by MacVicar et al., 1991) are listed as indicative of permanent, seasonal and temporary wetland zones.
- Soil Wetness Indicator. Certain soil colours and mottles are indicated as colours of wet soils. The guidelines stipulate that this is the primary indicator for wetland soils. (Refer to the guidelines for a detailed description of the colour indicators.) In essence, the reduction and removal of Fe in the form of “bleaching” and the accumulation of Fe in the form of mottles are the two main criteria for the identification of soils that are periodically or permanently wet.
- Vegetation Indicator. This is a key component of the definition of a wetland in the NWA. It often happens though that vegetation is disturbed and the guidelines therefore place greater emphasis on the soil form and soil wetness indicators as these are more permanent whereas vegetation communities are dynamic and react rapidly to external factors such as climate and human activities.

The main emphasis of the guidelines is therefore the use soils (soil form and wetness) as the criteria for the delineation of wetlands. The applicability of these guidelines in the context of the survey site will be discussed in further detail later in the report.

Due to numerous problems with the delineation of wetlands there are a plethora of courses being presented to teach wetland practitioners and laymen the required techniques. Most of the courses and practitioners focus on ecological or vegetation characteristics of landscapes and soil characteristics are often interpreted incorrectly due to a lacking soil science background of these practitioners. As such this author regularly presents, in conjunction with a colleague (Prof. Cornie van Huysteen) from the University of the Free State, a course on the aspects related to soil classification and wetland delineation.

#### **4.4 THE RESOURCE DIRECTED MEASURES FOR PROTECTION OF WATER RESOURCES**

The following are specific quotes from the different sections of the “Resource Directed Measures for Protection of Water Resources.” as published by DWAF (1999).

##### **4.4.1 The Resource Directed Measures for Protection of Water Resources: Volume 4: Wetland Ecosystems.**

From the Introduction:

“This set of documents on Resource Directed Measures (RDM) for protection of water resources, issued in September 1999 in Version 1.0, presents the procedures to be followed in undertaking **preliminary determinations of the class, Reserve and resource quality objectives for water resources**, as specified in sections 14 and 17 of the South African National Water Act (Act 36 of 1998).

The development of procedures to determine RDM was initiated by the Department of Water Affairs and Forestry in July 1997. Phase 3 of this project will end in March 2000. Additional refinement and development of the procedures, and development of the full water resource classification system, will continue in Phase 4, until such time as the detailed procedures and full classification system are ready for publication in the Government Gazette.

It should be noted that until the final RDM procedures are published in the Gazette, and prescribed according to section 12 of the National Water Act, all determinations of RDM, whether at the rapid, the intermediate or the comprehensive level, will be considered to be preliminary determinations.”

#### **4.4.2 The Resource Directed Measures for Protection of Water Resources: Generic Section “A” for Specialist Manuals – Water Resource Protection Policy Implementation Process**

“Step 3: Determine the reference conditions of each resource unit”

“What are reference conditions?”

“The determination of reference conditions is a very important aspect of the overall Reserve determination methodology. Reference conditions describe the natural unimpacted characteristics of a water resource. Reference conditions quantitatively describe the ecoregional type, specific to a particular water resource.”

#### **4.4.3 The Resource Directed Measures for Protection of Water Resources: Appendix W1 (Ecoregional Typing for Wetland Ecosystems)**

Artificial modifiers are explained namely:

“Many wetlands are man-made, while others have been modified from a natural state to some degree by the activities of humans. Since the nature of these alterations often greatly influences the character of such habitats, the inclusion of modifying terms to accommodate human influence is important. In addition, many human modifications, such as dam walls and drainage ditches, are visible in aerial photographs and can be easily mapped. The following Artificial Modifiers are defined and can be used singly or in combination wherever they apply to wetlands:

*Farmed:* the soil surface has been physically altered for crop production, but hydrophytes will become re-established if farming is discontinued

*Artificial:* substrates placed by humans, using either natural materials such as dredge spoils or synthetic materials such as concrete. Jetties and breakwaters are examples of Non-vegetated Artificial habitats

*Excavated:* habitat lies within an excavated basin or channel

*Diked/Impounded:* created or modified by an artificial barrier which obstructs the inflow or outflow of water

*Partially Drained*: the water level has been artificially lowered, usually by means of ditches, but the area is still classified as wetland because soil moisture is sufficient to support hydrophytes.“

#### **4.4.4 The Resource Directed Measures for Protection of Water Resources: Appendix W4 IER (Floodplain Wetlands) Present Ecological Status (PES) Method**

In Appendix W4 the methodology is provided for the determination of the present ecological status (PES) of a palustrine wetland.

The present ecological state (PES) of the wetland was determined according to the method described in “APPENDIX W4: IER (FLOODPLAIN WETLANDS) PRESENT ECOLOGICAL STATUS (PES) METHOD” of the “Resource Directed Measures for Protection of Water Resources. Volume 4: Wetland Ecosystems” as published by DWAF (1999). However, the PES methodology already forms an adaptation from the methodology to assess palustrine wetlands. Hillslope seepage wetlands have a range of different drivers and as such some modification of the criteria has been made by this author to accommodate the specific hydrology drivers of hillslope seepage wetlands.

The criteria as described in Appendix 4 is provided below with the relevant modification or comment provided as well.

The summarised tasks in the PES methodology are (for detailed descriptions refer to the relevant documentation):

1. Conduct a literature review (review of available literature and maps) on the following:
  - a. Determine types of development and land use (in the catchment in question).
  - b. Gather hydrological data to determine the degree to which the flow regime has been modified (with the “virgin flow regime” as baseline). The emphasis is predominantly on surface hydrology and hydrology of surface water features as well as the land uses, such as agriculture and forestry, that lead to flow modifications. Important Note: The hydrology of landscapes is not explicitly mentioned in the RDM documentation and this author will make a case for its consideration as probably the most important component of investigating headwater systems and seepage wetlands and areas.
  - c. Assessment of the water quality as is documented in catchment study reports and water quality databases.
  - d. Investigate erosion and sedimentation parameters that address aspects such as bank erosion and bed modification. Important Note: The emphasis in the RDM documentation is again on river and stream systems with little mention of erosion of headwater and seepage zone systems. Again a case will be made for the emphasis of such information generation.
  - e. Description of exotic species (flora and fauna) in the specific catchment in question.
2. Conduct an aerial photographic assessment in terms of the parameters listed above.

3. Conduct a site visit and make use of local knowledge.
4. Assess the criteria and generate preliminary PES scores.
5. Generation of report.

**Table 1** presents the scoresheet with criteria for the assessment of habitat integrity of palustrine wetlands (as provided in the RDM documentation).

**Table 1 “Table W4-1: Scoresheet with criteria for assessing Habitat Integrity of Palustrine Wetlands (adapted from Kleynhans 1996)”**

Criteria and attributes	Relevance	Score	Confidence
<b>Hydrologic</b>			
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.		
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.		
<b>Water Quality</b>			
Water Quality Modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland		
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.		
<b>Hydraulic/Geomorphic</b>			
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.		
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railwaylines and other substrate disruptive activities which reduces or changes wetland habitat directly or through changes in inundation patterns.		
<b>Biota</b>			
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change		

	from wetland to terrestrial habitat and loss of wetland functions.		
Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.		
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).		
Alien fauna	Presence of alien fauna affecting faunal community structure.		
Overutilisation of biota	Overgrazing, Over-fishing, etc		
TOTAL MEAN			

Scoring guidelines per attribute:

natural, unmodified = 5; Largely natural = 4, Moderately modified = 3; largely modified = 2; seriously modified = 1; Critically modified = 0.

Relative confidence of score:

Very high confidence = 4; High confidence = 3; Moderate confidence = 2; Marginal/low confidence = 1.

Important Note: The present ecological state (PES) determination is, as discussed earlier in the report, based on criteria originally generated for palustrine and floodplain wetlands. Seepage wetlands very rarely have the same degree of saturation or free water and consequently often do not have permanent wetland zones. These wetlands are therefore often characterised by seasonal or temporary properties and as such a standard PES approach is flawed. The existing criteria is provided below as is a comment on the applicability as well as proposed improvements.

**Criteria**

Hydrological Criteria

- “Flow modification: Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.” Comment: Although the description is wide it is very evident that seepage or hillslope wetlands do not become inundated but rather are fed by hillslope return flow processes. The main criterion should therefore be the surface and subsurface hydrological linkages expressed as a degree of alteration in terms of the surface, hydrology and groundwater hydrology.



- “Permanent inundation: Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.” Comment: Mostly not applicable to hillslope seepage wetlands.

#### Water Quality Criteria

- “Water quality modification: From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.” Comment: Water quality in this context applies generally but cognisance should be taken of seepage water quality that can be natural but significantly different to exposed water bodies. The main reason for this being the highly complex nature of many redox processes within the hillslope.
- “Sediment load modification: Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.” Comment: This is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences.

#### Hydraulic / Geomorphic Criteria

- “Canalisation: Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.” Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydrogeology of the hillslope. These aspects should be elucidated and contextualised.
- “Topographic Alteration: Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railwaylines and other substrate disruptive activities which reduces or changes wetland habitat directly or through changes in inundation patterns.” Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydrogeology of the hillslope. These aspects should be elucidated and contextualised.

#### Biological Criteria

- “Terrestrial encroachment: Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.” Comment: Again this is a very relevant concept but on hillslopes should be linked to erosivity of the soils as well as the specific land use influences. This concept does however not address the influences on the hydrogeology of the hillslope. These aspects should be elucidated and contextualised.
- “Indigenous vegetation removal: Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.”
- “Invasive plant encroachment: Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).”
- “Alien fauna: Presence of alien fauna affecting faunal community structure.”
- “Overutilisation of biota: Overgrazing, Over-fishing, etc.”

### Scoring Guidelines

Scoring guidelines per attribute:

Natural, unmodified = 5

Largely natural = 4

Moderately modified = 3

Largely modified = 2

Seriously modified = 1

Critically modified = 0

Relative confidence of score:

Very high confidence = 4

High confidence = 3

Moderate confidence = 2

Marginal/low confidence = 1

#### **4.4.5 The Resource Directed Measures for Protection of Water Resources: Appendix W5 IER (Floodplain Wetlands) Determining the Ecological Importance and Sensitivity (EIS) and the Ecological Management Class (EMC)**

In Appendix W5 the methodology is provided for the determination of the ecological importance and sensitivity (EIS) and ecological management class (EMC) of floodplain wetlands.

"Ecological importance" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred. The Ecological Importance and sensitivity (EIS) provides a guideline for determination of the Ecological Management Class (EMC)." Please refer to the specific document for more detailed information.

The following primary determinants are listed as determining the EIS:

1. Rare and endangered species
2. Populations of unique species
3. Species / taxon richness
4. Diversity of habitat types or features
5. Migration route / breeding and feeding site for wetland species
6. Sensitivity to changes in the natural hydrological regime
7. Sensitivity to water quality changes
8. Flood storage, energy dissipation and particulate / element removal

The following modifying determinants are listed as determining the EIS:

1. Protected status
2. Ecological integrity

#### 4.5 SUMMARY AND PROPOSED APPROACH

When working in environments where the landscape and land use changes are significant (such as urban and mining environments) it is important to answer the following critical questions regarding the assessment and management planning for wetlands:

1. What is the reference condition?
2. What is the difference between the reference condition and the current condition and how big is this difference from a hydrological driver perspective?
3. What are the hydrological drivers (as a function of geology, topography, rainfall and soils) and what are the relative contributions of these drivers to the functioning of the wetland system?
4. What is the intended or planned land use in the wetland as well as terrestrial area and how will these developments impact on the hydrology of the landscape and wetlands?
5. How can the intended land use be plied to secure the best possible hydrological functioning of the landscape in terms of storm water attenuation, erosion mitigation and water quality?

The key to the generation of adequate information lies in the approach that is to be followed. In the next section an explanation about and motivation in favour of will be provided for a hydrology assessment approach. Due to the detailed nature of the information that can be generated through such an approach it is motivated that all wetland assessments be conducted with the requirements of criminal law in mind. The main reason for this is the fact that many well-meaning administrative exercises often yield not tangible results due to the gap in terms of information that is required should there be a compliance process followed.

#### **To Summarise:**

**During wetland assessments and delineations it is important to provide a perspective on assessment tools, the original or reference state of the wetland, the assessment process and outcome as well as the intended or possible state of the wetland and site post development. Urban and mining developments are good examples of cases where surrounding developments and land use changes have significant effects on wetland integrity and water quality emanating from the site.**

#### **5. CHALLENGES REGARDING WETLAND DELINEATION IN COMPLEX GEOLOGICAL ENVIRONMENTS**

**Disclaimer:** The following section represents a discussion that I use as standard in describing the challenges regarding wetland delineation and management in complex geological environments. This implies that the section is verbatim the same as in other reports provided to clients and the authorities. Copyright is strictly reserved.