LEAP

Dr. Gwen Theron
PrLArch No 97082

Landscape Architect
Environmental Planner

Imbrilinx cc 2010/089810/23

P.O. Box 13185
Hatfield 0028

FAX: 086 606 6130
012 34327512
083 302 2116

gwen.theron@telkomsa.net

15 December 2016

Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch
Gauteng Department of Agriculture and Rural Development
Diamond Building
11 Diagonal Street,
Johannesburg, 2001
Department central telephone number: (011) 240 2500

RE: The Whiskin Residential Development on Crowthorn Agricultural Holdings 101 and part of Holding 92, Kyalami, City of Johannesburg Metropolitan Municipality
Request for Confirmation that a NEMA application is not required.

1. INTRODUCTION

The proposed site is located within Crowthorne Agricutural Holdings in Kyalami, Johannesburg, just east of the Macgregor Road intersection with Pitts Avenue (R55). The site has been developed with current houses, remnants of previous houses and small open areas in-between. Refer to Figure 1 (A3 copy under Annexure A) for the location of the proposed site.

We wish to confirm that the land referred to as "The Whiskin Residential Development on Crowthorn Agricultural Holdings 101 and part of holding 92" does not require Environmental Authorisation.

We also wish to confirm that the above activity may commence in conjunction with activities in respect of "The Whiskin Residential Development on Holding 102, 103, 104, 105 and 106 Crowthorne Agricultural Holdings" which received Environmental Authorisation on 10 December 2015 (Gaut 002/14-15/E0258 – Attached as Annexure B1).

The aforementioned developments are two separate projects. Refer to Figure 2. After Environmental Authorisation has been granted for the residential development on Crowthorne Agricultural Holdings 102, 103, 104, 105 and 106, more land (Holdings 101 and 92) became available to the developer who wishes to now also develop these two properties.

A third application was lodged for linking a section of Whisken Avenue and Ethyl Avenue with the Future K56 Road, including the upgrade and widening for a section of Whisken Avenue and a section of Ethyl Avenue (GAUT: 002/15-16/E0166). This road will also traverse Crowthorne Agricultural Holdings 101 and 92 but will not have any conflict with the proposed residential developments as discussed above. This application received Environmental Authorisation on 10 December 2016 (Gaut 002/15-16/E0166– Attached as Annexure B2).

Please refer to Figure 3 (A3 copy under Annexure C) for the layout plan of the proposed development on holdings 101 and part of Holding 92 as well as the future K56 Road.

We thus wish to request that the Department please confirm that environmental authorisation in respect of the proposed residential development on Crowthorne Agricultural Holdings 101 and 92 is not required, as the proposed activities of the development falls below the thresholds as per the 2014 NEMA EIA.

A description of the proposed residential development on Crowthorne Agricultural Holdings 101 and 92 is as follows.

2. PROPOSED DEVELOPMENT ON CROWTHORN AH 101 & 92

The size of the land is approximately 3,19 ha; however, a large portion of the land has already been cleared and transformed (built up area and residential gardens). Less than 1 ha of existing vegetation, with a low sensitivity, will be cleared to accommodate the proposed residential development. See Figure 1 below for the location map.

Figure 1: Location map of Crowthorne Agricultural Holdings 101 and part of Holding 92

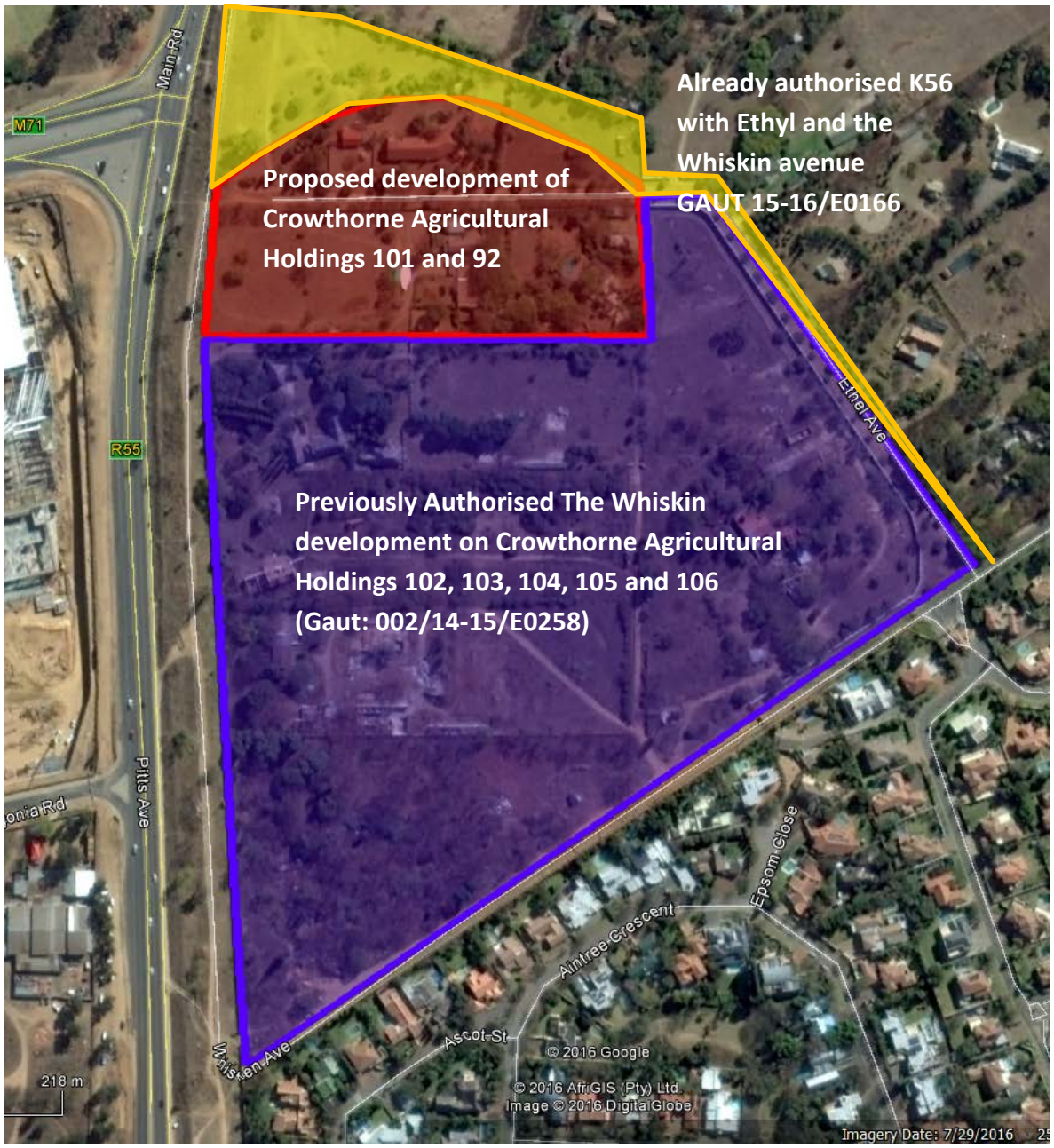


Figure 2: Location map of the proposed development in relation to K56 and The Whiskin residential development on Holding 102, 103, 104, 105 and 106 Crowthorne Agricultural Holdings.

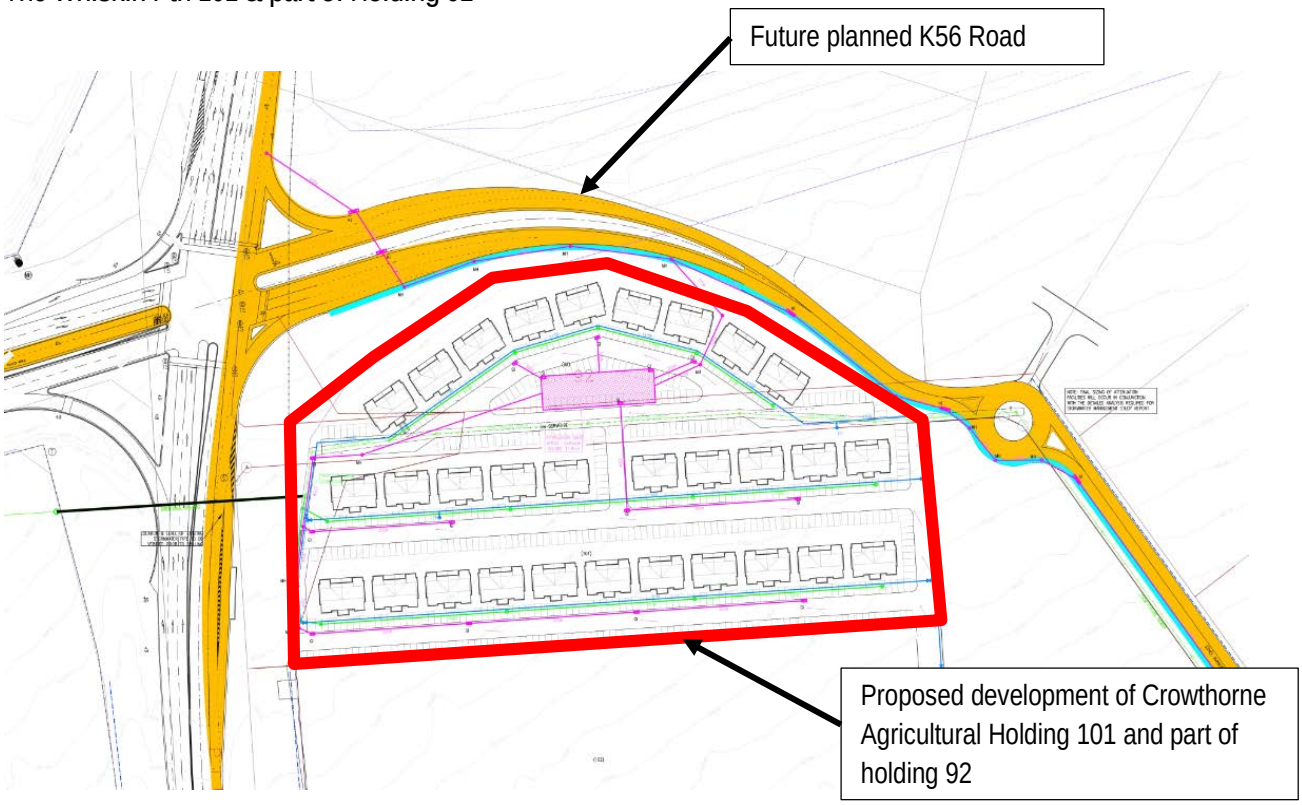


Figure 3: Layout Plan indicating the proposed development in relation to the future planned K56 Road (under separate Application)

3. SERVICES

3.1 Water

The existing 90mm Ø water supply network feeding the Crowthorne A/H area is insufficient to cater for the proposed development. It is therefore proposed to connect onto the 160mm Ø water main that will be extended for the adjacent residential development to the south (that has already been approved). This water main branches off from the 400mm Ø trunk main adjacent to the boundary between Erven 23 and 24 Kyalami Estates, at a point outside the boundary of these erven with Whisken Avenue.

The new supply pipe will be of uPVC and will be fitted with either fully restrained or victaulic couplings. Internally a combination of 110mm Ø and 75mm Ø pipes forming a network will be sufficient. The site connection will be at the highest point of the site (in the south-eastern corner).

Adequate flow and pressure thus exists for this development in conjunction with the adjacent approved development located to the south.

3.2 Sewer reticulation

There is currently no formal sewer reticulation servicing the erven making up the site. As a result, the two erven making up the site are presently making use of septic tank type systems.

A new 2500 mm Ø sewer will be implemented within the road reserve of the future planned K56 road. The proposed development will connect to this planned sewer in the north-eastern corner of the proposed site.

For both internal and external sewer reticulation, to comply with good engineering principles and Johannesburg Water standards for sewer maintenance manholes will be constructed at all changes of horizontal direction, changes in gradient and at junctions as well as at a maximum spacing of 80 m on straight lengths.

3.3 Stormwater

A new stormwater system will be implemented in conjunction with the future planned K56 Road. The proposed development will connect to this system just north of the site within the road reserve

Stormwater will be collected by 300mm Ø pipes and will be attenuated in a 1170m^3 attenuation tank before it is released into the formal system just north of the proposed site. All the piped systems within the development will be designed for a 1:20 year recurrence interval.

3.4 Floodlines

The development will not be affected by 1:50 year and 1:100 year flood lines.

3.5 Roads

Vehicular and pedestrian access will be obtained from the adjacent residential development situated to the south, which already has an approved access point from Whisken Avenue.

3.6 Electrical

It was confirmed that the electrical supply to the proposed development will be provided off the MV connection provided by Eskom.

4. DESCRIPTION OF ENVIRONMENT

4.1 GDARD Ridges Policy

The site is not subject to any ridges according to GDARD's ridges policy. Please see Figure 4 below.

4.2 GDARD Wetlands and Rivers

The site is not subject to any wetlands or rivers according to GDARD's layers. Please see Figure 5 below.

4.3 GDARD C-Plan 3

The site is not subject to an Important Area or Conservation Area according to GDARD's C-Plan 3. Please see Figure 6 below.

4.4 GDARD GAPA

According to the Gauteng Agricultural Potential Atlas the proposed site does has sections of moderate agricultural potential. However the site is situated within a developed urban area and any agricultural practices would not be practical as the sizes of the land is insufficient to provide sufficient services in terms of agricultural practices. Please refer to Figure 7 below.

Figure 4: Ridges (Source GDARD)

Figure 5: Rivers and Wetlands (Source GDARD)

Figure 6: C-Plan 3 (Source GDARD)

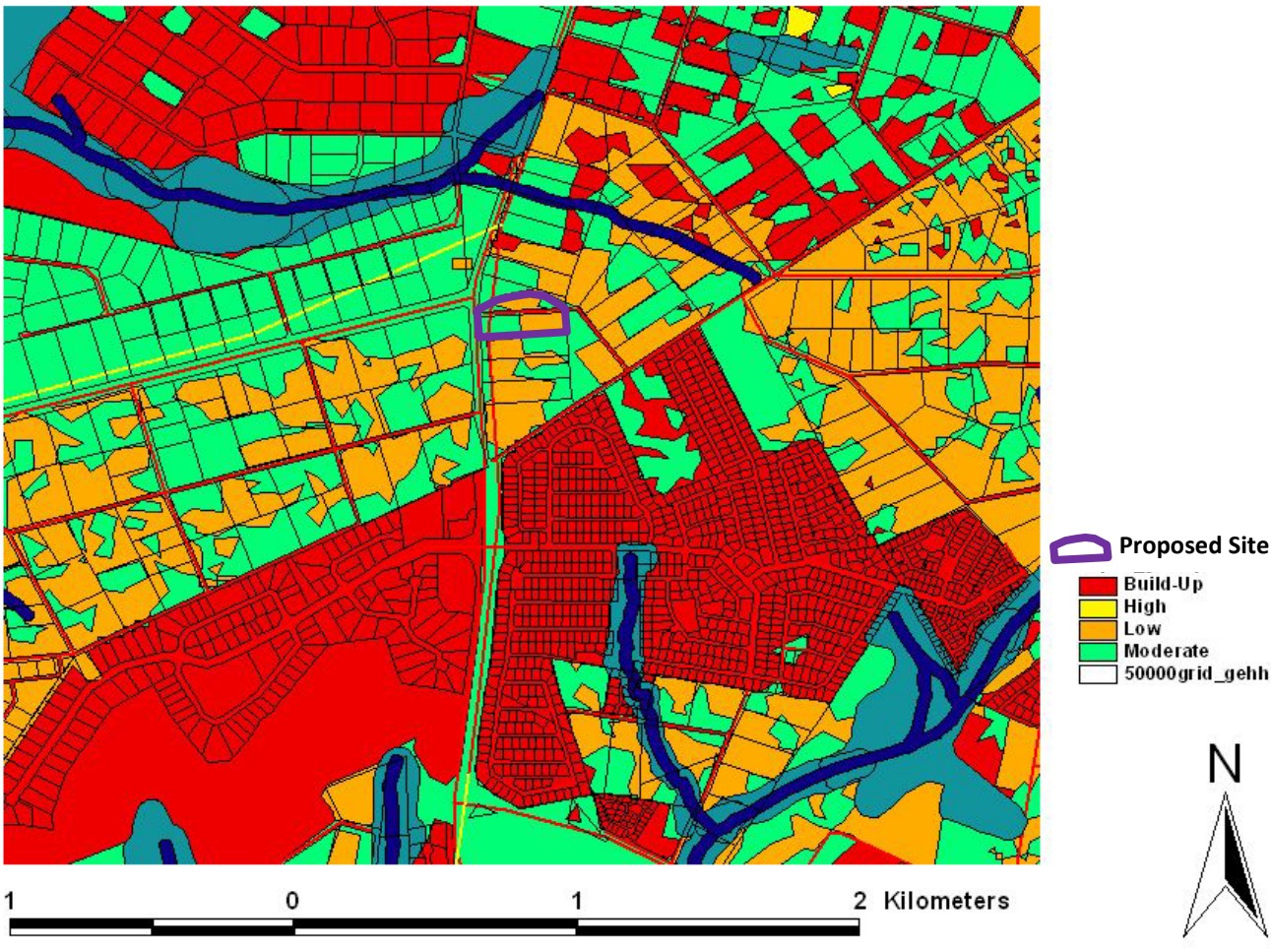


Figure 7: Gauteng Agricultural Potential Atlas (Source GDARD)

4.5 Flora

Prof. Leslie Brown complete a study for both the K56 as well as the Areas under development for The Whiskin. The study area falls within the Grassland Biome and classified as belonging to the endangered Egoli Granite Grassland vegetation type (GM10) (Mucina & Rutherford 2006) and comprises of two vegetation units namely the 1) Developed area; and 2) the Degraded grassland.

Developed area:

This area comprises various residential and out-buildings on small holdings. Various roads (paved and gravel) occur within these areas. The gardens are landscaped in some places with the indigenous grasses mowed on a weekly basis and maintained as lawns. The trees cover between 5-10%, the shrubs 5%, grasses 65-70% and the forbs 10% of the area.

Degraded grassland

This degraded grassland occurs on the western side next to the R55 (Pitts Avenue) road. Smaller patches are also present inbetween the developed areas. The soil is loamy with few rocks present. Trees cover up to 5%, shrubs 2%, grasses 80% and forbs 10% of the area.

Alien Woodland

The vegetation is dominated by the declared invader trees Melia azedarach that are mostly more than 10m tall. These trees cover more than 80% of the study site resulting in a highly degraded herbaceous layer underneath the canopies. A large number of declared alien invader species are prominent underneath the canopies of these trees and include Araujia sericifera, Cereus jamacaru, Mirabilis jalapa, Datura stramonium, Solanum mauritianum and Lantana camara. Forbs present include Bidens pilosa, Conyza bonariensis and Sida alba.

Refer to the relevant Ecological Reports (Annexure E) for more information with regards to the vegetation on the proposed site.

4.6 Fauna

Amphibians

No breeding habitat occurs on the site or in the immediate surrounding area. Extremely limted migratory habitat remains as the site has extensive barriers/walls as well as situated adjacent to R55 and M71 road and several secondary roads. These roads often offer the only migrational route for Giant Bullfrogs towards suitable breeding habitats; resulting in mass road fatalities. The R55 with its high vehicular traffic can be considered a migration barrier for the majority of frog species. Several high security walls and wire (razor) fences limit the migration of several species around the entire Kyalami Estate area.

Reptiles

No termite mounds were observed within the degraded grasslands and landscaped areas within the site. Two reptile species were recorded namely a Striped or Speckled Rock Skink (*Trachylepis punctatissima*) and a Cape Dwarf Gecko (*Lygodactylus capensis*). Both these species are urban exploiters and were observed within the landscaped/maintained gardens. Low reptile diversity is expected from the

transformed site due to extensive habitat transformation and high levels of anthropogenic activities on and surrounding the site.

Avifauna

The majority of species recorded during field surveys are common, widespread and typical highveld species. Numbers of bird species in the Kyalami area have declined mainly due to increased levels of human disturbances (quad and off-road bikes); extensive habitat transformation due to increased urban sprawl and agricultural activities; as well as severe habitat degradation of the wetlands as well as rivers (especially the Modderfontein spruit, Klein Jukskei and Jukskei)

Mammals

The only mammal species observed were a few scattered African Molerat burrows in the sandier sections of the site as well as a House Rat. Mammal diversity is expected to be low and mainly urban exploiters such as the introduced House Rat and House Mouse.

Figure 8 shows the results of the ecological assessment for 101 and 92 as included in the assessments for K56 and The Whiskin applications.

Figure 8: Ecological zones on Portion 92 and portion 101 taken form the results from Ecogical assessments on The Whiskin and K56

4.7 Heritage

The study area falls within that zone usually located on the front edge of (city) urban-sprawl where the land previously used for agricultural use (only) have become subdivided into small holdings. What used to be a large single agricultural unit or farm now consists of small properties. These units do not have their economic base in traditional agriculture but are sustained by a variety of land uses and economic activities with strong urban associations. This phenomenon happened in the past forty years. Therefore, most of the built fabric, date from this period. The result is that any historic farmsteads older than 60 years that may have existed have either disappeared or have been 'upgraded'.

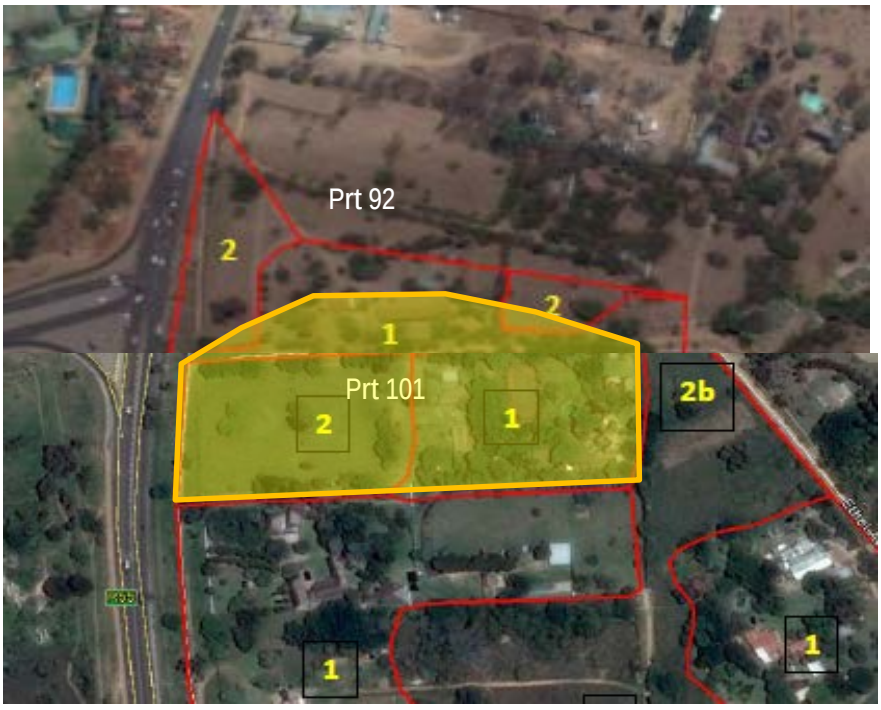
At present the open areas in the study area is densely overgrown and properties show an eclectic mix of styles and material used in their construction. Coupled to this is in some cases haphazard extension of the associated structures, indicating a chronological development of expansion as more room was required due to expanding families.

Heritage Impact Assessment studies (Annexure E) was undertaken to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which the development is proposed.

No site, features or objects of cultural significance could be identified in the study area, and it was therefore established that there would be no impact on heritage resources as a result of construction of the proposed development.

The heritage specialist recommended that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage consultant so that an investigation and evaluation of the finds can be made.

5. SENSITIVITY ASSESSMENT



The ecological assessments completed by Dr Leslie Brown shows that the site is not mostly developed by residential houses and gardens. sensitive. Small areas of grasslands remain on the land but is degraded.

The entire site is thus classified as Low sensitivity.

Figure 9: Sensitivity map

6. TOWN PLANNING STATUS

The SDF 2040 should be read in conjunction with Regional Spatial Development Frameworks (RSDFs) and other localised spatial policy documents including Urban Development Frameworks (UDFs) and Precinct Plans (PPs) that have been approved by council (SDF 2040, p23).

Notwithstanding this, in respect of the application site, the SDF 2040 overrides the guidelines and sub-area tables of the Regional Spatial Development Framework, including the density guidelines along mobility spines.

"For areas explicitly covered by this SDF including Transformation Zones and economic nodes (Chapter 7), density regulations (Table 6 p.160) and urban performance measures (section 8.3); this SDF will apply, with the exception to regulations of the approved Strategic Area Frameworks (2014) and PPs/UDFs approved since and including 2015" (SDF 2040, p24).

The application site does not form part of an approved Strategic Areas Framework, nor does it form part of a Precinct Plan or Urban Development Framework approved since 2015.

It is proposed to develop a high-density residential scheme and uses ancillary and subservient thereto.

The following land use development controls are proposed:

Proposed Erf 1 & 2

- Zoning: "Residential 3" and uses ancillary and subservient thereto, including a community centre and Private Open Space
- Density: A maximum of 300 units shall be developed
- Height: The height of all buildings shall be restricted to 4 storeys
- Coverage: The coverage shall not exceed 50%

7. CONCLUSION

None of the listed activities in terms of NEMA Reg 983, Reg 984 or GNR 985, will be triggered by the proposed residential development on Crowthorn Agricultural Holdings 101 & 92, and no sensitive areas could be identified.

8. REQUEST

We wish to confirm that the proposed The Whiskin Residential Development on Crowthorn Agricultural Holdings 101 and 92 does <u>not</u> require Environmental Authorisation.

We also wish to confirm that activities in respect of the proposed The Whiskin Residential Development on holdings 101 and 92 may commence in conjunction with activities of the adjacent residential development on Holding 102, 103, 104, 105 and 106 (which has already been approved). The aforementioned developments are two separate projects however the Developer wishes to construct both projects at the same time.

Please provide us with the confirmation in writing.

With respect,

Dr. Gwen Theron
EAP PrLArch 97802
X:\Main data\PROJECTS\T\The Whiskin - Ptn 101 & 92\Statutory bodies\The Whiskin - Ptn 101 & 92 Request for Confirmation.docx

ANNEXURES
Annexure A: Locality Map
Annexure B: Adjacent Developments - Records of Decision
Annexure C: Proposed Layout
Annexure D: Ecological Assessments
Annexure E: Heritage Impact Assessments
Annexure F: Townplanning Memorandum
Annexure G: Civil Services Report

Annexure A

Locality Map

The Whiskin Residential Development on Crowthorn Agricultural Holdings Ptn 101 and 92

Legend

Crowthorn Agricultural Holdings Ptn 101 and 92

Annexure B

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

OFFICE OF THE HEAD OF DEPARTMENT (HOD)
Diamond Building, 11 Diagonal Street, Newtown
PO Box 8769, Johannesburg, 2000
Tel: 011 240 2500
Fax: 011 240 2700

Reference: **Gaut 002/14-15/E0258**
Enquiries: Caroline Sithi
Telephone: 011 240 3394
Email: Caroline.Sithi@gauteng.gov.za

BY FACSIMILE: 086 578 4650
BY REGISTERED MAIL

Balwin Properties (Pty) Ltd
Private Bag X4
GARDENVIEW
2047

GDARD
Office of the HOD
10 DEC 2015 000011

Telephone No.: 011 680 4551

Dear Rodney Gray

ENVIRONMENTAL AUTHORISATION GRANTED-BAR: THE PROPOSED WHISKIN RESIDENTIAL DEVELOPMENT ON HOLDINGS 102, 103, 104, 105 AND 106 CROWTHORNE AGRICULTURAL HOLDINGS, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY

With reference to the above-mentioned application, please be advised that the Department has decided to **grant** Environmental Authorisation. The Environmental Authorisation and reasons for the decision are attached herewith as Annexure 1.

In terms of Regulation 4 (2) of the Environmental Impact Assessment Regulations, 2014, you must, in writing and within **fourteen (14) days** of the date of the decision on the application ensure that all registered interested and affected parties are provided with access to the decision and the reasons for such a decision as well as the provisions regarding the making of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 2 of the National Appeal Regulations, 2014 which regulates the appeal process. Should you wish to appeal any aspect of the decision, you must within **twenty (20) days** of the date of notification of the decision submit your appeal including supporting documents to the appeal administrator by any of the following means:

Postal Address:

The Appeals Administrator
Department of Agriculture and Rural Development
PO Box 8769
Johannesburg
2000

Physical Address:

The Appeals Administrator
Department of Agriculture and Rural Development
11 Diagonal Street
Diamond Building, 04th Floor
Newtown
Johannesburg
2000

Fax No: 011 240 3158/2700

Email Address: appeals@gauteng.gov.za

Your appeal must be submitted in the prescribed appeal form obtainable from the appeal administrator, Ms Tsholofelo Mere at telephone number 011 240 3204 or email address Tsholofelo.mere@gauteng.gov.za. The appeal form is also available from our website: www.gdard.gpg.gov.za. Should you have queries or require additional information regarding the appeal process, you can contact the appeal administrator on any of the mentioned contact details.

Yours faithfully

MS THANDEKA MBASSA
HEAD OF DEPARTMENT
DATE: 09/12/15

GDARD
Office of the HOD
10 DEC 2015 000011

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

GDARD
Office of the HOD
10 DEC 2015 000011

Reference Number:	Gaut 002/14-15/0258
Holder of authorisation:	Balwin Properties (Pty) Ltd
Location of activity:	Holdings 102, 103, 104, 105 and 106 Crowthorne Agricultural Holdings

1. Decision

The Department is satisfied, on the basis of information available and subject to compliance with the conditions of this Environmental Authorisation, that the applicant should be authorised to undertake the activities specified below:

2. Activities authorised

By virtue of the powers conferred by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) and the Environmental Impact Assessment Regulations, 2014, the Department hereby authorises- **Balwin Properties (Pty) Ltd** with the following contact details –

Private Bag X4
GARDENVIEW
2047

Tel No.: 011 680 4551
Fax No.: 086 578 4650

GDARD
Office of the HOD
10 DEC 2015 000011

to undertake the following activities (hereafter referred to as "the activities"):

listed as GN R. 983 Activities 9, 10 and 27 of Environmental Impact Assessment Regulations, 2014 promulgated in terms of Sections 24 (2)(a) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998, as amended), as described in the Basic Assessment Report (BAR: On-site Notice) dated October 2015 at the location stated below:

Proposal	Latitude(S)	Longitude(E)
	25°59'2.50"	28°4'42.07"

on Holdings 102, 103, 104, 105 and 106 Crowthorne Agricultural Holdings, City of Johannesburg Metropolitan Municipality.

The granting of this Environmental Authorisation is subject to the conditions set out below.

3. Specific Conditions of Authorisation

3.1 Environmental Authorisation is granted for the above mentioned activities on the above mentioned site that measures 12.8272 hectares in extent.

3.2 A **fourteen (14) days** written notice must be given to the Department that the activities will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activities will commence.

3.3 The proposed new marginal access road on Pitts Avenue by Kantey and Temper (Pty) Ltd dated 18 June 2015 must be submitted to the Johannesburg Roads Agency for approval.

3.4 A detailed storm water management plan must be approved by the City of Johannesburg Metropolitan Municipality (COJMM) and Johannesburg Roads Agency (JRA).

3.5 The construction area must be clearly demarcated before any construction activity take place and signage must be displayed during the construction phase to inform the general public about potential dangerous conditions on site.

3.6 An email entitled "request for medicinal plant rescue operation" must be sent to GDARD_BiodiversityInfo@gauteng.gov.za/Calvin.Jonhasi@gauteng.gov.za a minimum of six weeks prior to site clearance. The following documents must be attached to the

email: (1) A scanned version of the Record of Decision, (2) a map clearly showing the location of the site, (3) a plant species list for the site, (4) the site layout plan, clearly indicating which areas are to be retained as natural open space. The email should also indicate (1) the size of the site, (2) the contact details (telephone, fax and email) of the environmental control officer, who must make themselves available during the rescue operations and (3) the contact details (telephone, fax and email) of the project proponent and/or landowner. The relocation medical plats species must be done before commencement of the development.

3.7 Site clearing must be strictly limited to the construction area.

3.8 Any mixing of cement, solvents, asphalts, sealants, adhesives, paints, chemical or other noxious materials must be done on an impervious surface designated for such.

3.9 All waste streams generated must be managed in accordance with the hierarchy of waste management principles and disposed of at a licensed landfill site permitted to receive waste of that class must be the last option. Proof of disposal of waste must be kept on site and made available to the Department upon request. **The recyclable materials must be sorted at source and not be disposed off the landfill site.**

3.10 The rain water must be used for irrigation of landscape areas.

3.11 The bulbs and geyser must use renewable energy for township development.

3.12 If any soil contamination occurs during the construction and operational phases of the proposed activities, the contaminated soil must be removed to a suitable waste disposal facility and the site must be rehabilitated to the satisfaction of this Department. The opportunity for the on-site remediation and re-use of contaminated soil must be investigated prior to disposal and this Department must be informed in this regard.

3.13 The bulk services approval (e.g. water supply, sewage, waste disposal, electricity and storm water) and other related services must be obtained from the relevant competent authority before the commencement of any construction activities on site.

3.14 Should any heritage resources of any nature be uncovered during the construction the development must cease, SAHRA and/ or professional Heritage Specialists must be contacted immediately for investigations.

3.15 On completion of the project, all litter and construction debris must be removed from the site immediately. All waste must be disposed of at a registered or permitted waste disposal site for the type of waste produced.

3.16 Post development rehabilitation must make use of species which are indigenous to the area.

4. Management of the activities

4.1 The Environmental Management Programme ("EMPr") submitted as part of the application for environmental authorisation must be implemented. In addition to the submitted EMPr, the following must be implemented and be considered part of the subject EMPr:

a) Noise generated from construction activities must not exceed the recommended noise level of 85dB as required by the Occupational Health and Safety Standards.
b) Dust mitigation measures must be implemented throughout the construction phase.

5. Monitoring and Reporting

5.1 The commitment/mitigation measures and recommendations in all submitted documentation, including the Environmental Management Programme (EMPr) which forms part of the BAR dated October 2015 are an extension of this Environmental Authorisation. The EMPr submitted as part of the application for Environmental Authorisation is approved and must be strictly implemented during the construction phase of the proposed development. A copy of

the approved EMPr & Environmental Authorisation must be kept on site during the construction phase of the development.

5.2 Any proposed amendments to the EMPr (as a result of this Environmental Authorisation or otherwise) must be submitted in writing to the Department for approval prior to the amendment being implemented.

6. Operation of activities

6.1 These activities must commence within a period of **ten (10) years** from the date of issue of this authorisation.

6.2 If commencement of the activities does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activities to be undertaken.

GDARD
Office of the HOD
10 DEC 2015 000011

7. General conditions

7.1 Conditions of this authorisation are binding on the holder of the authorisation, including any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

7.2 The activities authorised may only be carried out at site indicated in this authorisation.

7.3 This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activities.

7.4 This authorisation, and EMPr, must be kept at the site where the activities will be undertaken. These documents must be produced to any authorised official of the Department who requests to inspect them and must also be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

7.5 Where any of the applicant's contact details change, including the name of the responsible holder of the authorisation, the physical or postal address and/ or telephonic details, the applicant must follow an amendment process as prescribed in Chapter 5 of the NEMA Environmental Impact Assessment Regulations, 2014 by submitting an amendment application to the Department for consideration and decision making as soon as the new details become known to the applicant.

7.6 Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 (as amended) and the regulations.

7.7 The holder of the Environmental Authorisation must notify the Department, in writing and within **twenty four (24) hours**, if the conditions of this Authorisation cannot be or are not adhered.

7.8 If the Department has reason to believe that the authorisation was obtained through fraud, non-disclosure of material information or misrepresentation of a material fact, the Department may, in writing, suspend or partially suspend, with immediate effect, the environmental authorisation and direct the holder of such environmental authorisation forthwith to cease any activities that have been commenced or to refrain from commencing any activities, pending a decision to withdraw the environmental authorisation.

8. Appeal of authorisation

8.1 The holder of the Environmental Authorisation must notify every registered interested and affected party, in writing and within **fourteen (14) days**, of receiving notice of the Department's decision to authorise the activities.

8.2 The notification referred to in 8.1 must:

8.2.1 Specify the date on which the Environmental Authorisation was issued;

8.2.2 Inform the registered interested and affected party of the appeal procedure provided for in Chapter 2 of the National Appeals Regulations, 2014; and

8.2.3 Advise the interested and affected party that a copy of the Environmental Authorisation and reasons for the decision will be furnished on request.

Date of Environmental Authorisation: 09/12/15

GDARD
Office of the HOD
10 DEC 2015 000011

Annexure 1: Reasons for Decision

1. Background

The applicant, **Balwin Properties (Pty) Ltd** applied for authorisation to undertake the following activities listed as GN R. 983 Activities 9, 10 and 27 for the proposed development of a high density residential scheme and uses ancillary and subservient thereto on Holdings 102, 103, 104, 105 and 106 Crowthorne Agricultural Holdings, City of Johannesburg Metropolitan Municipality.

The applicant appointed **Landscape Architect Environmental Planner** to undertake a Basic Assessment process.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration -

a) The information contained in the Basic Assessment Report dated October 2015, including:
   - Ecological Report on Flora and Fauna;
   - Motivation for the proposed new marginal access road;
   - Heritage Impact Assessment; and
   - Environmental Management Programme.

b) The comments received from interested and affected parties as included in the basic assessment report submitted to the Department on 14 October 2015.

c) Relevant information contained in the Departmental information base including the Geographical Information System (GIS) and Conservation Plan Version 3.3.

d) The objectives and requirements of relevant legislation, policies and guidelines, including Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended).

e) The findings of the site inspection undertaken by Kagiso Motlhasedi on 04 November 2015.

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) Nature of the proposed site.
b) The suitability of the proposed activities within the receiving environment.
c) Public Participation process.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings -

a) The portion of the proposed site is located within an Endangered Ecosystem (Egoli Granite Grassland) as per the Departmental Conservation Plan version 3.3. Page 29 of an Ecological Report on the Flora and Fauna by Enviroguard Ecological Services dated February 2015 states that one threatened medicinal plant species (African Potato/ Hypoxis hermerocallidea) was found within the site, no wetlands or any other sensitive features have been identified on site.

b) The site is already transformed and consists of old residential buildings, in addition to this the proposed development is in line with the RSDF 2010/11 for Region A, Sub Area 6.

c) The public participation process complies with the requirements of Chapter 6 of the EIA Regulations, 2014 and the comments from the organs of state have been included in the BAR dated October 2015. The interested and affected parties' consultation process included the placing of advertisement in the Beeld Newspaper dated 23 January 2015. Site notices were placed at various points. Written notices were sent to all the adjoining land owners and a public meeting was held on 24 February 2015 at the Urban Life Church, Midrand. The public participation process was thus adequately conducted.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the Environmental Authorisation, the activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activities can be mitigated to acceptable levels. The Environmental Authorisation is **accordingly granted.**

GDARD
Office of the HOD
10 DEC 2015 000011

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

OFFICE OF THE HEAD OF DEPARTMENT (HOD)
Diamond Building, 11 Diagonal Street, Newtown
PO Box 8769, Johannesburg, 2000
Tel: 011 240 2500
Fax: 011 240 2700

Reference: **Gaut 002/15-16/E0166**
Enquiries: Caroline Sithi
Telephone: 011 240 3394
Email: Caroline.Sithi@gauteng.gov.za

BY FACSIMILE: 086 578 4650
BY EMAIL: Rodney@balwin.co.za

BY REGISTERED MAIL

GDARD
Office of the HOD
13 DEC 2016 000021

Balwin Properties (Pty) Ltd on behalf of GAUTRANS
Private Bag X 4
GARDENVIEW
2047

Telephone No.: 011 680 4551

Dear Rodney Gray

ENVIRONMENTAL AUTHORISATION GRANTED-BAR: THE PROPOSED LINKING OF A SECTION OF WHISKEN AVENUE AND ETHYL AVENUE WITH THE FUTURE K56 ROAD INCLUDING THE UPGRADE AND WIDENING OF A SECTION OF WHISKEN AVENUE AND A SECTION OF ETHYL AVENUE; CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY

With reference to the above-mentioned application, please be advised that the Department has decided to grant Environmental Authorisation. The Environmental Authorisation and reasons for the decision are attached herewith as Annexure 1.

In terms of Regulation 4 (2) of the Environmental Impact Assessment Regulations, 2014, you are instructed to notify all registered interested and affected parties, in writing and within **fourteen (14) days** of the date of this letter, of the Department's decision in respect of your application as well as the provisions regarding lodging of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 2 of the National Appeal Regulations, 2014 which regulates the appeal process. Should you wish to appeal any aspect of this decision, you must within **twenty (20) days** of the date of notification of the decision submit your appeal including supporting documents to the appeal administrator by any of the following means:

Postal Address:

The Appeals Administrator
Department of Agriculture and Rural Development
PO Box 8769
JOHANNESBURG
2000

Physical Address:

The Appeals Administrator
Department of Agriculture and Rural Development
11 Diagonal Street
Diamond Building, 04th Floor
Newtown
JOHANNESBURG
2000

GDARD
Office of the HOD
13 DEC 2016 000021

Fax No: 011 240 3158/2700

Email Address: appeals@gauteng.gov.za

Your appeal must be submitted in the prescribed appeal form obtainable from the appeal administrator, Ms Tsholofelo Mere at telephone number 011 240 3204 or email address Tsholofelo.mere@gauteng.gov.za. The appeal form is also available from our website: www.gdard.gpg.gov.za. Should you have queries or require additional information regarding the appeal process, you can contact the appeal administrator on any of the mentioned contact details.

Yours faithfully

MS THANDEKA MBASSA
HEAD OF DEPARTMENT
DATE: 13/12/16

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

GDARD
Office of the HOD
13 DEC 2016 000021

Environmental Authorisation

Reference Number:	Gaut 002/15-16/E0166
Holder of authorisation:	Balwin Properties (Pty) Ltd on behalf of GAUTRANS
Location of activities:	Holding 92 Crowthorne Agricultural Holdings

1. Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this Environmental Authorisation, that the applicant should be authorised to undertake the activities specified below.

2. Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) and the Environmental Impact Assessment Regulations, 2014, the Department hereby authorises- **Balwin Properties (Pty) Ltd** with the following contact details –

Private Bag X4
GARDENVIEW
2047

GDARD
Office of the HOD
13 DEC 2016 000021

Telephone No.: 011 680 4551

to undertake the following activities (hereafter referred to as "the activities"):

listed as GN R. 983 Activities 9, 24 and 27 of Environmental Impact Assessment Regulations, 2014 promulgated in terms of Sections 24 (2) (a) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998, as amended), as described in the application form and Basic Assessment Report (BAR) dated 03 March 2016 and 21 September 2016 respectively, for the proposed linking of a section of Whisken Avenue and Ethyl Avenue with the future K56 Road and the upgrade and widening of a section of Whisken Avenue and a section of Ethyl Avenue; City of Johannesburg Metropolitan Municipality.

The granting of this Environmental Authorisation is subject to the conditions set out below.

3. Specific Conditions of Authorisation

3.1 Environmental Authorisation is granted for the proposed linking of a section of Whisken Avenue and Ethyl Avenue with the future K56 Road including the upgrade and widening of a section of Whisken Avenue and a section of Ethyl Avenue. Below are co-ordinates of the proposed route.

Proposal	Latitude(S)	Longitude(E)
Commencement Point	25°59'4.35"	28°4'49.49"
Corner of Whisken and Ethyl Avenue	25°59'2.30"	28°4'51.74"
Ethyl Avenue Bend	25°58'55.80"	28°4'46.86"
Intersection with R55	25°58'84.37"	28°4'37.22"

3.2 A **fourteen (14) days** written notice must be given to the Department that the activities will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activities will commence.

3.3 The Traffic Impact Assessment (Report No. 21740) conducted by WSP/Parsons Brinkerhoff dated June 2016 must be submitted to the Johannesburg Roads Agency (JRA) and the Gauteng Department of Roads and Transport (GAUTRANS) for approval.

3.4 Excerpt for the one Orange listed geophyte *Hypoxis hemerocalidea* (African potato), no Red data habitat is present on the property and no such species were recorded. It is

recommended that *Hypoxis hemerocalidea* individuals are removed from the property (under the supervision of a qualified botanists/ecologist/natural conservator) and replanted in suitable natural habitat.

3.5 An email entitled "request for medicinal plant rescue operation" must be sent to GDARD_BiodiversityInfo@gauteng.gov.za/Calvin.Jonhasi@gauteng.gov.za a minimum of six weeks prior to site clearance. The following documents must be attached to the email: (1) A scanned version of the Environmental Authorisation, (2) a map clearly showing the location of the site, (3) a plant species list for the site, (4) the site layout plan, clearly indicating which areas are to be retained as natural open space. The email should also indicate (1) the size of the site, (2) the contact details (telephone, fax and email) of the environmental control officer, who must make themselves available during the rescue operations and (3) the contact details (telephone, fax and email) of the project proponent and/or landowner.

3.6 The construction area must be clearly demarcated before any construction activity takes place and signage must be displayed during the construction phase to inform the general public about potential dangerous conditions on site.

3.7 A detailed storm water management plan must be approved by the City of Johannesburg Metropolitan Municipality (COJMM) and Johannesburg Roads Agency (JRA).

3.8 Removal of vegetation must be minimal to the development foot-print.

3.9 If any soil contamination occurs during the construction phase of the proposed activities, the contaminated soil must be removed to a licensed waste disposal facility and the site must be rehabilitated to the satisfaction of this Department. The opportunity for the on-site remediation and re-use of contaminated soil must be investigated prior to disposal and this Department must be informed in this regard.

3.10 The storage and handling of hazardous substances such as solvents, lubricants, fuels and oils must be done on an impervious surface that is able to contain 110% of substance should a spillage occur.

3.11 The holder of the Environmental Authorisation must ensure that vehicles used for construction purposes are maintained in good condition in order to minimise noise, vehicle exhaust emissions, and the risk of soil contamination through the loss of lubricants and hydraulic fluids.

3.12 On completion of the project, all litter and construction debris must be removed from the site immediately. All waste streams to be generated must be managed in accordance with the hierarchy of waste management principles and disposal at a licensed landfill site permitted to receive waste of that class must be the last option. Proof of disposal of waste must be kept on site and made available to the Department upon request. All waste must be disposed of at a registered or permitted waste disposal site for the type of waste produced.

3.13 Should any heritage resources of any nature be uncovered during the construction development, construction must cease, SAHRA and/ or professional Heritage Specialists must be contacted immediately for investigations.

3.14 Post development rehabilitation must make use of species which are indigenous to the area.

4. Management of the activities

4.1 The Environmental Management Programme ("EMPr") submitted as part of the application for Environmental Authorisation must be implemented. In addition to the submitted EMPr, the following must be implemented and be considered part of the subject EMPr:

a) Noise generated from construction activities must not exceed the recommended noise level of 85dB as required by the Occupational Health and Safety Standards. If construction is to take place over the weekend; permission from adjacent landowners should be acquired prior to construction.

b) Dust suppression measures must be implemented throughout the construction phase.

5. Monitoring and reporting

5.1 The commitment/mitigation measures and recommendations in all submitted documentation, including the Environmental Management Programme (EMPr) which forms part of the BAR received by the Department on 21 September 2016 are an extension of this Environmental Authorisation and are binding to all contractors and operators on site and must be implemented. A copy of the approved EMPr & Environmental Authorisation must be kept on site during the construction phase of the development.

5.2 An Environmental Control Officer (ECO) must be appointed by the Environmental Authorisation holder for the duration of the construction phase to ensure that the conditions as stipulated in the Environmental Authorisation as well as the approved EMPr are adhered to. The contact details of the ECO must be forwarded to the Department, prior the commencement of the activities.

6. Operation of activities

6.1 These activities must commence within a period of **ten (10) years** from the date of issue of this Environmental Authorisation.

6.2 If commencement of the activities does not occur within that period, the Environmental Authorisation lapses and a new application for Environmental Authorisation must be made in order for the activities to be undertaken.

7 General Conditions

7.1 Conditions of this Environmental Authorisation are binding on the holder of the Environmental Authorisation, including any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the Environmental Authorisation.

7.2 The activities authorised may only be carried out at the properties or sites indicated in this Environmental Authorisation.

7.3 Any changes to, or deviations from, the activities description set out in this Environmental Authorisation must follow the amendment process as prescribed in Chapter 4 (Part 1 and 2) of the NEMA EIA Regulations, 2014 and be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the Environmental Authorisation to apply for further authorisation in terms of the Regulations.

7.4 This Environmental Authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activities.

7.5 This Authorisation and EMPr must be kept at the property/site where the activities will be undertaken. These documents must be produced to any authorised official of the Department who requests to inspect them and must also be made available for inspection by any employee or agent of the holder of the Environmental Authorisation who works or undertakes work at the property.

7.6 Where any of the applicant's contact details change, including the name of the responsible holder of the Environmental Authorisation, the physical or postal address and/ or telephonic details, the applicant must follow an amendment process as prescribed in Chapter 5 of the

NEMA Environmental Impact Assessment Regulations, 2014 by submitting an amendment application to the Department for consideration and decision making as soon as the new details become known to the applicant.

7.7 Non-compliance with a condition of this Environmental Authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 (as amended) and the regulations.

7.8 The holder of the Environmental Authorisation must notify the Department, in writing and within **twenty four (24) hours**, if the conditions of this Environmental Authorisation cannot be or are not adhered.

7.9 If the Department has reason to believe that the Environmental Authorisation was obtained through fraud, non-disclosure of material information or misrepresentation of a material fact, the Department may, in writing, suspend or partially suspend, with immediate effect, the Environmental Authorisation and direct the holder of such Environmental Authorisation forthwith to cease any activities that have been commenced or to refrain from commencing any activities, pending a decision to withdraw the Environmental Authorisation.

8 Appeal of authorisation

8.1 The holder of the Environmental Authorisation must notify every registered interested and affected party, in writing and within **fourteen (14) days**, of receiving notice of the Department's decision to authorise the activities.

8.2 The notification referred to in 8.1 must:

8.2.1 Specify the date on which the Environmental Authorisation was issued;

8.2.2 Inform the registered interested and affected party of the appeal procedure provided for in Chapter 2 of the National Appeals Regulations, 2014; and

8.2.3 Advise the interested and affected party that a copy of the Environmental Authorisation and reasons for the decision will be furnished on request.

Date of Environmental Authorisation: 13/12/16

GDARD
Office of the HOD
13 DEC 2016 000021

Annexure 1: Reasons for Decision

1. Background

The applicant, **Balwin Properties (Pty) Ltd on behalf of GAUTRANS** applied for authorisation to undertake the following activities:

listed as GN R. 983 Activities 9, 24 and 27 of Environmental Impact Assessment Regulations, 2014 for the proposed linking of a section of Whisken Avenue and Ethyl Avenue with the future K56 Road including the upgrade and widening of a section of Whisken Avenue and a section of Ethyl Avenue; City of Johannesburg Metropolitan Municipality.

The applicant appointed **LEAP** to undertake a Basic Assessment process.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia,* the following into consideration –

a) The information contained in the Basic Assessment Report dated September 2016, including:
   - Ecological Report on the Flora and Fauna;
   - Cultural Heritage Impact Assessment;
   - Traffic Impact Assessment; and
   - Environmental Management Programme.

b) The comments received from interested and affected parties as included in the Basic Assessment Report and Addendum to the Basic Assessment Report submitted to the Department on 21 September 2016, 27 September 2016 and 30 September 2016 respectively.

c) Relevant information contained in the Departmental information base including Geographical Information System (GIS) and Conservation Plan Version 3.3.

d) The objectives and requirements of relevant legislation, policies and guidelines, including Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended).

e) The findings of the site inspection undertaken by officials of the Department on 30 September 2016.

3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) Nature of the proposed site.
b) The suitability of the proposed activities within the receiving environment.
c) Public Participation Process.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings –

a) The Departmental Conservation Plan Version 3.3 depicts patches of Threatened Ecosystem (Endangered) along the proposed route. Sections of the proposed route have also been transformed and no other sensitivities have been depicted. Page 17 of the Draft BAR indicates that one Orange Listed geophyte Hypoxis Hemerocalidea (African Potato) has been identified within the proposed route. The mitigation measures provided in the BAR submitted to this Department are considered adequate for the management of the individual species as well as the overall proposed activities.
b) The proposed Road will predominantly be constructed within the existing Road reserves of Whisken and Ethyl Avenues, with a section of the road crossing through Holding 92 of Crowthorne Agricultural Holdings which has already been transformed (low ecological significance).
c) The public participation process complied with the requirements of the EIA Regulations, 2014 and the comments from the organs of state and interested and affected parties have been included in the BAR. The interested and affected parties' consultation process included the placing of an advertisement in the Citizen Newspaper on 4 March 2016. Site notices were placed on various conspicuous places around the site and written notifications were sent to different stakeholders.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the Environmental Authorisation, the activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activities can be mitigated to acceptable levels. The Environmental Authorisation is **accordingly granted.**

GDARD
Office of the HOD
13 DEC 2016 000021

Annexure C

N

LEGEND

160ø EXISTING SEWER
MANHOLE
PROPOSED SEWER
110ø EXISTING WATER
WATER VALVE
PROPOSED WATER
200ø EXISTING STORM WATER
PROPOSED STORM WATER
GRID INLET

NOTE: FINAL SIZING OF ATTENUATION FACILITIES WILL OCCUR IN CONJUNCTION WITH THE DETAILED ANALYSIS REQUIRED FOR STORMWATER MANAGEMENT STUDY REPORT

3m SERVITUDE

ATTENUATION TANK APRON 13x43x2m³ VOLUME 1170m³

LOCATION & LEVEL OF EXISTING STORMWATER PIPE TO BE VERIFIED PRIOR TO DRILLING

DRAINAGE SERVICE

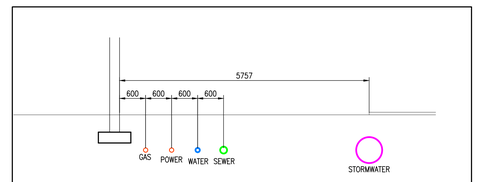
PHILIP MOKAE STREET

WHISKIN AVENUE

ETHEL AVENUE

(92) (101) (102) (103)

TYPICAL SECTION OF SERVICES
SCALE 1:50



REFERENCE DRAWINGS

DRG. No.	DESCRIPTION

REV	DESCRIPTION	DR.	APP.	DATE
A	ISSUED FOR DISCUSSION	WNR		27/10/2016

	INITIALS	SIGN	DATE
DESIGNED	W.N. RIHLAMPFU		27/10/2016
DRAWN	W.N. RIHLAMPFU		27/10/2016
PROJECT ENG.	F. BAIN		27/10/2016
APPROVED	F. BAIN		27/10/2016

K&T
KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
P O BOX 412541 CRAIGHALL SOUTH AFRICA 2024 TEL +27 11 501 4760

CLIENT
Balwin PROPERTIES

PROJECT
WHISKIN AVENUE
ERF 92 & 101
(CROWTHORNE EXT.20)

TITLE
COMBINED
SERVICES LAYOUT
PHASE B

SCALE 1:500

DRAWING No. 6752/205 REV A

Annexure D

March 2016

AN ECOLOGICAL REPORT ON THE FLORA AND FAUNA: The Whisken Portion 92

A report commissioned by LEAP

ENVIROGUARD ECOLOGICAL SERVICES CC
PO Box 703
Heidelberg
1438

Cell: 082 4641021
envguard@telkomsa.net

CONTENTS

CONDITIONS RELATING TO THIS REPORT

Declaration of interest

Enviroguard Ecological Services cc and its members/co-workers have no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Enviroguard Ecological Services cc is not a subsidiary, legally or financially of the proponent.

The study was undertaken by Prof. LR Brown (PhD UP) and Mr CL Cook (MSc UP). Prof Brown and Mr Cook are registered as a Professional Natural Scientists with the following details:

Prof LR Brown: Reg. No. 400075/98 (Botanical Science and Ecological Science).
Mr C Cook: Reg. No. 400084/08 (Aquatic Science)

Indemnity

Although Enviroguard Ecological Services cc exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Enviroguard Ecological Services cc and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. .Enviroguard Ecological Services cc accepts no liability, and the client, by receiving this document, indemnifies Enviroguard Ecological Services cc and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Enviroguard Ecological Services cc and by the use of the information contained in this report.

Factors limiting the quality of this study

Flora: A once off survey was conducted while the study was done in March 2016. Thus only those flowering plants that flowered at the time of the visit could be identified with high levels of confidence. Some of the more rare and cryptic species may have been overlooked due to their inconspicuous growth forms. Many of the rare and endangered succulent species can only be distinguished (in the veld) from their very similar relatives on the basis of their reproductive parts. These plants flower during different times of the year. Multiple visits to any site during the different seasons of the year could therefore increase the chances to record a larger portion of the total species complex associated with the area. The survey of

the study site is however considered as successful with a correct identification of the different vegetation units.

Fauna: Limitation to a base-line ecological survey for one day during March 2016. The majority of threatened species are extremely secretive and difficult to observe even during intensive field surveys conducted over several years this is especially pertinent to the highly elusive and secretive Striped Harlequin Snake and Giant Bullfrog. There is a limitation of historic data and available databases for the majority of threatened species especially the Striped Harlequin Snake where only 80 records exist for Southern Africa, Swaziland and Lesotho (SARCA 2009). The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys conducted in similar habitats within the area).

Approach

Conclusions reached and recommendations made are based not only on occurrence of individual species, but more appropriately on habitats and ecosystem processes. Planning must therefore allow for the maintenance of species, habitats and ecosystem processes, even if Red Data or endemic plant species are absent.

Prof LR Brown *Pri.SciNat*; MGSSA
Enviroguard Ecological Services cc

INTRODUCTION

The natural resources of South Africa, with its highly complex and diversified society, are continually under threat from development especially in areas richly endowed with natural resources. Uncontrolled and ill-planned development is one of the biggest threats to the naturally evolved life forms on earth. Past development in many parts of the world has led to the destruction of various plant and animal species and their habitats. The achievement of balanced development satisfying the human needs while also conserving the natural resources/habitat is one of the biggest challenges faced by decision-makers in the country today.

In order to prevent the destruction of any ecosystem, it is important that systematic planning and co-ordination of human activities and development should receive priority. This planning should include studies of the natural environment (soil, water, vegetation, animals and cultural / historical aspects).

Plant communities are regarded as fundamental units of an ecosystem and therefore form the base for environmental planning and the compilation of environmental management plans. Plant species assemblages reflect habitat and ecosystem health and rarity, and are therefore imperative for an Environmental Impact Assessment.

AIMS OF THE STUDY

This report aims to present an ecological assessment of the flora and fauna of Holding 98 Chartwell, Johannesburg (hereafter referred to as the study area).

The objectives of this study were to:

- Identify, describe and delineate the different vegetation units present on the property
- Compile a vegetation unit map of the area
- Provide a description of the fauna occurring on the study site.
- Identify species (mammals, birds, reptiles, amphibians) of conservation importance that could possibly occur on the proposed site.
- To provide a sensitivity map of the study area (where applicable)

STUDY AREA

The study area falls within the **Grassland Biome** and classified as belonging to the endangered **Egoli Granite Grassland vegetation type (GM10)** (Mucina & Rutherford 2006).

The site is located within Crowthorne Agricutural Holdings in Kyalami, Johannesburg. The northern and eastern boundaries are formed by Ethel Avenue, the southern by Whisken Avenue and the western by Pitts Avenue (R55). The site has been developed with current houses, remnants of previous houses and small open areas in-between. The area is surrounded by residential developments in the south while residential houses on small holding properties occur around the other boundaries (Figure 1).

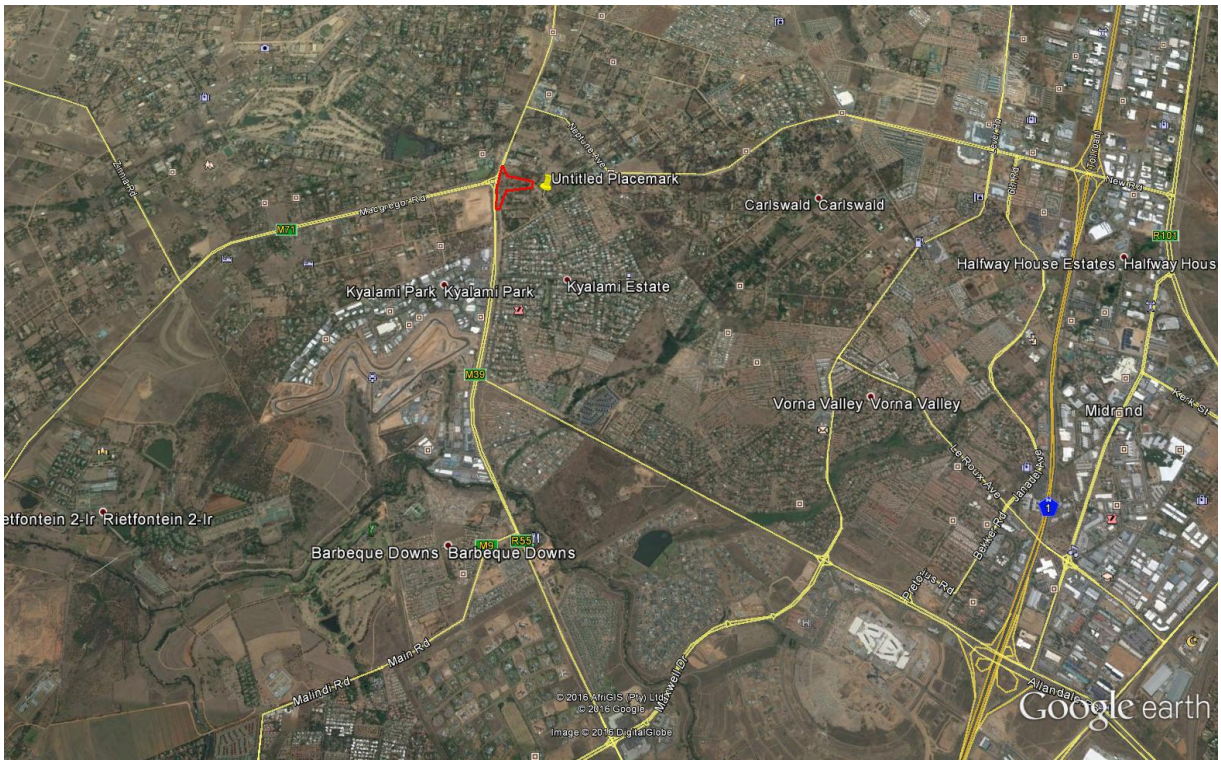


Figure 1. Approximate location of the study site – indicated in red (Source: Google Earth).

Existing impacts on the site include:

- The site is situated mainly within small holding developments and along transformed road reserves.
- Sections are maintained as lawns.
- Illegal dumping of building rubble and garden refuse occurs around the site.
- Extensive littering adjacent to the roads.
- Alien invasive vegetation is present throughout the area
- Various footpaths traverse the area.

METHODS

VEGETATION

The total floristic approach to vegetation sampling was used to describe the vegetation as ecological units for study. An overview of the vegetation was first obtained from relevant literature. Ecological sensitivity of the larger vegetation type within which the study area occurs was researched and the habitat and plant species assemblages were categorised accordingly.

Data recorded included:

A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were compiled. All identifiable plant species were listed. Notes were additionally made of any other features that might have an ecological influence.

Red data species

An investigation was also carried out on rare and protected plants that might possibly occur in the region. For this investigation the National Red List of Threatened Plants of South Africa, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI) was used. The presence of rare and protected species or suitable habitat was recorded during the field visit.

Data processing

A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the vegetation units include the tree, shrub and herbaceous layers. The conservation priority of each vegetation unit was assessed by evaluating the plant species composition in terms of the present knowledge of the vegetation of the Savanna Biome of South Africa. The following four conservation priority categories were used for each vegetation unit::

High:	Ecologically sensitive and valuable land with high species richness that should be conserved and no developed allowed.
Medium:	Land that should be conserved but on which low impact development could be considered.
Medium-low:	Land that has some conservation value but on which development could be considered with limited impact on the vegetation / ecosystem. It is suggested that certain sections of the vegetation be maintained.

Low: Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation / ecosystem.

FAUNA

Predictive methods

A 1:50 000 map of the study area was provided showing existing infrastructure and the proposed Crowthorne Agricutural Holdings site. This was used as far as possible in order to identify potential "hot-spots" or specialised habitats e.g. patches of open Egoli Granite grassland vegetation, rivers (Modderfontein Spruit, Klein Jukskei and Jukskei River), palustrine wetlands (valley bottom and seepage wetlands) and dams. Satellite imagery of the area was obtained from Google Earth was studied in order to get a three dimensional impression of the topography and current land use. Aerial photographs were utilised for the sensitivity mapping using Arcview 9.2

Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur within the Kyalami AH (2528 DA) Quarter Degree Grid Cell (QDGC). The literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al,* 2009) as well as internet using POSA (http://posa.sanbi.org). *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU's MammalMAP (http://vmus.adu.org.za/vm_sp_list.php accessed on the 10th of January 2015) for mammals. Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds). 2005. *Roberts- Birds of Southern Africa VII*th *ed*. And BARNES, K.N. (ed.) (2000) *The Escom Red Data Book of Birds of South Africa, Lesotho and Swaziland* for avifauna (birds) as well as internet SABAP2 (http://sabap2.adu.org.za accessed on the 10th of January 2015). *A Complete Guide to the Frogs of Southern Africa* (du Preez & Carruthers 2009) and *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SAFAP's FrogMAP (http://vmus.adu.org.za). The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) as well as SARCA's ReptiMAP (http://sarca.adu.org.za accessed on the 10th of January 2015 for reptiles.

Site Investigation Methodology

A preliminary assessment of the status, spatial requirements and habitat preferences of all priority species likely to occur on the proposed Kyalami Estate site was undertaken. For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. For other species such as the Striped Harlequin Snake, little of this information was readily available and conservation targets remain speculative. Species assessments will be updated when additional data becomes available and where appropriate, proposed conservation targets will be revised.

A survey of the proposed development areas was carried out by driving around the entire area by car and closer inspection of the actual site carried out on foot during daylight as well as an evening survey during March 2016. Due to the close proximity of the site to the R55 as well as historic agricultural activities and present high-density residential developments within Kyalami Estate; the majority of natural vegetation (Egoli Granite Grassland Gm10) has already been transformed or become severely degraded due to large scale illegal dumping activities and invasion of anthropogenic grasses (kikuyu) as weedy plant and alien tree species (*Acacia mearnsii*, Melia azedarach*, Jacaranda mimosifolia** and *Morus alba**). The majority of the site consists of completely transformed vegetation due to existing residential developments and abandoned buildings.

RESULTS OF VEGETATION SURVEY

The study area comprises two vegetation units (Figure 2) namely the 1) Developed area; and 2) the Degraded grassland.

1. Developed area

Status:
Transformed due to developments and human influences

Wildlife:
Birds & insects

Need for rehabilitation
High

Conservation Priority:
Low

Agricultural potential
Medium

This area comprises various residential and out-buildings on small holdings. Various roads (paved and gravel) occur within these areas. The garedens are landscaped in some places with the indigenous grasses mowed on a weekly basis and maintained as lawns. The trees cover between 5-10%, the shrubs 5%, grasses 65-70% and the forbs 10% of the area.

The vegetation is characterised by the presence of a variety of grass species that are mowed as lawn grass. These include *Urochloa panicoides, Eragrostis chloromelas, Eragarostis curvula, Cynodon dactylon* together with the forbs *Conyza podocephala* and *Guillemenia densa.* The woody component consists of a mixture of indigenous species, garden ornamentals and declared alien invader trees. These incluse *Searsia lancea, Olea europaea* subsp. *africana* and *Ehretia rigida.* A large number of garden ornamentals occur together with declared alien invasive species. Alien invasive species include *Jacaranda mimosifolia, Acacia podalyriifolia, Ligustrum lucidum, Grevillea robusta, Melia azedarach, Nerium oleander, Robinia pseudoacacia, Cotteneaster pannossus, Tecoma stans, Tipuana tipu* and *Lantana camara.* Garden hybrids include *Ceratonia saliqua, Quercus* spp*., Acer buergerianum* and various conifer species.

This area includes a gravel road that leads to the different properties. The edges of the road are lines with the indigenous *Olea europaea* subsp. *africana* on the one side with large trees of the declared alien invasive *Melia azedarach* on the other side. Pioneer grasses and forbs form the herbaceous layer while a number of the declared alien invasive succulent *Cereus jamacaru* is also present in this section.

The following is a list of species identified on the site (Red = alien invasive species):

WOODY SPECIES

Acacia mearnsii De Wild.
Acacia podalyriifolia A.Cunn. ex G.Don
Acer negundo L.
Celtis africana Burm.f.
Celtis sinensis Pers.
Cotoneaster pannosus Franch.
Diospyros lycioides Desf.

Ehretia rigida
Grevillea robusta
Jacaranda mimosifolia D.Don
Lantana camara L.
Ligustrum lucidum Aiton f.
Maytenus heterophylla (Eckl. & Zeyh.) N.Robson
Melia azedarach L.
Morus alba L.
Nerium oleander
Olea eurpaea ssp africana
Pinus spp.
Robinia pseudoacacia
Tipuana tipu
Quercus species
Searsia lancea Diels
Searsia pyroides Burch.
Schinus molle L.
Solanum mauritianum
Tecoma stans
Pyracantha angustifolia
Vachellia karroo Hayne

GRASSES
Cynodon dactylon (L.) Pers.
Eleusine coracana (L.) Gaertn.
Eragrostis chloromelas
Eragrostis curvula
Paspalum notatum
Urochloa panicoides P.Beauv.

FORBS
Agapanthus species
Agave americana L.
Arundo donax L.
Cereus jamacaru
Conyza podacephala
Chenopodium carinatum R.Br.
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley
Gloriosa superba L.
Guilleminea densa (Willd.) Moq.
Monsonia angustifolia
Opuntia ficus-indica (L.) Mill.
Portulaca oleracea L.
Richardia brasiliensis Gomes
Verbena tenuisecta Briq.

Figure 2. Vegetation units of the study area (image obtained from Google Earth)

2. Degraded grassland

Status:
Degraded

Wildlife:
Birds, rodents & insects

Need for rehabilitation
High

Conservation Priority:
Low

Agricultural potential
Medium-high

This degraded grassland occurs on the western side next to the R55 (Pitts Avenue) road. Smaller patches are also present inbetween the developed areas. The soil is loamy with few rocks present. Trees cover up to 5%, shrubs 2%, grasses 80% and forbs 10% of the area.

The vegetation is dominated by the grasses *Hyparrhenia hirta* and *Eragrostis curvula,* while sections are dominated by the alien invasive grass *Pennisetum clandestinum* (kikuyu). Other grasses present include *Trichoneura grandiglumis, Heteropogon contortus, Sporobolus africanus, Pogonarthria squarrosa* and *Cynodon dactylon.* The woody layer is characterised by the prominence of the declared alien invader tree *Eucalyptus camaldulensis.* Other woody species include *Searsia leptodictya, Vachellia karroo* and the declared alien invader trees *Robinia pseudoacacia, Melia azedarach, lantana camara* and *Tpuana tipu*. The forbs include *Zinnia peruviana, Chamaecrista mimmosoides, Vernonia oligocephala, Monsonia angustifolia, Indigofera hedyantha* and *Sida alba.* The orange listed geophyte *Hypoxis hemerocallidea* also occurs as small groups within this unit.

A small section in the east of the study area between residential houses is dominated by the grass *Eragrostis chloromelas.*

The following is a list of species observed during the survey (Red = alien invasive species; Orange = Threatened species):

WOODY SPECIES

Acacia podalyriifolia A.Cunn. ex G.Don
Asparagus suaveolens Burch.
Eucalyptus camaldulensis Dehnh.
Lantana camara L.
Melia azedarach L.
Pyracantha angustifolia (Franch.) C.K.Schneid.
Robinia pseudoacacia L.
Searsia lancea L.f.
Tipuana tipu L.
Seriphium plumosum
Vachellia karroo

GRASSES

Aristida congesta Roem. & Schult.
Brachiaria serrata
Chloris virgata Sw.
Cynodon dactylon (L.) Pers.
Eragrostis chloromelas Nees
Eragrostis curvula (Schrad.) Nees
Eragrostis gummiflua Nees
Eragrostis rigidior
Heteropogon contortus
Hyparrhenia hirta (L.) Stapf
Melinis repens (Willd.) Zizka
Panicum maximum
Pennisetum clandestinum Chiov.
Perotis patens Gand.
Pogonarthria squarrosa (Roem. & Schult.) Pilg.
Sporobolus africanus (Poir.) Robyns & Tournay
Themeda triandra Forssk.
Trichoneura grandiglumis (Nees) Ekman
Urochloa panicoides P.Beauv.

FORBS

Albuca setosa
Bidens pilosa L.
Campuloclinium macrocephalum (Less.) DC.
Commelina africana
Conyza bonariensis (L.) Cronquist
Conyza podocephala DC.
Chamaecrista mimmosoides
Datura stramonium
Felicia muricata (Thunb.) Nees
Gomphocarpus fruticosus (L.) Aiton f.
Gomphrena celosioides Mart.
Helichrysum kraussii Sch.Bip.
Helichrysum nudifolium (L.) Less.
Hypoxis hemerocallidea Fisch. & C.A.Mey.
Indigofera hedyantha
Ipomoea purpurea (L.) Roth
Kyllinga alba Nees
Monsonia angustifolia
Pellaea calomelanos (Sw.) Link
Polygala hottentotta C.Presl
Schkuhria pinnata (Lam.) Cabrera
Sida alba L.
Tagetes minuta L.
Verbena bonariensis
Verbena tenuisecta Briq.
Vernonia ologocephala
Zinnia peruviana (L.) L.

RESULTS OF FAUNAL SURVEY

Amphibians

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Frog populations throughout the world have crashed dramatically in the last twenty years. Deforestation, wetland draining and pollution are immediately obvious causes. But other, more fundamental, man-made impacts are causing population declines in 'pristine' habitats such as national parks and remote rainforests. Reductions in atmospheric ozone levels are allowing increased UV-radiation, pollutants are accumulating in natural systems and bacterial and virus distribution is accelerating across the globe (Carruthers 2001). Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. The Giant Bullfrog (*Pyxicephalus adspersus*) has been chosen as a flagship species for the grassland ecoregion (Cook, in le Roux 2002)

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in the Gauteng Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken for a single day/evening during the summer months (March), only a few species of frogs were recorded. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (September-January). It is only during this period accurate frog lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records; data from the South African Frog Atlas Project (SAFAP) and published data, and the list provided in Table below is therefore regarded as likely to be fairly comprehensive.

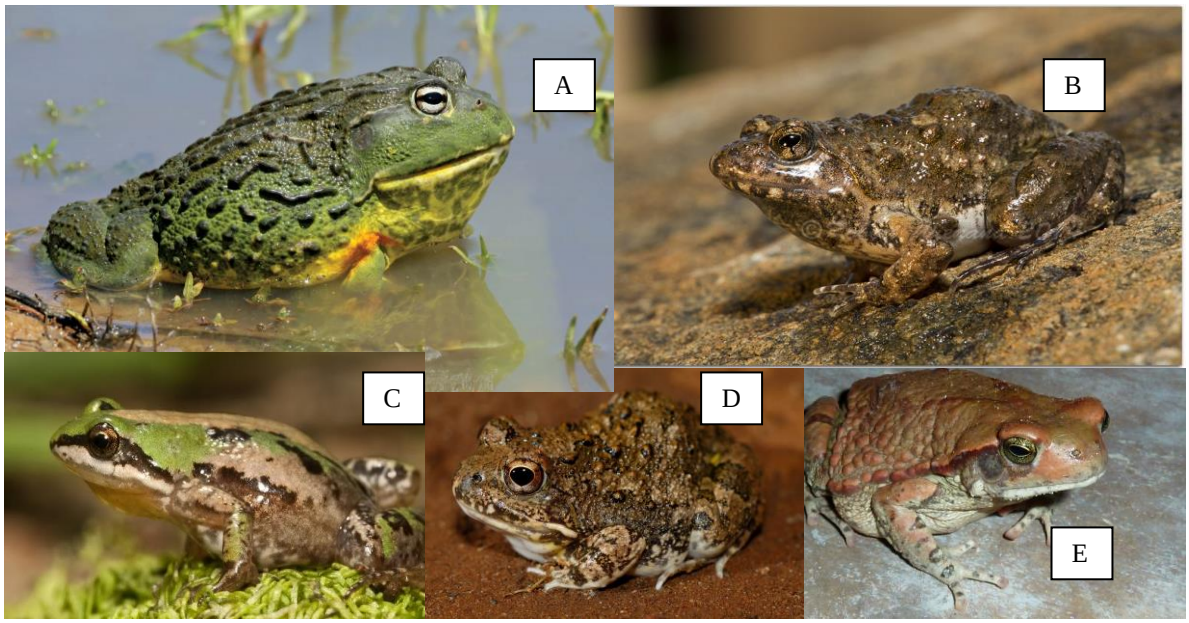


Figure 3. **A conglomerate of photographs of the frog species likely to occur or in suitable habitat surrounding the proposed site. A:** Giant Bullfrog (*Pyxicephalus adspersus*); **B**: Snoring Puddle Frog (*Phrynobatrachus natalensis*); **C:** Boettger's Caco (*Cacosternum boettgeri*); **D:** Tremolo sand frog (*Tomopterna cryptotis*); **E:** Red Toad (*Schismaderma carens*) (some photos obtained from Google images).

Table 1. Frog species recorded by the consultant in the Kyalami /Blue Hills/Chartwell and Beauliea areas during the period 1991 to 2015.

COMMON NAME	SCIENTIFIC NAME	BREEDING HABITAT	SUITABLE HABITAT ON SITE
Guttural Toad	*Amietophrynus gutturalis*	Seasonal pools within the valley bottom wetlands and dams	No
Red Toad	*Schismaderma carens*	Reed invaded artificially created dams along the Modderfontein spruit.	No
Common Platanna	*Xenopus laevis*	Dams along the Modderfontein spruit	No
Boettger's or Common Caco	*Cacosternum boettgeri*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area	No
Bubbling Kassina	*Kassina senegalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area	No
*Tremelo Sand Frog	*Tomopterna cryptotis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area	No

Natal Sand Frog	*Tomopterna natalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area	No
Giant Bullfrog	*Pyxicephalus adspersus*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu Bird Sancturay, Crowthorne AH and Blue Hills area.	No
Drakensberg River Frog	*Amietia quecketti*	Permanent pools within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area	No
Snoring Puddle Frog	*Phrynobatrachus natalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area.	No

Reptiles

Comprehensive reptile species lists are impossible to determine with extensive fieldwork over a number of months or even years. Reptile lists provided are of species most likely to occur on the site for reptile fauna present on the site is presented in Table below (see Appendix). As a result of human presence in the area (pathways, houses) coupled with habitat destruction, alterations to the original reptilian fauna are expected to have already occurred. No scattered rupicolous or rocky outcrops and indigenous Egoli Granite Grassland vegetation remains on the degraded site. Destruction of rocky outcrops and removal of rock will result in the destruction of vital habitat for remaining rupicolous (living on or amongst rocks) reptile species including snakes, skinks and geckos. No termite mounds were observed within the degraded grasslands and landscaped areas within the site. Two reptile species were recorded namely a Striped or Speckled Rock Skink (*Trachylepis punctatissima*) and a Cape Dwarf Gecko (*Lygodactylus capensis*). Both these species are urban exploiters and were observed within the landscaped/maintained gardens. Low reptile diversity is expected from the transformed site due to extensive habitat transformation and high levels of anthropogenic activities on and surrounding the site.

Table 2. Reptile species recorded for the 2528 DA QDGC according to ReptiMAP (SARCA). Actual species list for the site will contain considerable less species due to extensive habitat transformantion and degradation.

Family	Genus	Species	Subspecies	Common name	Red list category	Endemic
Agamidae	*Acanthocercus*	*atricollis*	*atricollis*	Southern Tree Agama	Least Concern (SARCA 2014)	No
Agamidae	*Agama*	*atra*		Southern Rock Agama	Least Concern (SARCA 2014)	No
Atractaspididae	*Aparallactus*	*capensis*		Black-headed Centipede-eater	Least Concern (SARCA 2014)	No
Atractaspididae	*Atractaspis*	*bibronii*		Bibron's Stiletto Snake	Least Concern (SARCA 2014)	No
Chamaeleonidae	*Chamaeleo*	*dilepis*	*dilepis*	Common Flap-neck Chameleon	Least Concern (SARCA 2014)	No
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Least Concern (SARCA 2014)	No
Colubridae	*Crotaphopeltis*	*hotamboeia*		Red-lipped Snake	Least Concern (SARCA 2014)	No
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern (SARCA 2014)	No
Colubridae	*Dispholidus*	*typus*	*typus*	Boomslang	Least Concern (SARCA 2014)	No
Colubridae	*Lamprophis*	*aurora*		Aurora House Snake	Least Concern (SARCA 2014)	Yes
Colubridae	*Lycodonomorphus*	*rufulus*		Brown Water Snake	Least Concern (SARCA 2014)	No
Colubridae	*Lycophidion*	*capense*	*capense*	Cape Wolf Snake	Least Concern (SARCA 2014)	No
Colubridae	*Philothamnus*	*semivariegatus*		Spotted Bush Snake	Least Concern (SARCA 2014)	No
Colubridae	*Prosymna*	*sundevallii*		Sundevall's Shovel-snout	Least Concern (SARCA 2014)	No
Colubridae	*Psammophis*	*brevirostris*		Short-snouted Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Psammophylax*	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Psammophylax*	*tritaeniatus*		Striped Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Pseudaspis*	*cana*		Mole Snake	Least Concern (SARCA 2014)	No
Colubridae	*Thelotornis*	*capensis*	*capensis*	Southern Twig Snake	Least Concern (SARCA 2014)	No
Cordylidae	***Chamaesaura***	***aenea***		**Coppery Grass Lizard**	**Near Threatened (SARCA 2014)**	**Yes**
Cordylidae	*Cordylus*	*vittifer*		Common Girdled Lizard	Least Concern (SARCA 2014)	No
Elapidae	*Elapsoidea*	*sundevallii*	*media*	Highveld Garter Snake	Not listed	No
Elapidae	*Hemachatus*	*haemachatus*		Rinkhals	Least Concern (SARCA 2014)	No
Elapidae	*Naja*	*annulifera*		Snouted Cobra	Least Concern (SARCA 2014)	No
Elapidae	*Naja*	*mossambica*		Mozambique	Least Concern	No

				Spitting Cobra	(SARCA 2014)	
Gekkonidae	*Lygodactylus*	*capensis*	*capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)	No
Gekkonidae	*Lygodactylus*	*nigropunctatus*		Black-spotted Dwarf Gecko	Least Concern (SARCA 2014)	Yes
Gekkonidae	*Pachydactylus*	*affinis*		Transvaal Gecko	Least Concern (SARCA 2014)	Yes
Gekkonidae	*Pachydactylus*	*capensis*		Cape Gecko	Least Concern (SARCA 2014)	No
Gerrhosauridae	*Gerrhosaurus*	*flavigularis*		Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Ichnotropis*	*capensis*		Ornate Rough-scaled Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Meroles*	*squamulosus*		Common Rough-scaled Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Nucras*	*holubi*		Holub's Sandveld Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Nucras*	*intertexta*		Spotted Sandveld Lizard	Least Concern (SARCA 2014)	No
Leptotyphlopidae	*Leptotyphlops*	*incognitus*		Incognito Thread Snake	Least Concern (SARCA 2014)	No
Leptotyphlopidae	*Leptotyphlops*	*scutifrons*	*scutifrons*	Peters' Thread Snake	Not listed	No
Pelomedusidae	*Pelomedusa*	*subrufa*		Central Marsh Terrapin	Least Concern (SARCA 2014)	No
Scincidae	*Mochlus*	*sundevallii*	*sundevallii*	Sundevall's Writhing Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*punctatissima*		Speckled Rock Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*sp. (Transvaal varia)*		Skink sp. 1	Not listed	No
Scincidae	*Trachylepis*	*varia*		Variable Skink	Least Concern (SARCA 2014)	No
Testudinidae	*Kinixys*	*lobatsiana*		Lobatse Hinged Tortoise	Least Concern (SARCA 2014)	No
Testudinidae	*Kinixys*	*spekii*		Speke's Hinged Tortoise	Least Concern (SARCA 2014)	No
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Least Concern (SARCA 2014)	No
Typhlopidae	*Afrotyphlops*	*bibronii*		Bibron's Blind Snake	Least Concern (SARCA 2014)	No
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Least Concern (SARCA 2014)	No
Varanidae	*Varanus*	*niloticus*		Water Monitor	Least Concern (SARCA 2014)	No
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern (SARCA 2014)	No
Viperidae	*Causus*	*rhombeatus*		Rhombic Night Adder	Least Concern (SARCA 2014)	No

Avifauna/birds

Due to time constraints no comprehensive bird lists could be compiled. During brief site visitations (total of 8 hrs), 15 bird species were recorded. Two hundred and forty five (245) bird species have been recorded during the SABAP2 within the 2555-2800 pentad in which the study site is situated. The majority of species recorded during field surveys are common, widespread and typical highveld species. Numbers of bird species in the Kyalami area have declined mainly due to increased levels of human disturbances (quad and off-road bikes); extensive habitat transformation due to increased urban sprawl and agricultural activities; as well as severe habitat degradation of the wetlands as well as rivers (especially the Modderfontein spruit, Klein Jukskei and Jukskei). Human activity has transformed grasslands in South Africa to a point where few pristine examples exist (Low & Rebelo 1996; Barnes 1998). Factors such as agricultural intensification, increased pasture management (overgrazing), decrease in grassland management due to frequent fires and land-use alteration (urbanisation). Continuing pressure on sensitive wetland and surrounding open grassland habitat are largely responsible for the decline of the threatened avifaunal species.

Mammals

No small mammal trapping was conducted. Fieldwork was augmented with previous surveys in similar habitats as well as published data. The area was initially traversed on foot to ascertain the presence of available refuges which comprised of soil, rubble and waste stockpiles. The only mammal species observed wer a few scattered African Molerat burrows in the sandier sections of the site as well as a House Rat. Mammal diversity is expected to be low and mainly urban exploiters such as the introduced House Rat and House Mouse.

DISCUSSION

VEGETATION

Vegetation type

The vegetation of the study is a classified as belonging to the endangered Egoli Granite vegetation type (Mucina & Rutherford 2006) (Figure 5). Egoli Granite Grasslands in the Gauteng Province are highly threatened and are listed as Endangered. Only a small fraction (3%) of this vital habitat has been formerly conserved within Gauteng. These grassland areas form vital habitats for numerous animal and plant species. This vegetation type is characterised by the dominance of the anthropogenic grass *Hyparrhenia hirta* but with a high biodiversity in terms of other climax and late secondary successional grass and forb species. These include the grasses *Aristida canescens, Digitaria monodactyla, Setaria sphacelata, Themeda triandra, Eragrostis curvula, Eragrostis choromelas, Tristachya leucothrix, Andropogon eucomis, Monocymbium ceresiiforme* and the forbs *Crabbea hirsuta, Cyanotis speciosa, Dicoma anomala, Helichrysum rugulosum, Becium obovatum, Acalypha angustata, Justicea anagalloides, Kohautia amatymbica* and *Senecio venosus.*

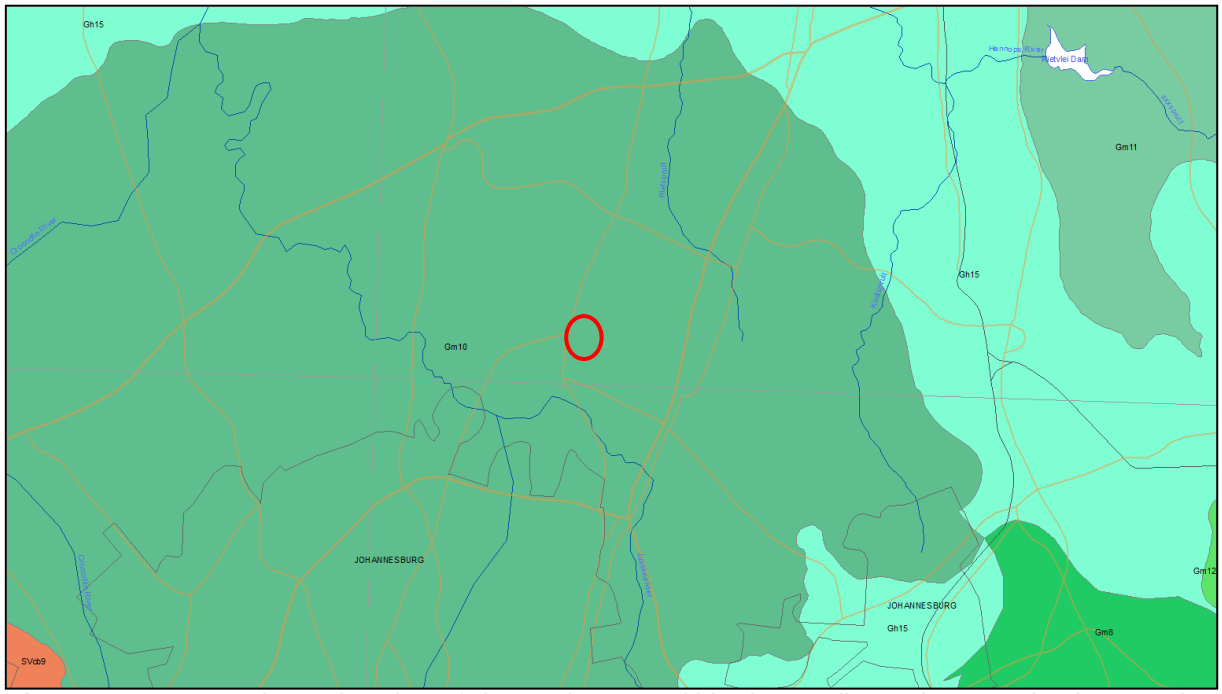
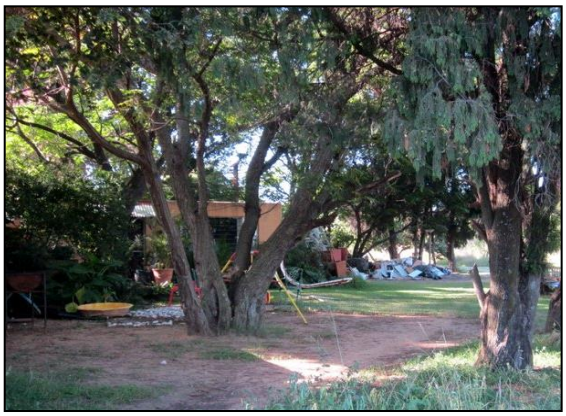


Figure 5. Approximate location of the study area within the Egoli Granite Grassland vegetation type (red circle) (image obtained Mucina & Rutherfore, 2006).

Vegetation unit 1 of the study area is transformed and has no vegetation reminiscent of the original grassland vegetation remaining. Vegetation unit 2 is degraded and only has a few species remaining that has some affinity with Egoli Granite Grassland.

Vegetation units

Vegetation unit 1 (Developed areas) is transformed due to these areas having been landscaped and managed as gardens with the grasses regularly being mowed as lawns. The trees that occur in these areas are a combination of ornamentals, indigenous species and declared alien invasive species. Most of them was planted many years ago and they have developed into trees all mostly taller than 3 m. The buildings (some unused) have also destroyed the natural vegetation that remained with only pioneer and ornamental species remaining next to the buidlings. All these human-induced influences have resulted in the vegetation becoming transformed, not resembling any natural vegetation characteristic of the natural grasslands that occurred within the area. This unit herefore has from a plant ecological and ecosystem functioning point of view a **low conservation value**.



Vegetation unit 2 (Degraded grassland) is a small section next to the R55 road and small sections between the residential buildings. The vegetation has some species that occur within Egoli Granite Grassland, though it is characterised by mostly pioneer and alien invasive species. The alien species have displaced the natural vegetation in the areas where they occur, while various footpaths are also present within this unit causing further degradation of the area. The area is also small and occurs as fragments throughout the study site. The negative effect of the R55 road on the vegetation is also evident from the large number of litter and rubble present in the area. From a plant ecological and ecosystem functioning point of view this area has a **low conservation value**.

Medicinal plants

Five medicinal plant species were found within the study site. Only one species (*Hypoxis hemerocallidea*) is important with the rest occurring abundantly in natural areas and are not threatened.

Plant name	Plant part used	Medicinal use	Vegetation unit
Vachellia karroo	Leaves, bark and gum	Diarrhoea & dysentery Gum: colds, oral thrush & haemorrhage.	1; 2
Gomphocarpus fruticosus	Leaves, sometimes roots	Headache, stomach pain, tuberculosis.	2
Helichrysum nudifolium	Leaves and twigs, sometimes roots	Treat ailments such as coughs, colds, fever, infections, headaches and menstrual pain. Also used for wound dressing	2
Hypoxis hemerocallidea	Corm	Infusions of corm used to treat dizziness, bladder disorders and insanity. Are given to children as a tonic	2
Pellaea calomelanos	Leaves and rhizomes	Smoked for olds, asthma. Also used for coughs and kidney problems	2

Red data species

Except for the one orange listed geophyte *Hypoxis hemerocalidea* (African potato), no red data habitat is present on the property and no such species were recorded. It is recommended that *Hypoxis hemerocallidea* individuals are removed from the property (under the supervision of a qualified botanist/ecologis/natura conservator) and replanted in suitable natural habitat.

Alien plant species

Alien invasive species pose a huge threat to the natural ecosystems in South Africa. Not only do they displace the natural vegetation of an area wherey the also negatively affect the faunal component, but they also use a large amount of water. Thus these species negatively affect the natural ecological process within an ecosystem thereby causing ecosystem degradation and a loss of ecosystem functioning. A large number of alien plants as listed in the table below is present throughout the study area. These species have in some areas already displaced all the indigenous vegetation, while some are in the process of becoming dominant. A total number of 26 different alien plant species were identified on the property. These species must be removed and eradicated from the property as a high priority.

Species	NEMBA category	CARA category	1	2
Acacia mearnsii De Wild.	2	2		
Acacia podalyriifolia A.Cunn. ex G.Don	1b	3		
Acer negundo L.	3	Not listed		
Agave americana L.	Not listed	2		
Arundo donax L.	1b	1		
Campuloclinium macrocephalum (Less.) DC.	1b	1		
Cereus jamacaru	1b	1		
Cotoneaster pannosus Franch.	1b	3		
Datura stramonium	1b	1		
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley	1b	1		
Eucalyptus camaldulensis Dehnh.	1b	2		
Grevillea robusta	3	3		
Ipomoea purpurea (L.) Roth	1b	1		
Jacaranda mimosifolia D.Don	1b	3		
Lantana camara L.	1b	1		
Ligustrum lucidum Aiton f.	3	3		
Melia azedarach L.	3	3		
Morus alba L.	3	3		
Nerium oleander	1b	1		
Opuntia ficus-indica (L.) Mill.	1b	1		
Pennisetum clandestinum Chiov.	Not listed	Not listed		
Pyracantha angustifolia (Franch.) C.K.Schneid.	1b	3		
Robinia pseudoacacia	1b	2		
Solanum mauritianum	1b	1		
Tecoma stans	1b	1		
Tipuana tipu	3	3		

FAUNA

Amphibians

Figure 6. The Giant Bullfrog (Pyxicephalus adspersus) has been recorded in the Kyalami AH, Blue Hills and Beaulieu area. Remaining populations are threatened due to extensive habitat transformation and degradation within the area. Large numbers are killed annually after heavy summer downspous on the major roads. Historic breeding activities (1987-1994) were recorded from the shallow margins of the artificial dams in the Beaulieu (Witpoort) Bird Scantuary by the consultant. The majority of recent recordings are of maigrating adult males or road fatalities.

Threatened species

The Giant Bullfrog (*Pyxicephalus adspersus*) is a protected frog species whose conservation status has been revised and was included as a Red Data Species under the category 'Lower Risk near threatened' (Minter *et al.* 2004). Giant Bullfrogs historically occurred throughout the Kyalami-Blue Hills-Crowthorne Agricultural Holdings area. A major causal factor in the decline in Giant Bullfrog populations in this area is massive habitat destruction by previous agricultural activities (draining wetlands, ploughing of grasslands) and within the past twenty years by extensive residential and commercial developments. Major (R55, N1, M71) and secondary road networks bisect suitable breeding and foraging areas resulting in mass road fatalities of migrating adult and juvenile bullfrogs. Fences and high security walls also

prevent the natural migration of adult and juveniles from foraging areas and suitable breeding sites (habitat fragmentation).

Limited foraging potential occurs on the site due to the transformation of the entire site into an existing residential erven and garden as well as degraded grassland (old horse paddocks and Teff pastures). Margianlly suitable foraging habitat occurs within the open grasslands to the north of the site. Due to frequent burning of the remaining patches of grasslands, the natural species composition and prey availability become transformed. Several large termite mounds occur on these sites and the annual emergence of several thousand winged alates provide an important food source to several animal species, especially herpetofauna.

No breeding habitat occurs on the site or in the immediate surrounding area. Extremely limted migratory habitat remains as the site has extensive barriers/walls as well as situated adjacent to R55 and M71 road and several secondary roads. These roads often offer the only migrational route for Giant Bullfrogs towards suitable breeding habitats; resulting in mass road fatalities. The R55 with its high vehicular traffic can be considered a migration barrier for the majority of frog species. Several high security walls and wire (razor) fences limit the migration of several species around the entire Kyalami Estate area.

It is therefore considered the study site contains limited suitable foraging and migratory habitat of **low** conservation importance, and no suitable breeding habitat for Bullfrogs. Destruction of the habitat provided by the study area will have an impact of **low significance** on the conservation status of these species within a local (Kyalami Estate) scale and a **low** significance within Gauteng.

Reptiles

Threatened species

Continual destruction of suitable habitats has resulted in the disappearance of numerous reptile species on the Highveld. No snake species were recorded during the brief field survey. Indiscriminate killing of snake species is likely to have resulted in the disappearance of the larger and the more sluggish snake species within the study area. No evidence of illegal reptile collecting was observed throughout the site although it may have occurred in the past. No threatened reptile species were recorded during this survey, but the Coppery Grass Lizard (Chaemaesaura aenea), which is categorised as Near-Threatened in the latest Red Data List (SARCA 2014) has been recorded from the grid square (2528 DA) within which the study area is situated. These very unusual lizards have extremely reduced limbs

(often littlee more than spikes) and a very long tail (3-4 times longer than the SVL length). The body scales are rough, strongly keeled and arranged in regular rows. The elongate shape of grass lizards allows them to move freely in long grass through which they 'swim' with the speed and agility of snakes. The Coppery Grass Lizard is endemic to Southern Africa occurring on grass covered mountain slopes and plateaus (Alexander & Mariais 2007). No suitable habitat occurs within the proposed site due to the transformation (established gardens and lawns) and degradation of the majority of grasslands (overgrazing, frequent fires, alien vegetation invasion and grass harvesting activities).

Avifauna/birds

TABLE 3: Red listed species recorded in Kyalami AH area (HARRISON ET AL. 1997; SABAP1 AND SABAP2.adu.org.za).

Species	Conservation status (Barnes 2000)	Reporting rate SABAP2 %	Habitat requirements (Barnes 2000; Hockey et al 2005; Harrison et al 1997; personal observations)
Peregrine Falcon *Falco peregrinus*	Near threatened	1.38	Wide range of habitat, but cliffs is a prerequisite for breeding. **No suitable habitat on site.**
Lesser Kestrel *Falco naumanni*	Vulnerable	0.69	Grasslands, old lands, cultivated lands. Occasional foraging arrays are possible on site.
Half-collared Kingfisher *Alcedo semitorquata*	Near-Threatened	0.6	Fast-flowing streams with clear water and well-wooded banks. Occurs around dams (pers.obs.). No suitable habitat on site.
Greater Flamingo *Phoenicopterus ruber*	Near-Threatened	0.69	Endorheic pans, estuaries and other wetlands.No suitable habitat on the site.

At a local (Kyalami AH) scale the transformed grasslands on the site provide limited habitat for birds in general. Destruction of the habitat provided by the study area will have an impact of **negligible significance** on the conservation status of threatened species within a local (Kyalami) scale and no significance within Gauteng.

Mammals

Threatened species

No sensitive or endangered mammals were recorded within the study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of hunting and poaching as well as habitat alteration and degradation. Common or Bush Duiker, Black-backed Jackal have however been recorded from surrounding grasslands situated in the Kyalami and Blue Hills area. Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats and dogs.

According to the “South African Red Data Book of Terrestrial Mammals” (Smithers 1986) and Skinner and Smithers (1990), the study area falls within the distribution ranges of 12 species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). The study site may provide suitable habitat for at least 1 of the 12 above-mentioned threatened species, though the presence of dogs on the property could result in them being killed. This species is listed in the table below.

Table 4. Red Data List mammal for which suitable habitat may be present, and which may therefore occur within the study area.

Common Name	Scientific Name	Conservation Status Friedman & Daily (2004)
South African Hedgehog	*Atelerix frontalis*	Near-Threatened

Figure 7. The South African Hedgehog has declined in the Kyalami-Midrand area due to habitat transformation, road fatlities, illegal pet trade as well as been killed by dogs.

South African Hedgehog *Atelerix frontalis* (A.Smith, 1831)

Distribution (Southern African Sub-region)

They occur in Namibia, Botswana, Zimbabwe, Lesotho and South Africa. The South African distribution includes the Gauteng, Free State, Limpopo and Cape Provinces (Skinner and Smithers, 1991).

Habitat

Hedgehogs occur in such a wide variety of habitats that it is difficult to assess its habitat requirements. The one factor that is common to all the habitats in which they occur is dry cover, which they require for resting places and breeding purposes. Habitat must provide a plentiful supply of insects and other foods. Suburban gardens provide these requirements and this may explain their occurrence in this type of habitat. Hedgehogs are predominantly nocturnal, becoming active after sundown, although, after light rains at the commencement of the wet season, they may be active during daylight hours (Skinner and Smithers, 1991).

Food

Hedgehogs are omnivorous feeding predominantly on invertebrates such as beetles, termites, centipedes, millipedes, moths and earthworms. They will take small mice, lizards and the eggs and chicks of ground-living birds as well as frogs, slugs and some vegetable matter, including fungi (Skinner and Smithers, 1991).

Reproduction

Seasonal breeders, with young being born during the warm, wet summer months from October to March (Skinner and Smithers, 1991).

South African Hedgehogs have been recorded in the Fourways, Chartwell and Dainfern areas. The recent transformation and destruction of large open grassland areas for high density residential developments within Broadacres, Dainfern, Fourways and Charwell areas and increased human presence has resulted in the decline of Hedgehogs in the area. Destruction of the transformed habitat provided by the study area will have a negligible impact on the remaining (albeit limited) mammals found on the site. The development of the site will have a **low significance** on the conservation status of the remaining animal species within a local (Kyalami) scale and no ignificance within Gauteng

POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON THE ASSOCIATED FLORA & FAUNA

Loss of habitat

The proposed development will have a **long-term impact** on the vegetation of the area. The development of roads will lead to the permanent destruction of the vegetation. The imact is regarded as **low-medium** due to the degraded condition of the vegetation

The proposed mixed use development will most likely result in a **medium-low, short, medium and long-term negative impact** on the limited faunal species utilising these areas. The proposed development comprises transformed or degraded habitats with low conservation value. This will result in the destruction of transformed habitats which offers limited suitable habitat for remaining animal species. Further, direct and indirect impacts of the development include increased access and human presence into the area as well as neighbouring properties. Increased human pressure and activities in these degraded habitats could result in further environmental degradation if environmentally sensitive practices are not followed and maintained throughout all stages of the development.

Mitigation and Recommendations

- Vegetation clearance should be restricted to the areas under construction allowing remaining animals opportunity to move away from the disturbance.
- All alien invasive plant and tree species should be removed from the site to prevent further invasion.
- Remaining indigenous trees (naturally occurring in the area) should be retained wherever possible.
- No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.
- Where the removal of alien species may leave spoil exposed, alternative indigenous species should be established before eradication takes place. Individual property owners should be encouraged to plant indigenous non-invasive plants. The attention of property owners must be drawn to the most recent Declared Weeds List (2001) in the *Conservation of Agricultural Resources Act* 43 of 1983 and the associated penalties and prohibitions. Horticultural activities such as fertilisers, herbicide and pesticide runoff, increase in alien vegetation and weedy species, dumping of refuge and building material must be strictly managed and be environmentally sensitive and should meet the following requirements:
    - *Limited to building environs and limited areas of proposed development.*
    - *Limited irrigation by water-wise gardening (use local plants adapted to local conditions).*
    - *Strict fertiliser, pesticide and herbicide control (limited usage)*
    - *Invertebrate pests on the site should be controlled in the following manner: The least environmentally damaging insecticides must be applied. Pyrethroids and Phenylpyrazoles are preferable to Acetylcholines. Use insecticides that are specific to the pest (species specific) in question. The lowest effective dosages must be applied. The suppliers advice should always be sought. Do not irrigate for 24 hours after applying insecticides in areas where there is a chance of*

contaminating water-courses or dams, fungal pathogens should be used in preference to chemical insecticides.

- *Reduction of weed and erosion by minimum tillage gardening practices (groundcovers and mulching better in all respects).*

GENERAL RECOMMENDATIONS & MITIGATION

Erosion and Surface runoff

Urban development is characterised by large areas of sealed surfaces such as roads, houses etc. Impermeable surface cover ranges from 15% to 60% of suburban areas to almost 100% in central business districts. Infiltration is considerable reduced with an increase in surface run-off. Run-off is generally discharged to surface water systems and often contains pollutants. Pollutants range from organic matter, including sediments, plant materials and sewage, to toxic substances such as heavy metals, oils and hydrocarbons. Construction activities associated with urban development can lead to massive short term erosion unless adequate measures are implemented to control surface run-off. Sheet erosion occurs when run-off surface water carries away successive thin layers of soil over large patches of bare earth. This type of erosion is most severe on sloping soils, which are weakly structured with low infiltration, which promotes rapid run-off. It occurs on the site where vegetation has been destroyed. Continual erosion in sheet-eroded slopes is a common cause of gully erosion. Gully erosion results from increased flow along a drainage line, especially where protective vegetation has been removed and soils are readily transported. A gully has steep, bare sides and is often narrow and deep. Once formed, a gully usually spreads upstream through continual slumping of soil at the gully head. Gully erosion can be associated with salting as the saline sub-soils are readily eroded.

Mitigation and recommendations

Vegetation plays a critical role in the hydrological cycle by influencing both the quantity and quality of surface run-off. It influences the quantity of run-off by intercepting rainfall, promoting infiltration and thus decreasing run-off. Vegetation can influence water quality in two ways: by binding soils thus protecting the surface layer, and by intercepting surface run-off thus preventing erosion. When the speed of the run-off is reduced, suspended particles can settle out and dissolve substances, such as nutrients, can be assimilated by plants. The vegetation has a filtering effect. The timing of clearing activities is of vital importance. Clearing activities and earth scraping should preferably be restricted to the dry season in order to prevent erosion and siltation. The dry months are also the period when the majority of species are either dormant or finished with their breeding activities. Future soil stockpiling areas must follow environmentally sensitive practices and be situated a sufficient distance

away from drainage areas. The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site. Sufficient measures must be implemented to prevent the possible contamination of the surface water and surrounding groundwater.

Migratory Routes (Fencing)

The migratory movements of several animal (frog, reptile and mammal) species could be completely disrupted by the erection of numerous walls around properties, fences and road networks, which restrict natural movements between suitable foraging and breeding areas. This could potentially result in the disruption of natural gene flow between populations and could result in a high impact on the highly mobile species. Fencing off of residential areas and private property also plays a critical role in impeding the natural migration of the majority of animal species. A trade off thus exists between safety and security on the one hand and movement of animal species on the other.

Mitigation and recommendations

Ideally fences should not restrict the natural migratory movements of certain animals. The site offers limited suitable migratory habitat. Electric fences have a negative impact on certain animal species including Bushbabies, geckoes, chameleons, bullfrogs and tortoises. Palisade fencing with adequate gaps is recommended for the conserved private open spaces.

Artificial Lighting

Artificial lighting will most likely result in a **moderate** to **high** negative short, medium and long- term impact on all nocturnal animal species. Numerous species will be attracted towards the light sources and this will result in the disruption of natural cycles, such as the reproductive cycle and foraging behaviour. The lights may destabilise insect populations, which may alter the prey base, diet and ultimately the well-being of nocturnal insectivorous fauna. The lights may attract certain nocturnal species to the area, which would not normally occur there, leading to competition between sensitive and the more common species.

Mitigation and recommendations

During the construction phase, artificial lighting must be restricted to areas under construction only. Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention. Yellow sodium lights or Compressed Flourescent Bulbs (CFL's) should be prescribed as they do not attract as many invertebrates (insects) at

night and will not disturb the existing wildlife. Sodium lamps require a third less energy than conventional light bulbs.

Rehabilitation

The traditional definition of rehabilitation aims at returning the land in a given area to some degree of its former state after a particular process has resulted in its damage. Where areas have been cleared of vegetation and are exposed to the environment after construction, rehabilitation/landscaping must be implemented. Vegetation has been reported to be the single most important habitat component for all species of animals. Linked to this, is the preservation, maintenance and creation of tracts of natural and ornamental vegetation in all stages of ecological succession, interconnected by corridors or green belts for escape, foraging, breeding and exploratory movements. Landscaping projects are all too frequently characterized by exotic or indigenous (not to the area) trees, planted at the same time, at the same size and are spaced at regular centred settings. The resulting pattern and structure is one of limited vegetation diversity, trees of uniform size, even age stands and little or no under-story planting. Only a few species of animals (urban exploiters) will occupy these limited niches, leading to decreased faunal biodiversity.

Mitigation and recommendation

Gardens or landscaped areas around the proposed commercial development should be planted with indigenous (preferably using endemic or local species from the area) grasses, forbs, shrubs and trees, which are water wise and require minimal horticultural practices. A species list of suitable species should be compiled for future property owners.

A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen. Where herbicides are used to clear vegetation, specimen-specific chemicals should be applied to individual plants only. General spraying should be prohibited. All alien vegetation should be eradicated from the property.

General

During the **CONSTRUCTION** phase the following is recommended: Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. All temporary stockpile areas, litter and dumped material and rubble must be removed on completion of construction.

CONCLUSION & RECOMMENDATIONS

Although the study area is located within the threatened Egoli Granite Grassland vegetation type (Mucina & Rutherford 2006), the study area ranges from degraded to completely transformed due to human activities. The area has over the years been developed and utilised for various purposes. This has resulted in a gradual degradation of the natural environment. No sensitive habitat or plant and animal species are present on the site and it is doubted whether such species will be present due to the degraded condition thereof. The areas are also small and fragmented. Although the area has a moderate species richness, the largest number of species are pioneer and secondary successional species. The large number of declared alien invasive species is present on the study site is alarming. Not only do these species affect the study area negatively, but also serves as a central point from where there seeds are dispersed into surrounding natural areas.

The orange listed geophyte individuals *Hypoxis hemerocallidea* must be removed by a qualified botanist/ecologist/nature conservationist before any development commences. These species should then be replanted in suitable natural habitat.

No threatened floral, faunal or invertebrate species or any sensitive habitats for such species were observed on the site. From a plant and animal ecological point of view the area has **no conservation** or **biodiversity value** and the proposed development should have little to no negative impact on the natural environment. All alien plant species must be removed from the property. It is recommended that the indigenous trees are conserved and development planned around them as far as possible.

REFERENCES

ACOCKS, J.P.H. 1988. Veld Types of South Africa. 3rd edn. *Mem*. *Bot. Surv. S. Afr*. 57: 1–146.

BARNES, K.N. (ed.) (2000). *The Escom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. Birdlife South Africa, Johannesburg.

BRANCH, W.R. (1988). *Field Guide to the Snakes and other Reptiles of Southern Africa*. Struik Publishers, Cape Town.

BROMILOW, C. 2001. *Problem plants of South Africa*. Briza Publications, Pretoria.

CARRUTHERS, V.C. (2001). *Frogs and Frogging in South Africa*. Struik Publishers, Cape Town.

COOK, C.L. (1997). *Aspects of the breeding biology and ecology of the Giant Bullfrog Pyxicephalus adspersus*. Unpublished MSc. Thesis, University of Pretoria, Pretoria.

DE GRAAF, G. (1981). *The rodents of southern Africa*. Butterworth Press, Pretoria.

DU PREEZ, L & CARRUTHERS, V.C. 2009. *A complete guide to the Frogs of Southern Africa*. Struik Publishers, Cape Town.

GAUTENG STATE OF THE ENVIRONMENT REPORT. 2004. Biodiversity. [Online]. (URL http:// www.environment.gov.za/soer/reports/gauteng).

HOCKEY, P.A.R., DEAN, W.R.J., RYAN, P.G. (eds).(2005) Roberts- Birds of Southern Africa VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

HOLM, E., MARAIS, E. 1992. Fruit Chafers of Southern Africa. Sigma Press (Pty) Ltd., Pretoria.

MARAIS, E. and PEACOCK, F. 2008. *The Chamberlain Guide to Birding Gauteng*. Miafra Publishing.

MCKINNELY, M. L. 1999. High rates of extinction and threat in poorly studied taxa. *Conservation Biology* **13**: 1273-1281.

MINTER, L.R., BURGER, M., HARRISON, J.A., BRAAK, H.H, BISHOP, P.J, AND KLOEPFER, D. 2004. *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series 9. Smithsonian Institution, Washington, DC.

MUCINA, L AND RUTHERFORD, M.C. (eds) 2006. The *vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. SANBI, Pretoria.

PASSMORE, N.I. and CARRUTHERS, V.C. (1995). *Frogs of South Africa. A Complete Guide*. Wits University Press, Witwatersrand.

PFAB, M. 2006. *Requirements for biodiversity assessments*. Department of Agriculture, Conservation and Environment, Directorate of Nature Conservation GDACE, Johannesburg.

ROBERTS, A. (1951). *The mammals of South Africa*. Central News Agency, Cape Town.

SKINNER, J.D. and CHIMIMBA, C.T. (2005). *The Mammals of the Southern African Subregion* 3rd ed. Cambridge University Press.

SKINNER, J.D. and SMITHERS, R.H.N. (1990). *The Mammals of the Southern African Subregion*. University of Pretoria, Pretoria.

SMITHERS, R.H.N. (1986). *South African Red Data Book-Terrestrial Mammals*. South African National Scientific Programmes Report No.125: 1-214.

VAN OUDTSHOORN, F. 1999. Guide to grasses of southern Africa. Briza Publications, Pretoria.

VAN WYK, A. E. & MALAN, S.J. 1998. *Field guide to the wild flowers of the highveld*. Struik Publishers (Pty) Ltd, Cape Town.

APPENDIX A

Potential red data species for the study area

Plant species

Species	Priority Grouping	Recorded	Comments
Agrostis eriantha var. *planifolia*	A1	No	Habitat not suitable
Barleria rehmannii	N/A	No	Habitat not suitable
Brachystelma discoideum	A3	No	Habitat not suitable
Bowiea volubilis	N/A	No	Habitat not suitable
Calamagrostis epigeios var. *capensis*	N/A	No	Habitat not suitable
Cleome conrathii	A3	No	Habitat not suitable
Delosperma gautengense	A1	No	Habitat not suitable
Eulophia coddii	A2	No	Habitat not suitable
Habenaria mossii	A1	No	Habitat not suitable
Heteranthera callifolia	N/A	No	Habitat not suitable
Holothrix randii	B	No	Habitat not suitable
Lotononis adpressa subsp *leptantha*	A1	No	Habitat not suitable
Melolobium subspicatum	A1	No	Habitat not suitable
Trachyandra erythrorrhiza	A3	No	Not recorded

Mammal species recorded from the 2528DA QDGC according to MammalMAP.

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Bovidae	*Aepyceros*	*melampus*		Impala	Least Concern	Yes
Bovidae	*Alcelaphus*	*caama*		Red Hartebeest	Least Concern	Yes
Bovidae	*Antidorcas*	*marsupialis*		Springbok	Least Concern	Yes
Bovidae	*Connochaetes*	*taurinus*	*taurinus*		Least Concern	
Bovidae	*Damaliscus*	*pygargus*	*phillipsi*	Blesbok	Least Concern	
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Not listed	Yes
Bovidae	*Sylvicapra*	*grimmia*		Bush Duiker	Least Concern	Yes
Bovidae	*Taurotragus*	*oryx*		Common Eland	Least Concern	Yes
Bovidae	*Tragelaphus*	*strepsiceros*		Greater Kudu	Least Concern	Yes
Canidae	*Canis*	*mesomelas*		Black-backed Jackal	Least Concern	Yes
Equidae	*Equus*	*quagga*		Plains Zebra	Not listed	Yes
Giraffidae	*Giraffa*	*camelopardalis*	*giraffa*	The South	Least	

				African Giraffe	Concern	
Herpestidae	*Cynictis*	*penicillata*		Yellow Mongoose	Least Concern	Yes
Herpestidae	*Galerella*	*sanguinea*		Slender Mongoose	Least Concern	Yes
Hystricidae	*Hystrix*	*africaeaustralis*		Cape Porcupine	Least Concern	Yes
Suidae	*Phacochoerus*	*africanus*		Common Wart-hog	Least Concern	Yes

Amphibian species recorded from the 2528DA QDGC according to FrogMAP.

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Bufonidae	*Amietophrynus*	*gutturalis*		Guttural Toad	Least Concern	
Bufonidae	*Poyntonophrynus*	*fenoulheti*		Northern Pygmy Toad	Least Concern	
Bufonidae	*Schismaderma*	*carens*		Red Toad	Least Concern	
Hyperoliidae	*Kassina*	*senegalensis*		Bubbling Kassina	Least Concern	
Microhylidae	*Phrynomantis*	*bifasciatus*		Banded Rubber Frog	Least Concern	
Phrynobatrachidae	*Phrynobatrachus*	*natalensis*		Snoring Puddle Frog	Least Concern	
Pipidae	*Xenopus*	*laevis*		Common Platanna	Least Concern	
Ptychadenidae	*Ptychadena*	*porosissima*		Striped Grass Frog	Least Concern	
Pyxicephalidae	*Amietia*	*quecketti*		Drakensberg River Frog	Least Concern	Yes
Pyxicephalidae	*Cacosternum*	*boettgeri*		Common Caco	Least Concern	
Pyxicephalidae	*Pyxicephalus*	*adspersus*		Giant Bull Frog	Near Threatened	
Pyxicephalidae	*Tomopterna*	*cryptotis*		Tremelo Sand Frog	Least Concern	
Pyxicephalidae	*Tomopterna*	*natalensis*		Natal Sand Frog	Least Concern	

February 2015

AN ECOLOGICAL REPORT ON THE FLORA AND FAUNA: The Whisken Portions 101, 106 & 108

A report commissioned by LEAP

ENVIROGUARD ECOLOGICAL SERVICES CC
PO Box 703
Heidelberg
1438
Cell: 082 4641021
envguard@telkomsa.net

CONTENTS

CONDITIONS RELATING TO THIS REPORT

Declaration of interest

Enviroguard Ecological Services cc and its members/co-workers have no vested interest in the property studied nor is it affiliated with any other person/body involved with the property and/or proposed development. Enviroguard Ecological Services cc is not a subsidiary, legally or financially of the proponent.

The study was undertaken by Prof. LR Brown (PhD UP) and Mr CL Cook (MSc UP). Prof Brown and Mr Cook are registered as a Professional Natural Scientists with the following details:

Prof LR Brown: Reg. No. 400075/98 (Botanical Science and Ecological Science).
Mr C Cook: Reg. No. 400084/08 (Aquatic Science)

Indemnity

Although Enviroguard Ecological Services cc exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempt Enviroguard Ecological Services cc and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. .Enviroguard Ecological Services cc accepts no liability, and the client, by receiving this document, indemnifies Enviroguard Ecological Services cc and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Enviroguard Ecological Services cc and by the use of the information contained in this report.

Factors limiting the quality of this study

Flora: A once off survey was conducted while the study was done on 6 February 2015. Thus only those flowering plants that flowered at the time of the visit could be identified with high levels of confidence. Some of the more rare and cryptic species may have been overlooked due to their inconspicuous growth forms. Many of the rare and endangered succulent species can only be distinguished (in the veld) from their very similar relatives on the basis of their reproductive parts. These plants flower during different times of the year. Multiple visits to any site during the different seasons of the year could therefore increase the chances to record a larger portion of the total species complex associated with the area. The survey of

the study site is however considered as successful with a correct identification of the different vegetation units.

Fauna: Limitation to a base-line ecological survey for one day during February 2015. The majority of threatened species are extremely secretive and difficult to observe even during intensive field surveys conducted over several years this is especially pertinent to the highly elusive and secretive Striped Harlequin Snake and Giant Bullfrog. There is a limitation of historic data and available databases for the majority of threatened species especially the Striped Harlequin Snake where only 80 records exist for Southern Africa, Swaziland and Lesotho (SARCA 2009). The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys conducted in similar habitats within the area).

Approach

Conclusions reached and recommendations made are based not only on occurrence of individual species, but more appropriately on habitats and ecosystem processes. Planning must therefore allow for the maintenance of species, habitats and ecosystem processes, even if Red Data or endemic plant species are absent.

Prof LR Brown *Pri.SciNat*; MGSSA
Enviroguard Ecological Services cc

INTRODUCTION

The natural resources of South Africa, with its highly complex and diversified society, are continually under threat from development especially in areas richly endowed with natural resources. Uncontrolled and ill-planned development is one of the biggest threats to the naturally evolved life forms on earth. Past development in many parts of the world has led to the destruction of various plant and animal species and their habitats. The achievement of balanced development satisfying the human needs while also conserving the natural resources/habitat is one of the biggest challenges faced by decision-makers in the country today.

In order to prevent the destruction of any ecosystem, it is important that systematic planning and co-ordination of human activities and development should receive priority. This planning should include studies of the natural environment (soil, water, vegetation, animals and cultural / historical aspects).

Plant communities are regarded as fundamental units of an ecosystem and therefore form the base for environmental planning and the compilation of environmental management plans. Plant species assemblages reflect habitat and ecosystem health and rarity, and are therefore imperative for an Environmental Impact Assessment.

AIMS OF THE STUDY

This report aims to present an ecological assessment of the flora and fauna of Holding 98 Chartwell, Johannesburg (hereafter referred to as the study area).

The objectives of this study were to:

- Identify, describe and delineate the different vegetation units present on the property
- Compile a vegetation unit map of the area
- Provide a description of the fauna occurring on the study site.
- Identify species (mammals, birds, reptiles, amphibians) of conservation importance that could possibly occur on the proposed site.
- To provide a sensitivity map of the study area (where applicable)

STUDY AREA

The study area falls within the **Grassland Biome** and classified as belonging to the endangered **Egoli Granite Grassland vegetation type (GM10)** (Mucina & Rutherford 2006).

The site is located within Crowthorne Agricutural Holdings in Kyalami, Johannesburg. The northern and eastern boundaries are formed by Ethel Avenue, the southern by Whisken Avenue and the western by Pitts Avenue (R55). The site has been developed with current houses, remnants of previous houses and small open areas in-between. The area is surrounded by residential developments in the south while residential houses on small holding properties occur around the other boundaries (Figure 1).

Figure 1. Approximate location of the study site – indicated in red (Source: Google Earth).

METHODS

VEGETATION

The Braun-Blanquet survey priciples was used to describe plant communities as ecological units were used for this study. An overview of the vegetation was first obtained from relevant literature. Ecological sensitivity of the plant communities were assessed and categorised according to habitat and plant species assemblages.

Data recorded included:

A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were compiled. All identifiable plant species were listed. Notes were additionally made of any other features that might have an ecological influence.

Red data species

An investigation was also carried out on rare and protected plants that might possibly occur in the region. For this investigation the National Red List of Threatened Plants of South Africa, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI) was used. The presence of rare and protected species or suitable habitat was recorded during the field visit.

Data processing

A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the vegetation units include the tree, shrub and herbaceous layers. The conservation priority of each vegetation unit was assessed by evaluating the plant species composition in terms of the present knowledge of the vegetation of the Savanna Biome of South Africa. The following four conservation priority categories were used for each vegetation unit::

High:	Ecologically sensitive and valuable land with high species richness that should be conserved and no developed allowed.
Medium:	Land that should be conserved but on which low impact development could be considered.
Medium-low:	Land that has some conservation value but on which development could be considered with limited impact on the vegetation / ecosystem. It is suggested that certain sections of the vegetation be maintained.
Low:	Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation / ecosystem.

FAUNA

Predictive methods

A 1:50 000 map of the study area was provided showing existing infrastructure and the proposed Crowthorne Agricutural Holdings site. This was used as far as possible in order to identify potential "hot-spots" or specialised habitats e.g. patches of open Egoli Granite grassland vegetation, rivers (Modderfontein Spruit, Klein Jukskei and Jukskei River), palustrine wetlands (valley bottom and seepage wetlands) and dams. Satellite imagery of the area was obtained from Google Earth was studied in order to get a three dimensional impression of the topography and current land use. Aerial photographs were utilised for the sensitivity mapping using Arcview 9.2

Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur within the Kyalami AH (2528 DA) Quarter Degree Grid Cell (QDGC). The literature search was undertaken utilising *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al,* 2009) as well as internet using POSA (http://posa.sanbi.org). *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU's MammalMAP (http://vmus.adu.org.za/vm_sp_list.php accessed on the 10th of January 2015) for mammals. Hockey, P.A.R., Dean, W.R.J., Ryan, P.G. (eds). 2005. *Roberts- Birds of Southern Africa VII*th *ed*. And BARNES, K.N. (ed.) (2000) *The Escom Red Data Book of Birds of South Africa, Lesotho and Swaziland* for avifauna (birds) as well as internet SABAP2 (http://sabap2.adu.org.za accessed on the 10th of January 2015). *A Complete Guide to the Frogs of Southern Africa* (du Preez & Carruthers 2009) and *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SAFAP's FrogMAP (http://vmus.adu.org.za). The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) as well as SARCA's ReptiMAP (http://sarca.adu.org.za accessed on the 10th of January 2015 for reptiles.

Site Investigation Methodology

A preliminary assessment of the status, spatial requirements and habitat preferences of all priority species likely to occur on the proposed Kyalami Estate site was undertaken. For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. For other species such as the Striped Harlequin Snake, little of this information was readily available and conservation targets remain speculative. Species assessments will be updated when additional data becomes available and where appropriate, proposed conservation targets will be revised.

A survey of the proposed development areas was carried out by driving around the entire area by car and closer inspection of the actual site carried out on foot during daylight as well as an evening survey on the 9th of February 2015. Due to the close proximity of the site to the R55 as well as historic agricultural activities and present high-density residential developments within Kyalami Estate; the majority of natural vegetation (Egoli Granite Grassland Gm10) has already been transformed or become severely degraded due to large scale illegal dumping activities and invasion of anthropogenic grasses (kikuyu) as weedy plant and alien tree species (*Acacia mearnsii*, Melia azedarach*, Jacaranda mimosifolia** and *Morus alba**). The majority of the site consists of completely transformed vegetation due to existing residential developments and abandoned buildings.

RESULTS OF VEGETATION SURVEY

The study area comprises three vegetation units (Figure 2) namely the 1) Developed area; 2) Degraded grassland; and 3) Alien woodland.

1. Developed area

Status	Transformed		
Vegetation structure:	Varies – tall tree canopy layer to short grass layer		
Topography:	Mostly level	**Soil**	Loam to clay
Rock cover:	0%		
Need for rehabilitation	High		
Conservation Priority	Low (none)		

This area comprises a guest house with a well maintained garden, various outbuildings and other residential houses with gardens or remnants of gardens surrounding them. The area has been landscaped many years ago and planted with mostly ornamental trees with some indigenous trees also present, and lawn grass. It is maintained in some way by regular mowing of the lawn areas. Buidling and other material are present in some locations especially in the areas that have been abandoned.

The grass areas are dominated by the grass *Cynodon dactylon* though the alien invasive grass *Pennisetum clandestinum* (kikuyu) is present in some areas. The woody component consists of a mixture of garden ornamentals, declared alien invader trees, and some indigenous trees that were planted many years ago as part of the landscaping activities. Alien invasive species include *Jacaranda mimosifolia, Cotoneaster pannosus, Acacia mearnsii* and *Lantana camara.* Indigenous species include *Acacia karroo, Diospyros lycioides, Gymnosporia buxifolia,* while garden hybrids include *Ceratonia saliqua, Quercus* spp*., Acer buergerianum* and various conifer species.

The following is a list of species identified on the site (Red = alien invasive species):

WOODY SPECIES

Acacia ataxacantha DC.
Acacia karroo Hayne
Acacia mearnsii De Wild.
Acacia podalyriifolia A.Cunn. ex G.Don
Acer negundo L.
Celtis africana Burm.f.
Celtis sinensis Pers.
Ceratonia siliqua L.
Cotoneaster pannosus Franch.
Diospyros lycioides Desf.
Jacaranda mimosifolia D.Don
Lantana camara L.
Ligustrum lucidum Aiton f.
Maytenus heterophylla (Eckl. & Zeyh.) N.Robson
Melia azedarach L.
Morus alba L.
Quercus species
Searsia leptodictya Diels
Searsia pyroides Burch.
Schinus molle L.

GRASSES

Cynodon dactylon (L.) Pers.
Eleusine coracana (L.) Gaertn.
Phragmites australis (Cav.) Steud.
Urochloa panicoides P.Beauv.

FORBS

Agapanthus species
Agave americana L.
Aloe arborescens Mill.
Arundo donax L.
Chenopodium carinatum R.Br.
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley
Gloriosa superba L.
Guilleminea densa (Willd.) Moq.
Nephrolepis species
Opuntia ficus-indica (L.) Mill.
Plumbago species
Portulaca oleracea L.
Richardia brasiliensis Gomes
Verbena tenuisecta Briq.

Figure 2. Vegetation units of the study area (image obtained from Google Earth)

2. Degraded grassland

Status	Transformed natural grassland		
Vegetation structure:	Grassland with some woody species		
Topography:	Mostly level	**Soil**	Loam
Rock cover:	1%		
Need for rehabilitation	High		
Conservation Priority	Low (none)		

This uinit is located in the central to east section of the study area. It consists of an old grassland that was most probably previously planted for pasture purposes and left fallow. There are a few rocks present while the soil is loamy.

The vegetation is dominated by the grass *Eragrostis curvula* with the weed *Gomphocarpus fruticosus* and the highly invasive category 1 declared invaders *Campuloclinium macrocephalum* and *Solanum mauritianum* prominent throughout these areas. Some woody species occur in dense clumps scattered throughout this unit but mostly on its northern boundary. These include *Searsia pyroides, Searsia lancea* and the exotic invader species *Acacia mearnsii, Lantana camara* and *Robinia pseudoacacia.*

The orange listed geophyte *Hypoxis hemerocallidea* is present and occurs as small groups and single individuals within this unit. Small maize patches are also present in some areas of this unit.

A small section in the north-eastern corner of the study site (labelled 2b on figure 2) is totally dominated by the grass *Eragrostis curvula* with few alien invasive species present. The grasses *Hyparrhenia hirta, Cynodon dactylon, Digitaria eriantha* and the forbs *Verbena tennuisecta* and *Peudognaphalium luteo-album* are prominent in this section.

The following is a list of species observed during the survey (Red = alien invasive species; Orange = Threatened species):

WOODY SPECIES

Acacia mearnsii De Wild.
Acacia podalyriifolia A.Cunn. ex G.Don
Asparagus suaveolens Burch.
Eucalyptus camaldulensis Dehnh.
Lantana camara L.
Melia azedarach L.
Pyracantha angustifolia (Franch.) C.K.Schneid.
Searsia lancea L.f.
Searsia pyroides Burch.
Robinia pseudoacacia L.
Solanum mauritianum Scop.
Seriphium plumosum

GRASSES

Aristida congesta Roem. & Schult.
Chloris virgata Sw.
Cynodon dactylon (L.) Pers.
Digitaria eriantha Steud.
Eragrostis curvula (Schrad.) Nees
Eragrostis gummiflua Nees
Hyparrhenia hirta (L.) Stapf
Melinis repens (Willd.) Zizka
Pennisetum clandestinum Chiov.
Perotis patens Gand.
Pogonarthria squarrosa (Roem. & Schult.) Pilg.
Sporobolus africanus (Poir.) Robyns & Tournay
Themeda triandra Forssk.
Trichoneura grandiglumis (Nees) Ekman
Urochloa panicoides P.Beauv.

FORBS

Agave americana L.
Bidens pilosa L.
Campuloclinium macrocephalum (Less.) DC.
Conyza bonariensis (L.) Cronquist
Conyza podocephala DC.
Cuscuta campestris Yunck.
Felicia muricata (Thunb.) Nees
Gladiolus crassifolius Baker
Gomphocarpus fruticosus (L.) Aiton f.
Gomphrena celosioides Mart.
Helichrysum kraussii Sch.Bip.
Helichrysum nudifolium (L.) Less.
Hypoxis hemerocallidea Fisch. & C.A.Mey.
Hypoxis rigidula Baker
Ipomoea purpurea (L.) Roth
Kyllinga alba Nees
Opuntia ficus-indica (L.) Mill.
Pellaea calomelanos (Sw.) Link
Polygala hottentotta C.Presl
Schkuhria pinnata (Lam.) Cabrera
Sida alba L.
Tagetes minuta L.
Tithonia rotundifolia (Mill.) S.F.Blake
Verbena tenuisecta Briq.
Zinnia peruviana (L.) L.

3. Alien woodland

Status	Transformed		
Vegetation structure:	Varies – tall tree canopy layer to short grass layer		
Topography:	Mostly level	**Soil**	Dark loam
Rock cover:	1%		
Need for rehabilitation	High		
Conservation Priority	Low (none)		

This woodland is located on an old abandoned and demolished residential portion in the southern section of the study site. The soil is dark loamy with few rocks present.

The vegetation is dominated by the declared invader trees *Melia azedarach* that are mostly more than 10m tall. These trees cover more than 80% of the study site resulting in a highly degraded herbaceous layer underneath the canopies. A large number of declared alien invader species are prominent underneath the canopies of these trees and include *Araujia sericifera, Cereus jamacaru, Mirabilis jalapa, Datura stramonium, Solanum mauritianum* and *Lantana camara*. Forbs present include *Bidens pilosa, Conyza bonariensis* and *Sida alba.*

A remnant area of a previously well-kept grass lawn (*Pennisetum clandestinum* – kikuyu) is also found within this unit. This area is totally dominated by the exotic invasive kikuyu grass

that is more than half a metre tall. Various pioneer weeds such as *tagetes minuta* and *Bidens pilosa* are also present within this unit.

The following is a list of species observed during the survey (Red = alien invasive species):

WOODY SPECIES
Asparagus suaveolens Burch.
Celtis africana Burm.f.
Lantana camara L.
Melia azedarach L.
Solanum mauritianum Scop.

GRASSES
Cynodon dactylon
Pennisetum clandestinum Chiov.

FORBS
Achyranthes aspera L. var. sicula L.
Araujia sericifera Brot.
Bidens pilosa L.
Cereus jamacaru DC.
Conyza bonariensis (L.) Cronquist
Datura stramonium L.
Ipomoea purpurea (L.) Roth
Mirabilis jalapa L.
Sida alba L.
Solanum nigrum L.
Tagetes minuta L.

RESULTS OF FAUNAL SURVEY

Amphibians

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Frog populations throughout the world have crashed dramatically in the last twenty years. Deforestation, wetland draining and pollution are immediately obvious causes. But other, more fundamental, man-made impacts are causing population declines in 'pristine' habitats such as national parks and remote rainforests. Reductions in atmospheric ozone levels are allowing increased UV-radiation, pollutants are accumulating in natural systems and bacterial and virus distribution is accelerating across the globe (Carruthers 2001). Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile fogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may acts as an early warning system for the quality of the environment. The Giant Bullfrog (*Pyxicephalus adspersus*) has been chosen as a flagship species for the grassland ecoregion (CooK in le Roux 2002)

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in the Gauteng Province can be classified as explosive breeders. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken for a single day/evening during the summer months (February), only a few species of frogs were recorded. Ideally, a herpetological survey should be undertaken throughout the duration of the wet season (September-January). It is only during this period accurate frog lists can be compiled. During this survey; fieldwork was augmented with species lists compiled from personal records; data from the South African Frog Atlas Project (SAFAP) and published data, and the list provided in Table below is therefore regarded as likely to be fairly comprehensive.

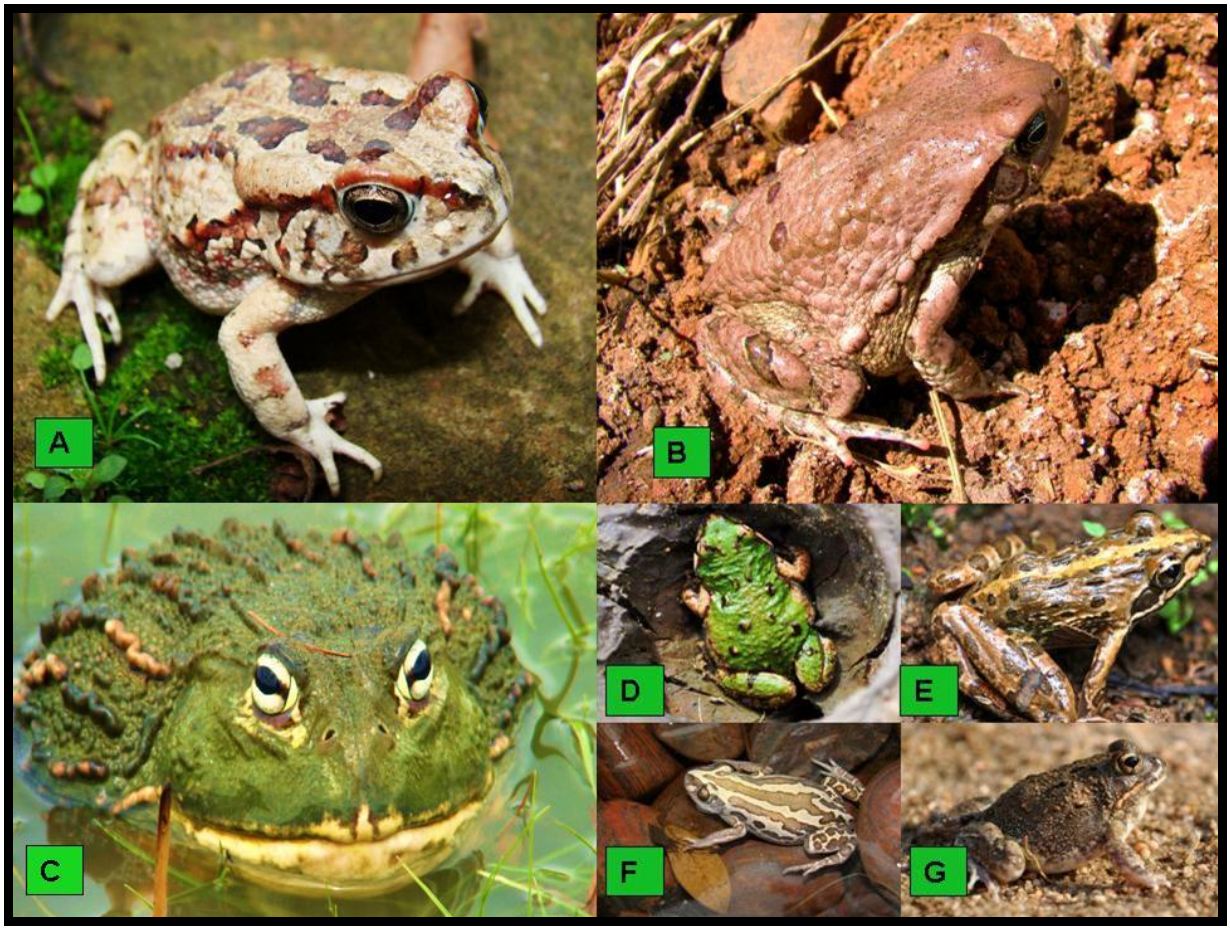


Figure 3. **A conglomerate of photographs of the frog species likely to occur or in suitable habitat surrounding the proposed site. A:** Guttural Toad (*Amietophrynus gutturalis*); **B**: Red Toad (*Schismaderma carens*); **C:** Giant Bullfrog (*Pyxicephalus adspersus*); **D:** Boettger's Caco (*Cacosternum boettgeri*); **E:** Drakensberg River Frog (*Amietia quecketti*); **F:** Bubbling Kassina (*Kassina senegalensis*) and **G**: Tremelo Sand Frog (*Tomopterna cryptotis*).

Table 1. Frog species recorded by the consultant in the Kyalami /Blue Hills/Chartwell and Beauliea areas during the period 1991 to 2015.

COMMON NAME	SCIENTIFIC NAME	BREEDING HABITAT
Guttural Toad	*Amietophrynus gutturalis*	Seasonal pools within the valley bottom wetlands and dams
Red Toad	*Schismaderma carens*	Reed invaded artificially created dams along the Modderfontein spruit.
Common Platanna	*Xenopus laevis*	Dams along the Modderfontein spruit
Boettger's or Common Caco	*Cacosternum boettgeri*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area
Bubbling Kassina	*Kassina senegalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area

*Tremelo Sand Frog	*Tomopterna cryptotis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area
Natal Sand Frog	*Tomopterna natalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area
Giant Bullfrog	*Pyxicephalus adspersus*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu Bird Sancturay, Crowthorne AH and Blue Hills area.
Drakensberg River Frog	*Amietia quecketti*	Permanent pools within the central valley bottom wetland within Beauliea, Crowthorne AH and Blue Hills area
Snoring Puddle Frog	*Phrynobatrachus natalensis*	Seasonal pools, inundated grasslands within the central valley bottom wetland within Beaulieu, Crowthorne AH and Blue Hills area.
Raucous Toad	*Amietophrynus rangeri*	Historic records (1992)

Reptiles

Comprehensive reptile species lists are impossible to determine with extensive fieldwork over a number of months or even years. Reptile lists provided are of species most likely to occur on the site for reptile fauna present on the site is presented in Table below (see Appendix). As a result of human presence in the area (pathways, houses) coupled with habitat destruction and disturbances (frequent fires at incorrect time of year), alterations to the original reptilian fauna are expected to have already occurred. No scattered rupicolous or rocky outcrops and indigenous Egoli Granite Grassland vegetation remains on the transformed site. Destruction of rocky outcrops and removal of rock will result in the destruction of vital habitat for remaining rupicolous (living on or amongst rocks) reptile species including snakes, skinks and geckos. No termite mounds were observed within the degraded grasslands and landscaped areas within the site. Two reptile species were recorded namely a Striped or Speckled Rock Skink (*Trachylepis punctatissima*) and a Cape Dwarf Gecko (*Lygodactylus capensis*). Both these species are urban exploiters and were observed within the residential garden. Low reptile diversity is expected from the transformed site due to extensive habitat transformation and high levels of anthropogenic activities on and surrounding the site.

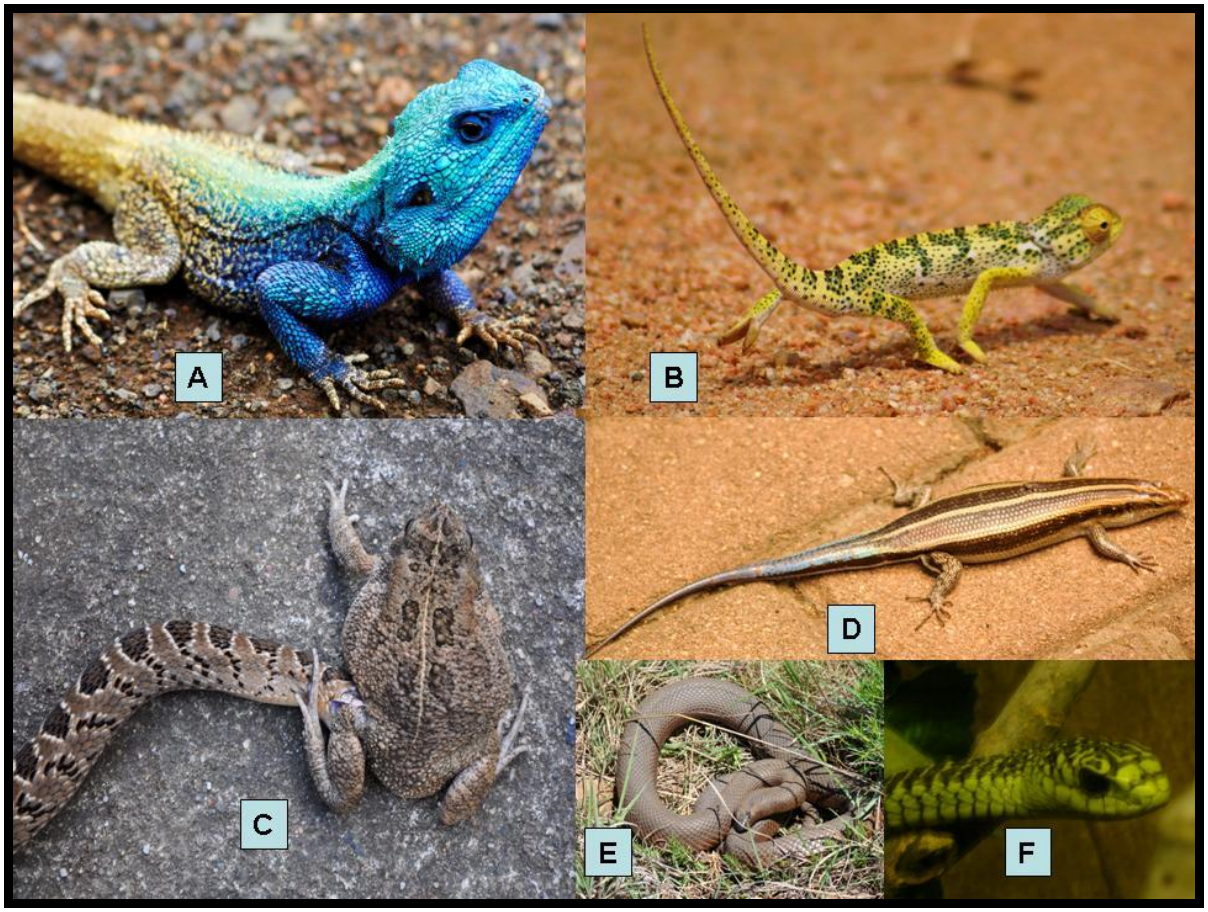


Figure 4. **A conglomerate of photographs displaying the reptile species recorded from the 2528DA locus. A:** Southern Tree Agama (*Acanthocercus atricolis*), **B:** Flap-necked Chameleon (*Chamaeleo dilepis*), **C:** Rhombic Night Adder (*Causus rhombeatus*) feeding on a Guttural Toad (*Amietophrynus gutturalis*), **D:** Female Rainbow or Five-Lined Skink (*Trachylepis margaritifer*), **E:** Mole Snake (*Pseudaspis cana*) and **F:** Boomslang (*Dispholidus typus*)

Table 2. Reptile species recorded for the 2528 DA QDGC according to ReptiMAP (SARCA). Actual species list for the site will contain considerable less species due to extensive habitat transformantion and degradation.

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Agamidae	*Acanthocercus*	*atricollis*	*atricollis*	Southern Tree Agama	Least Concern (SARCA 2014)	No
Agamidae	*Agama*	*atra*		Southern Rock Agama	Least Concern (SARCA 2014)	No
Atractaspididae	*Aparallactus*	*capensis*		Black-headed Centipede-eater	Least Concern (SARCA 2014)	No
Atractaspididae	*Atractaspis*	*bibronii*		Bibron's Stiletto Snake	Least Concern (SARCA 2014)	No
Chamaeleonidae	*Chamaeleo*	*dilepis*	*dilepis*	Common Flap-neck Chameleon	Least Concern (SARCA 2014)	No
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Least Concern (SARCA 2014)	No
Colubridae	*Crotaphopeltis*	*hotamboeia*		Red-lipped Snake	Least Concern (SARCA 2014)	No
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern (SARCA 2014)	No
Colubridae	*Dispholidus*	*typus*	*typus*	Boomslang	Least Concern (SARCA 2014)	No
Colubridae	*Lamprophis*	*aurora*		Aurora House Snake	Least Concern (SARCA 2014)	Yes
Colubridae	*Lycodonomorphus*	*rufulus*		Brown Water Snake	Least Concern (SARCA 2014)	No
Colubridae	*Lycophidion*	*capense*	*capense*	Cape Wolf Snake	Least Concern (SARCA 2014)	No
Colubridae	*Philothamnus*	*semivariegatus*		Spotted Bush Snake	Least Concern (SARCA 2014)	No

Colubridae	*Prosymna*	*sundevallii*		Sundevall's Shovel-snout	Least Concern (SARCA 2014)	No
Colubridae	*Psammophis*	*brevirostris*		Short-snouted Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Psammophylax*	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Psammophylax*	*tritaeniatus*		Striped Grass Snake	Least Concern (SARCA 2014)	No
Colubridae	*Pseudaspis*	*cana*		Mole Snake	Least Concern (SARCA 2014)	No
Colubridae	*Thelotornis*	*capensis*	*capensis*	Southern Twig Snake	Least Concern (SARCA 2014)	No
Cordylidae	***Chamaesaura***	***aenea***		**Coppery Grass Lizard**	**Near Threatened (SARCA 2014)**	**Yes**
Cordylidae	*Cordylus*	*vittifer*		Common Girdled Lizard	Least Concern (SARCA 2014)	No
Elapidae	*Elapsoidea*	*sundevallii*	*media*	Highveld Garter Snake	Not listed	No
Elapidae	*Hemachatus*	*haemachatus*		Rinkhals	Least Concern (SARCA 2014)	No
Elapidae	*Naja*	*annulifera*		Snouted Cobra	Least Concern (SARCA 2014)	No
Elapidae	*Naja*	*mossambica*		Mozambique Spitting Cobra	Least Concern (SARCA 2014)	No
Gekkonidae	*Lygodactylus*	*capensis*	*capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)	No
Gekkonidae	*Lygodactylus*	*nigropunctatus*		Black-spotted Dwarf Gecko	Least Concern (SARCA 2014)	Yes
Gekkonidae	*Pachydactylus*	*affinis*		Transvaal Gecko	Least Concern (SARCA 2014)	Yes

Gekkonidae	*Pachydactylus*	*capensis*		Cape Gecko	Least Concern (SARCA 2014)	No
Gerrhosauridae	*Gerrhosaurus*	*flavigularis*		Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Ichnotropis*	*capensis*		Ornate Rough-scaled Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Meroles*	*squamulosus*		Common Rough-scaled Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Nucras*	*holubi*		Holub's Sandveld Lizard	Least Concern (SARCA 2014)	No
Lacertidae	*Nucras*	*intertexta*		Spotted Sandveld Lizard	Least Concern (SARCA 2014)	No
Leptotyphlopidae	*Leptotyphlops*	*incognitus*		Incognito Thread Snake	Least Concern (SARCA 2014)	No
Leptotyphlopidae	*Leptotyphlops*	*scutifrons*	*scutifrons*	Peters' Thread Snake	Not listed	No
Pelomedusidae	*Pelomedusa*	*subrufa*		Central Marsh Terrapin	Least Concern (SARCA 2014)	No
Scincidae	*Mochlus*	*sundevallii*	*sundevallii*	Sundevall's Writhing Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*punctatissima*		Speckled Rock Skink	Least Concern (SARCA 2014)	No
Scincidae	*Trachylepis*	*sp. (Transvaal varia)*		Skink sp. 1	Not listed	No
Scincidae	*Trachylepis*	*varia*		Variable Skink	Least Concern (SARCA 2014)	No
Testudinidae	*Kinixys*	*lobatsiana*		Lobatse Hinged Tortoise	Least Concern (SARCA 2014)	No
Testudinidae	*Kinixys*	*spekii*		Speke's Hinged	Least Concern	No

				Tortoise	(SARCA 2014)	
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Least Concern (SARCA 2014)	No
Typhlopidae	*Afrotyphlops*	*bibronii*		Bibron's Blind Snake	Least Concern (SARCA 2014)	No
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Least Concern (SARCA 2014)	No
Varanidae	*Varanus*	*niloticus*		Water Monitor	Least Concern (SARCA 2014)	No
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern (SARCA 2014)	No
Viperidae	*Causus*	*rhombeatus*		Rhombic Night Adder	Least Concern (SARCA 2014)	No

Avifauna/birds

Due to time constraints no comprehensive bird lists could be compiled. During brief site visitations (total of 8 hrs), 26 bird species were recorded. Two hundred and forty five (245) bird species have been recorded during the SABAP2 within the 2555-2800 pentad in which the study site is situated. The majority of species recorded during field surveys are common, widespread and typical highveld species. Numbers of bird species in the Kyalami area have declined mainly due to increased levels of human disturbances (quad and off-road bikes); extensive habitat transformation due to increased urban sprawl and agricultural activities; as well as severe habitat degradation of the wetlands as well as rivers (especially the Modderfontein spruit, Klein Jukskei and Jukskei). Human activity has transformed grasslands in South Africa to a point where few pristine examples exist (Low & Rebelo 1996; Barnes 1998). Factors such as agricultural intensification, increased pasture management (overgrazing), decrease in grassland management due to frequent fires and land-use alteration (urbanisation). Continuing pressure on sensitive wetland and surrounding open grassland habitat are largely responsible for the decline of the threatened avifaunal species.

Mammals

No small mammal trapping was conducted. Fieldwork was augmented with previous surveys in similar habitats as well as published data. The area was initially traversed on foot to ascertain the presence of available refuges which comprised of soil, rubble and waste stockpiles. The only mammal species observed wer a few scattered African Molerat burrows in the sandier sections of the site as well as a House Rat. Mammal diversity is expected to be low and mainly urban exploiters such as the introduced House Rat and House Mouse.

DISCUSSION

VEGETATION

Vegetation type

The vegetation of the study is a classified as belonging to the endangered Egoli Granite vegetation type (Mucina & Rutherford 2006) (Figure 5). Egoli Granite Grasslands in the Gauteng Province are highly threatened and are listed as Endangered. Only a small fraction (3%) of this vital habitat has been formerly conserved within Gauteng. These grassland areas form vital habitats for numerous animal and plant species.

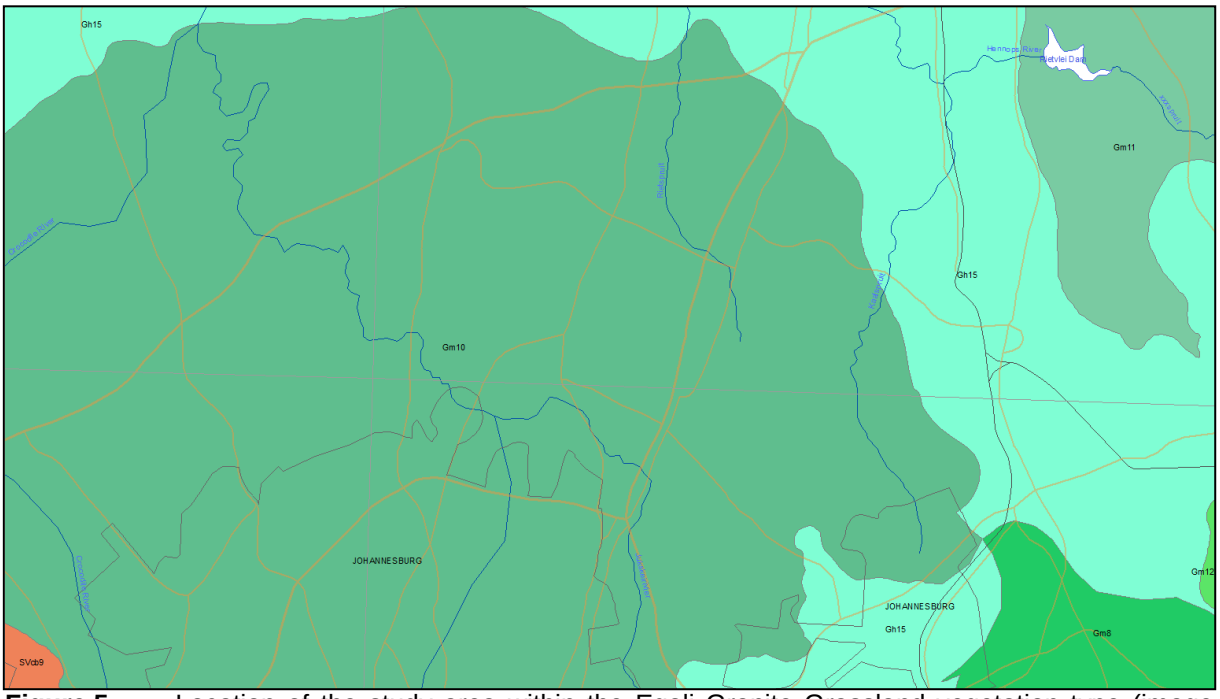


Figure 5. Location of the study area within the Egoli Granite Grassland vegetation type (image obtained Mucina & Rutherfore, 2006).

The study area is however, totally transformed with no vegetation reminiscent of the original grassland vegetation remaining.The total area is transformed due to the levelling of the land as well as the development of buildings some years ago. The area has no ecosystem functioning or value.

Vegetation units

Vegetation unit 1 (Developed areas) is transformed due to these areas having been landscaped and a mixture of ornamelta, alien invasive, and indigenous species planted. Various buildings have been erected on these premises many years ago resulting in the area

becoming transformed with vegetation not representative of the natural vegetation and environment. This unit herefore has from a plant ecological and ecosystem functioning point of view a **low conservation value**.

Vegetation unit 2 (Degraded grassland) was most probabply previously ploughed and planted with pasture grasses. This area has now been left fallow for many years resulting in the grass layer becoming moribund. These moribund areas became open spaces for pioneer weedy and alien species that are present throughout the study site. As a result these alien and pioneer species have established throughout the grassland and are slowly displacing all the natural species. The vegetation is dominated by secondary successional, pioneer and alien invasive species. The area is not representative of natural grassland and is regarded as being transformed. The high number of declared alien invasive species threatens the natural environment and its ecosystem functioning. From a plant ecological and ecosystem functioning point of view this area has a **low conservation value**.

The vegetation of the **Alien woodland (vegetation unit 3)** is completely dominated by tall *Melia azedarach* trees that form a dense forest-like canopy. The herbaceous layer is severely disturbed due to human actions and the dense tree cover. Rubble and litter are dumped in this area (while doing the survey a small truck dumped building rubble on the site). Humans use the area as a toilet with broken bottles and other litter strewn in various places. As a result the area is classified as an alien forest. The vegetation is completely transformed with no natural vegetation left. This area poses a huge threat to the environment due to the many alien invasive species and has from an ecological and ecosystem functioning point of view a **low (no) conservation value**.

Medicinal plants

Five medicinal plant species were found within the study site. Only one species (*Hypoxis hemerocallidea*) is important with the rest occurring abundantly in natural areas and are not threatened.

Plant name	Plant part used	Medicinal use	Vegetation unit
Acacia karroo	Leaves, bark and gum	Diarrhoea & dysentery Gum: colds, oral thrush & haemorrhage.	1
Datura stramonium	Leaves & green fruit	Asthma, rheumatism, abscesses, bronchitis, tonsillitis	3
Gomphocarpus fruticosus	Leaves, sometimes roots	Headache, stomach pain, tuberculosis.	2
Hypoxis hemerocallidea	Corm	Infusions of corm used to treat dizziness, bladder disorders and insanity. Are given to children as a tonic	2
Pellaea calomelanos	Leaves and rhizomes	Smoked for olds, asthma. Also used for coughs and kidney problems	2

Red data species

Except for the one orange listed geophyte *Hypoxis hemerocalidea* (African potato), no red data habitat is present on the property and no such species were recorded. It is recommended that *Hypoxis hemerocallidea* is removed from the property (under the supervision of a qualified botanist/ecologis/natura conservator) and replanted in suitable natural habitat.

Alien plant species

Alien invasive species pose a huge threat to the natural ecosystems in South Africa. Not only do they displace the natural vegetation of an area wherey the also negatively affect the faunal component, but they also use a large amount of water. Thus these species negatively affect the natural ecological process within an ecosystem thereby causing ecosystem degradation and a loss of ecosystem functioning. A large number of alien plants as listed below is present throughout the study area. These species have in some areas already displaced all the indigenous vegetation, while some are in the process of becoming dominant. Of special concern is the presence of large numbers of the category 1 weed *Campuloclinium macrocephalum* and the catergory 1 shrub *Lantana camara.* A total number of 23 different alien plant species were identified on the propertyThese species must be removed and eradicated from the property as a high priority.

DECLARED ALIEN INVASIVE PLANTS

Acacia mearnsii De Wild.
Acacia podalyriifolia A.Cunn. ex G.Don
Agave americana L.
Araujia sericifera Brot.
Arundo donax L.
Campuloclinium macrocephalum (Less.) DC.
Cereus jamacaru DC.
Cotoneaster pannosus Franch.
Datura stramonium L.
Echinopsis spachiana (Lem.) Friedrich & G.D.Rowley
Eucalyptus camaldulensis Dehnh.
Ipomoea purpurea (L.) Roth
Jacaranda mimosifolia D.Don
Lantana camara L.
Ligustrum lucidum Aiton f.
Melia azedarach L.
Mirabilis jalapa L.
Morus alba L.
Opuntia ficus-indica (L.) Mill.
Pennisetum clandestinum Chiov.
Pyracantha angustifolia (Franch.) C.K.Schneid.
Robinia pseudoacacia L.
Solanum mauritianum Scop.

General

A large number of areas have rubble, litter and garden refuse that further degraded the vegetation.

FAUNA

Amphibians

Figure 6. The Giant Bullfrog (Pyxicephalus adspersus) has been recorded in the Kyalami AH, Blue Hills and Beaulieu area. Remaining populations are threatened due to extensive habitat transformation and degradation within the area. Large numbers are killed annually after heavy summer downspous on the major roads. Historic breeding activities (1987-1994) were recorded from the shallow margins of the artificial dams in the Beaulieu (Witpoort) Bird Scantuary by the consultant. The majority of recent recordings are of maigrating adult males or road fatalities.

Threatened species

The Giant Bullfrog (*Pyxicephalus adspersus*) is a protected frog species whose conservation status has been revised and was included as a Red Data Species under the category 'Lower Risk near threatened' (Minter *et al.* 2004). Giant Bullfrogs historically occurred throughout the Kyalami-Blue Hills-Crowthorne Agricultural Holdings area. A major causal factor in the decline in Giant Bullfrog populations in this area is massive habitat destruction by previous agricultural activities (draining wetlands, ploughing of grasslands) and within the past twenty years by extensive residential and commercial developments. Major (R55, N1, M71) and

secondary road networks bisect suitable breeding and foraging areas resulting in mass road fatalities of migrating adult and juvenile bullfrogs. Fences and high security walls also prevent the natural migration of adult and juveniles from foraging areas and suitable breeding sites (habitat fragmentation).

Limited foraging potential occurs on the site due to the transformation of the entire site into an existing residential erven and garden as well as degraded grassland (old horse paddocks and Teff pastures). Margianlly suitable foraging habitat occurs within the open grasslands to the north of the site. Due to frequent burning of the remaining patches of grasslands, the natural species composition and prey availability become transformed. Several large termite mounds occur on these sites and the annual emergence of several thousand winged alates provide an important food source to several animal species, especially herpetofauna.

No breeding habitat occurs on the site or in the immediate surrounding area. The seasonally inundated margins around the artificial dams in the Beaulieu (Witpoort) Bird Sanctuary approximately 980 m to the north-west of the site may still offer suitable breeding habitat. Historic breeding activities were recorded in 1991-1994 mainly due to the draining of the artifical permanently inundated dam. Extremely limted migratory habitat remains as the site has extensive barriers/walls as well as situated adjacent to R55 and M71 road and several secondary roads. These roads often offer the only migrational route for Giant Bullfrogs towards suitable breeding habitats; resulting in mass road fatalities. The R55 with its high vehicular traffic can be considered a migration barrier for the majority of frog species. Several high security walls and wire (razor) fences limit the migration of several species around the entire Kyalami Estate area.

It is therefore considered the study site contains limited suitable foraging and migratory habitat of **low** conservation importance, and no suitable breeding habitat for Bullfrogs. Destruction of the habitat provided by the study area will have an impact of **low significance** on the conservation status of these species within a local (Kyalami Estate) scale and a **low** significance within Gauteng.

Reptiles

Threatened species

Continual destruction of suitable habitats has resulted in the disappearance of numerous reptile species on the Highveld. No snake species were recorded during the brief field survey. Indiscriminate killing of snake species is likely to have resulted in the disappearance

of the larger and the more sluggish snake species within the study area. No evidence of illegal reptile collecting was observed throughout the site although it may have occurred in the past. No threatened reptile species were recorded during this survey, but the Coppery Grass Lizard (Chaemaesaura aenea), which is categorised as Near-Threatened in the latest Red Data List (SARCA 2014) has been recorded from the grid square (2528 DA) within which the study area is situated. These very unusual lizards have extremely reduced limbs (often littlee more than spikes) and a very long tail (3-4 times longer than the SVL length). The body scales are rough, strongly keeled and arranged in regular rows. The elongate shape of grass lizards allows them to move freely in long grass through which they 'swim' with the speed and agility of snakes. The Coppery Grass Lizard is endemic to Southern Africa occurring on grass covered mountain slopes and plateaus (Alexander & Mariais 2007). No suitable habitat occurs within the proposed site due to the transformation (established gardens and lawns) and degradation of the majority of grasslands (overgrazing, frequent fires, alien vegetation invasion and grass harvesting activities).

Avifauna/birds

TABLE 3: Red listed species recorded in Kyalami AH area (HARRISON ET AL. 1997; SABAP1 AND SABAP2.adu.org.za).

Species	Conservation status (Barnes 2000)	Reporting rate SABAP2 %	Habitat requirements (Barnes 2000; Hockey et al 2005; Harrison et al 1997; personal observations)
Peregrine Falcon *Falco peregrinus*	Near threatened	1.38	Wide range of habitat, but cliffs is a prerequisite for breeding. **No suitable habitat on site.**
Lesser Kestrel *Falco naumanni*	Vulnerable	0.69	Grasslands, old lands, cultivated lands. Occasional foraging arrays are possible on site.
Half-collared Kingfisher *Alcedo semitorquata*	Near-Threatened	0.6	Fast-flowing streams with clear water and well-wooded banks. Occurs around dams (pers.obs.). No suitable habitat on site.
Greater Flamingo *Phoenicopterus ruber*	Near-Threatened	0.69	Endorheic pans, estuaries and other wetlands.No suitable habitat on the site.

At a local (Kyalami AH) scale the transformed grasslands on the site provide limited habitat for birds in general. Destruction of the habitat provided by the study area will have an impact of **negligible significance** on the conservation status of threatened species within a local (Kyalami) scale and no significance within Gauteng.

Mammals

Threatened species

No sensitive or endangered mammals were recorded within the study area. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of hunting and poaching as well as habitat alteration and degradation. Common or Bush Duiker, Black-backed Jackal have however been recorded from surrounding grasslands situated in the Kyalami and Blue Hills area. Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats and dogs. According to the "South African Red Data Book of Terrestrial Mammals" (Smithers 1986) and Skinner and Smithers (1990), the study area falls within the distribution ranges of 12 species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). The study site may provide suitable habitat for at least 1 of the 12 above-mentioned threatened species, though the presence of dogs on the property could result in them being killed. This species is listed in the table below.

Table 4. Red Data List mammal for which suitable habitat may be present, and which may therefore occur within the study area.

Common Name	Scientific Name	Conservation Status Friedman & Daily (2004)
South African Hedgehog	*Atelerix frontalis*	Near-Threatened

Figure 7. The South African Hedgehog has declined in the Kyalami-Midrand area due to habitat transformation, road fatlities, illegal pet trade as well as been killed by dogs.

South African Hedgehog *Atelerix frontalis* (A.Smith, 1831)

Distribution (Southern African Sub-region)

They occur in Namibia, Botswana, Zimbabwe, Lesotho and South Africa. The South African distribution includes the Gauteng, Free State, Limpopo and Cape Provinces (Skinner and Smithers, 1991).

Habitat

Hedgehogs occur in such a wide variety of habitats that it is difficult to assess its habitat requirements. The one factor that is common to all the habitats in which they occur is dry cover, which they require for resting places and breeding purposes. Habitat must provide a plentiful supply of insects and other foods. Suburban gardens provide these requirements and this may explain their occurrence in this type of habitat. Hedgehogs are predominantly nocturnal, becoming active after sundown, although, after light rains at the commencement of the wet season, they may be active during daylight hours (Skinner and Smithers, 1991).

Food

Hedgehogs are omnivorous feeding predominantly on invertebrates such as beetles, termites, centipedes, millipedes, moths and earthworms. They will take small mice, lizards and the eggs and chicks of ground-living birds as well as frogs, slugs and some vegetable matter, including fungi (Skinner and Smithers, 1991).

Reproduction

Seasonal breeders, with young being born during the warm, wet summer months from October to March (Skinner and Smithers, 1991).

South African Hedgehogs have been recorded in the Fourways, Chartwell and Dainfern areas. The recent transformation and destruction of large open grassland areas for high density residential developments within Broadacres, Dainfern, Fourways and Charwell areas and increased human presence has resulted in the decline of Hedgehogs in the area. Destruction of the transformed habitat provided by the study area will have a negligible impact on the remaining (albeit limited) mammals found on the site. The development of the site will have a **low significance** on the conservation status of the remaining animal species within a local (Kyalami) scale and no ignificance within Gauteng

POTENTIAL IMPACTS OF THE PROPOSED WHISKEN DEVELOPMENT ON THE ASSOCIATED FAUNA

Loss of habitat

The proposed mixed use development will most likely result in a **medium-low, short, medium and long-term negative impact** on the limited faunal species utilising these areas. The proposed Whisken development comprises transformed or degraded habitats with low conservation value. This will result in the destruction of transformed habitats which offers limited suitable habitat for remaining animal species. Further, direct and indirect impacts of the development include increased access and human presence into the area as well as neighbouring properties. Increased human pressure and activities in these degraded habitats could result in further environmental degradation if environmentally sensitive practices are not followed and maintained throughout all stages of the development.

Mitigation and Recommendations

During the **CONSTRUCTION** phase the following is recommended: Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. All temporary stockpile areas, litter and dumped material and rubble must be removed on completion of construction. All alien invasive plant and tree species should be removed from the site to prevent further invasion. Vegetation clearance should be restricted to the areas under construction allowing remaining animals opportunity to move away from the disturbance. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. No hunting with firearms (shotguns, air rifles or pellet guns) or catapults should be permitted on the property as well as neighbouring areas.

Horticultural Activities

Landscape architects, and the developer, have an opportunity to conserve certain faunal biodiversity present on the site and possibly increase the biodiversity of certain animal species (birds). Vegetation has been reported to be the single most important habitat component for all species of animals. Linked to this, is the preservation, maintenance and creation of tracts of natural and ornamental vegetation in all stages of ecological succession, interconnected by corridors or green belts for escape, foraging, breeding and exploratory movements. Landscaping projects are all too frequently characterized by exotic or indigenous (not to the area) trees, planted at the same time, at the same size and are spaced at regular centred settings. The resulting pattern and structure is one of limited vegetation diversity, trees of uniform size, even age stands and little or no under-story planting. Only a few species of animals (urban exploiters) will occupy these limited niches, leading to decreased faunal biodiversity.

Mitigation and recommendation

Remaining indigenous trees (naturally occurring in the area) should be retained wherever possible. Gardens or landscaped areas around the proposed commercial development should be planted with indigenous (preferably using endemic or local species from the area) grasses, forbs, shrubs and trees, which are water wise and require minimal horticultural practices. A species list of suitable species should be compiled for future property owners.

A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen. Where herbicides are used to clear vegetation,

specimen-specific chemicals should be applied to individual plants only. General spraying should be prohibited. All alien vegetation should be eradicated from the property.

Where the removal of alien species may leave spoil exposed, alternative indigenous species should be established before eradication takes place. Individual property owners should be encouraged to plant indigenous non-invasive plants. The attention of property owners must be drawn to the most recent Declared Weeds List (2001) in the *Conservation of Agricultural Resources Act* 43 of 1983 and the associated penalties and prohibitions. Horticultural activities such as fertilisers, herbicide and pesticide runoff, increase in alien vegetation and weedy species, dumping of refuge and building material must be strictly managed and be environmentally sensitive and should meet the following requirements:

- Limited to building environs and limited areas of proposed development.
- Limited irrigation by water-wise gardening (use local plants adapted to local conditions).
- Strict fertiliser, pesticide and herbicide control (limited usage)
- Invertebrate pests on the site should be controlled in the following manner:
- The least environmentally damaging insecticides must be applied. Pyrethroids and Phenylpyrazoles are preferable to Acetylcholines. Use insecticides that are specific to the pest (species specific) in question. The lowest effective dosages must be applied. The suppliers advice should always be sought. Do not irrigate for 24 hours after applying insecticides in areas where there is a chance of contaminating water-courses or dams, fungal pathogens should be used in preference to chemical insecticides.
- Reduction of weed and erosion by minimum tillage gardening practices (groundcovers and mulching better in all respects).
- No dumping of any materials in undeveloped open areas and neighbouring properties.

Erosion and Surface runoff

Urban development is characterised by large areas of sealed surfaces such as roads, houses etc. Impermeable surface cover ranges from 15% to 60% of suburban areas to almost 100% in central business districts. Infiltration is considerable reduced with an increase in surface run-off. Run-off is generally discharged to surface water systems and often contains pollutants. Pollutants range from organic matter, including sediments, plant materials and sewage, to toxic substances such as heavy metals, oils and hydrocarbons. Construction activities associated with urban development can lead to massive short term erosion unless adequate measures are implemented to control surface run-off. Sheet erosion

occurs when run-off surface water carries away successive thin layers of soil over large patches of bare earth. This type of erosion is most severe on sloping soils, which are weakly structured with low infiltration, which promotes rapid run-off. It occurs on the site where vegetation has been destroyed. Continual erosion in sheet-eroded slopes is a common cause of gully erosion. Gully erosion results from increased flow along a drainage line, especially where protective vegetation has been removed and soils are readily transported. A gully has steep, bare sides and is often narrow and deep. Once formed, a gully usually spreads upstream through continual slumping of soil at the gully head. Gully erosion can be associated with salting as the saline sub-soils are readily eroded.

Mitigation and recommendations

Vegetation plays a critical role in the hydrological cycle by influencing both the quantity and quality of surface run-off. It influences the quantity of run-off by intercepting rainfall, promoting infiltration and thus decreasing run-off. Vegetation can influence water quality in two ways: by binding soils thus protecting the surface layer, and by intercepting surface run-off thus preventing erosion. When the speed of the run-off is reduced, suspended particles can settle out and dissolve substances, such as nutrients, can be assimilated by plants. The vegetation has a filtering effect. The timing of clearing activities is of vital importance. Clearing activities and earth scraping should preferably be restricted to the dry season in order to prevent erosion and siltation. The dry months are also the period when the majority of species are either dormant or finished with their breeding activities. Future soil stockpiling areas must follow environmentally sensitive practices and be situated a sufficient distance away from drainage areas. The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site. Sufficient measures must be implemented to prevent the possible contamination of the surface water and surrounding groundwater.

Migratory Routes (Fencing)

The migratory movements of several animal (frog, reptile and mammal) species could be completely disrupted by the erection of numerous walls around properties, fences and road networks, which restrict natural movements between suitable foraging and breeding areas. This could potentially result in the disruption of natural gene flow between populations and could result in a high impact on the highly mobile species. Fencing off of residential areas and private property also plays a critical role in impeding the natural migration of the majority of animal species. A trade off thus exists between safety and security on the one hand and movement of animal species on the other.

Mitigation and recommendations

Ideally fences should not restrict the natural migratory movements of certain animals. The site offers limited suitable migratory habitat. Electric fences have a negative impact on certain animal species including Bushbabies, geckoes, chameleons, bullfrogs and tortoises. Palisade fencing with adequate gaps is recommended for the conserved private open spaces.

Artificial Lighting

Artificial lighting will most likely result in a **moderate** to **high** negative short, medium and long- term impact on all nocturnal animal species. Numerous species will be attracted towards the light sources and this will result in the disruption of natural cycles, such as the reproductive cycle and foraging behaviour. The lights may destabilise insect populations, which may alter the prey base, diet and ultimately the well-being of nocturnal insectivorous fauna. The lights may attract certain nocturnal species to the area, which would not normally occur there, leading to competition between sensitive and the more common species.

Mitigation and recommendations

During the construction phase, artificial lighting must be restricted to areas under construction only. Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention. Yellow sodium lights or Compressed Flourescent Bulbs (CFL's) should be prescribed as they do not attract as many invertebrates (insects) at night and will not disturb the existing wildlife. Sodium lamps require a third less energy than conventional light bulbs.

CONCLUSION & RECOMMENDATIONS

Although the study area is located within the threatened Egoli Granite Grassland vegetation type (Mucina & Rutherford 2006), the study area is completely transformed due to human activities. No sensitive habitat or plant and animal species are present. The area has a very low biodiversity and comprises mostly pioneer and weedy plant species. The large number of declared alien invasive species is present on the study site is alarming. Not only do these species affect the study area negatively, but also serves as a central point from where there seeds are dispersed into surrounding natural areas. From a plant and animal ecological point of view the area has **no conservation** or **biodiversity value**. All alien plant species must be removed from the property. It is recommended that the indigenous trees are conserved and development planned around them as far as possible. The orange listed geophyte individuals *Hypoxis hemerocallidea* must be removed by a qualified botanist/ecologist/nature conservationist before any development commences. These species should then be replanted in suitable natural habitat.

At a local (Crowthorne and Kyalami AH) scale the study area comprises limited suitable habitat for remaining animal species. The entire site consists of existing residential houses and transformed open areas that no longer comprise the natural vegetation, and have **little or no conservation** or **biodiversity value**. No threatened floral, faunal or invertebrate species or any sensitive habitats for such species were observed on the site. These areas are ideally suitable for development with little to no negative impact on the natural environment.

REFERENCES

ACOCKS, J.P.H. 1988. Veld Types of South Africa. 3rd edn. *Mem*. *Bot. Surv. S. Afr*. 57: 1–146.

BARNES, K.N. (ed.) (2000). *The Escom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. Birdlife South Africa, Johannesburg.

BRANCH, W.R. (1988). *Field Guide to the Snakes and other Reptiles of Southern Africa*. Struik Publishers, Cape Town.

BROMILOW, C. 2001. *Problem plants of South Africa*. Briza Publications, Pretoria.

CARRUTHERS, V.C. (2001). *Frogs and Frogging in South Africa*. Struik Publishers, Cape Town.

COOK, C.L. (1997). *Aspects of the breeding biology and ecology of the Giant Bullfrog Pyxicephalus adspersus*. Unpublished MSc. Thesis, University of Pretoria, Pretoria.

DE GRAAF, G. (1981). *The rodents of southern Africa*. Butterworth Press, Pretoria.

DU PREEZ, L & CARRUTHERS, V.C. 2009. *A complete guide to the Frogs of Southern Africa*. Struik Publishers, Cape Town.

GAUTENG STATE OF THE ENVIRONMENT REPORT. 2004. Biodiversity. [Online]. (URL http:// www.environment.gov.za/soer/reports/gauteng).

HOCKEY, P.A.R., DEAN, W.R.J., RYAN, P.G. (eds).(2005) Roberts- Birds of Southern Africa VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.

HOLM, E., MARAIS, E. 1992. Fruit Chafers of Southern Africa. Sigma Press (Pty) Ltd., Pretoria.

MARAIS, E. and PEACOCK, F. 2008. *The Chamberlain Guide to Birding Gauteng*. Miafra Publishing.

MCKINNELY, M. L. 1999. High rates of extinction and threat in poorly studied taxa. *Conservation Biology* **13**: 1273-1281.

MINTER, L.R., BURGER, M., HARRISON, J.A., BRAAK, H.H, BISHOP, P.J, AND KLOEPFER, D. 2004. *Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series 9. Smithsonian Institution, Washington, DC.

MUCINA, L AND RUTHERFORD, M.C. (eds) 2006. The *vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. SANBI, Pretoria.

PASSMORE, N.I. and CARRUTHERS, V.C. (1995). *Frogs of South Africa. A Complete Guide*. Wits University Press, Witwatersrand.

PFAB, M. 2006. *Requirements for biodiversity assessments*. Department of Agriculture, Conservation and Environment, Directorate of Nature Conservation GDACE, Johannesburg.

ROBERTS, A. (1951). *The mammals of South Africa*. Central News Agency, Cape Town.

SKINNER, J.D. and CHIMIMBA, C.T. (2005). *The Mammals of the Southern African Subregion* 3rd ed. Cambridge University Press.

SKINNER, J.D. and SMITHERS, R.H.N. (1990). *The Mammals of the Southern African Subregion*. University of Pretoria, Pretoria.

SMITHERS, R.H.N. (1986). *South African Red Data Book-Terrestrial Mammals*. South African National Scientific Programmes Report No.125: 1-214.

VAN OUDTSHOORN, F. 1999. Guide to grasses of southern Africa. Briza Publications, Pretoria.

VAN WYK, A. E. & MALAN, S.J. 1998. *Field guide to the wild flowers of the highveld*. Struik Publishers (Pty) Ltd, Cape Town.

APPENDIX A

Potential red data species for the study area

Plant species

Species	Priority Grouping	Recorded	Comments
Agrostis eriantha var. *planifolia*	A1	No	Habitat not suitable
Barleria rehmannii	N/A	No	Habitat not suitable
Brachystelma discoideum	A3	No	Habitat not suitable
Bowiea volubilis	N/A	No	Habitat not suitable
Calamagrostis epigeios var. *capensis*	N/A	No	Habitat not suitable
Cleome conrathii	A3	No	Habitat not suitable
Delosperma gautengense	A1	No	Habitat not suitable
Eulophia coddii	A2	No	Habitat not suitable
Habenaria mossii	A1	No	Habitat not suitable
Heteranthera callifolia	N/A	No	Habitat not suitable
Holothrix randii	B	No	Habitat not suitable
Lotononis adpressa subsp *leptantha*	A1	No	Habitat not suitable
Melolobium subspicatum	A1	No	Habitat not suitable
Trachyandra erythrorrhiza	A3	No	Not recorded

Mammal species recorded from the 2528DA QDGC according to MammalMAP.

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Bovidae	*Aepyceros*	*melampus*		Impala	Least Concern	Yes
Bovidae	*Alcelaphus*	*caama*		Red Hartebeest	Least Concern	Yes
Bovidae	*Antidorcas*	*marsupialis*		Springbok	Least Concern	Yes
Bovidae	*Connochaetes*	*taurinus*	*taurinus*		Least Concern	
Bovidae	*Damaliscus*	*pygargus*	*phillipsi*	Blesbok	Least Concern	
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Not listed	Yes
Bovidae	*Sylvicapra*	*grimmia*		Bush Duiker	Least Concern	Yes
Bovidae	*Taurotragus*	*oryx*		Common Eland	Least Concern	Yes
Bovidae	*Tragelaphus*	*strepsiceros*		Greater Kudu	Least Concern	Yes
Canidae	*Canis*	*mesomelas*		Black-backed Jackal	Least Concern	Yes
Equidae	*Equus*	*quagga*		Plains Zebra	Not listed	Yes
Giraffidae	*Giraffa*	*camelopardalis*	*giraffa*	The South	Least	

				African Giraffe	Concern	
Herpestidae	*Cynictis*	*penicillata*		Yellow Mongoose	Least Concern	Yes
Herpestidae	*Galerella*	*sanguinea*		Slender Mongoose	Least Concern	Yes
Hystricidae	*Hystrix*	*africaeaustralis*		Cape Porcupine	Least Concern	Yes
Suidae	*Phacochoerus*	*africanus*		Common Wart-hog	Least Concern	Yes

Amphibian species recorded from the 2528DA QDGC according to FrogMAP.

Family	Genus	Species	Subspecies	Common name	Red list category	Atlas region endemic
Bufonidae	*Amietophrynus*	*gutturalis*		Guttural Toad	Least Concern	
Bufonidae	*Poyntonophrynus*	*fenoulheti*		Northern Pygmy Toad	Least Concern	
Bufonidae	*Schismaderma*	*carens*		Red Toad	Least Concern	
Hyperoliidae	*Kassina*	*senegalensis*		Bubbling Kassina	Least Concern	
Microhylidae	*Phrynomantis*	*bifasciatus*		Banded Rubber Frog	Least Concern	
Phrynobatrachidae	*Phrynobatrachus*	*natalensis*		Snoring Puddle Frog	Least Concern	
Pipidae	*Xenopus*	*laevis*		Common Platanna	Least Concern	
Ptychadenidae	*Ptychadena*	*porosissima*		Striped Grass Frog	Least Concern	
Pyxicephalidae	*Amietia*	*quecketti*		Drakensberg River Frog	Least Concern	Yes
Pyxicephalidae	*Cacosternum*	*boettgeri*		Common Caco	Least Concern	
Pyxicephalidae	*Pyxicephalus*	*adspersus*		Giant Bull Frog	Near Threatened	
Pyxicephalidae	*Tomopterna*	*cryptotis*		Tremelo Sand Frog	Least Concern	
Pyxicephalidae	*Tomopterna*	*natalensis*		Natal Sand Frog	Least Concern	

Annexure E

Cultural heritage impact assessment for
THE PROPOSED DEVELOPMENT AT THE WHISKEN, SITUATED ON A PART OF PORTION OF THE FARM WITPOORTJIE 406JR, CITY OF JOHANNESBURG LOCAL MUNICIPALITY, GAUTENG PROVINCE

CULTURAL HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT AT THE WHISKEN, SITUATED ON A PART OF PORTION OF THE FARM WITPOORTJIE 406JR, CITY OF JOHANNESBURG LOCAL MUNICIPALITY, GAUTENG PROVINCE

Report No: 2016/JvS/033
Status: Final
Revision No: 0
Date: April 2016

Prepared for:
LEAP
Representative: Mr J Botes

Postal Address: P O Box 13185, Hatfield, 0028
Tel: 012 343 2751
E-mail: jitske@telkomsa.net

Prepared by:
J van Schalkwyk (D Litt et Phil), Heritage Consultant
ASAPA Registration No.: 164
Principal Investigator: Iron Age, Colonial Period, Industrial Heritage

Postal Address: 62 Coetzer Avenue, Monument Park, 0181
Mobile: 076 790 6777
Fax: 086 611 3902
E-mail: jvschalkwyk@mweb.co.za

Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services, for which a fair numeration is charged.

J A van Schalkwyk (D Litt et Phil)
Heritage Consultant
April 2016

EXECUTIVE SUMMARY

CULTURAL HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT AT THE WHISKEN, SITUATED ON A PART OF PORTION OF THE FARM WITPOORTJIE 406JR, CITY OF JOHANNESBURG LOCAL MUNICIPALITY, GAUTENG PROVINCE

It is proposed to develop a section of land in order to create an access route (K56) for a development that is planned in the area known as The Whisken, City of Johannesburg Municipality, Gauteng Province.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by Leap Environmental Consultants to conduct a cultural heritage assessment to determine if the proposed development would have an impact on any sites, features or objects of cultural heritage significance.

The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

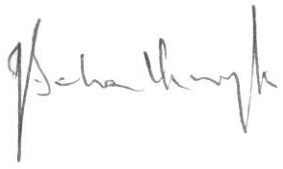
- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view it is recommended that the proposed development be allowed to continue.

Conditions for inclusion in the environmental authorisation:

- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.



J A van Schalkwyk
Heritage Consultant
April 2016

TECHNICAL SUMMARY

Property details						
Province	Gauteng					
Magisterial district	Randburg					
Local municipality	City of Johannesburg					
Topo-cadastral map	2528CC					
Farm name	Witpoortjie 406JR					
Closest town	Midrand					
Coordinates	Centre point					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	-25.98216	28.07783			

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	Yes
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	Yes
Any other development category, public open space, squares, parks, recreation grounds	No

Development	
Description	Township development
Project name	The Whisken – K56

Land use	
Previous land use	Farming
Current land use	Urban

TABLE OF CONTENTS

LIST OF FIGURES

GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Study area: Refers to the entire study area as indicated by the client in the accompanying Fig. 1 - 2.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 000 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Later Stone Age	30 000 - until c. AD 200

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country.

ABBREVIATIONS

ADRC	Archaeological Data Recording Centre
ASAPA	Association of Southern African Professional Archaeologists
CS-G	Chief Surveyor-General
EIA	Early Iron Age
ESA	Early Stone Age
LIA	Late Iron Age
LSA	Later Stone Age
HIA	Heritage Impact Assessment
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency

CULTURAL HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT AT THE WHISKEN, SITUATED ON A PART OF PORTION OF THE FARM WITPOORTJIE 406JR, CITY OF JOHANNESBURG LOCAL MUNICIPALITY, GAUTENG PROVINCE

1. INTRODUCTION

It is proposed to develop a section of land in order to create an access route (K56) for a development that is planned in the area known as The Whisken, City of Johannesburg Municipality, Gauteng Province.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. However, according to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by Leap Environmental Consultants to conduct a cultural heritage assessment to determine if the proposed development would have an impact on any sites, features or objects of cultural heritage significance.

This report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and is intended for submission to the South African Heritage Resources Agency (SAHRA).

2. TERMS OF REFERENCE

The aim of a full HIA investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives are to identify heritage resources (involving site inspections, existing heritage data and additional heritage specialists if necessary); assess their significances; assess alternatives in order to promote heritage conservation issues; and to assess the acceptability of the proposed development from a heritage perspective.

The result of this investigation is a heritage impact assessment report indicating the presence/ absence of heritage resources and how to manage them in the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, on condition of successful implementation of proposed mitigation measures.

2.1 **Scope of work**

The aim of this study is to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the development is to take place.

This includes:

- Conducting a desk-top investigation of the area;
- A visit to the proposed development site,

The objectives were to:

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

2.2 **Limitations**

The investigation has been influenced by the following factors:

- Access to the various properties could not be attained.
- It is assumed that the description of the proposed project, provided by the client, is accurate.
- No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA is required for such activities.
- It is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is sufficient and that is does not have to be repeated as part of the heritage impact assessment.
- The unpredictability of buried archaeological remains.
- This report does not consider the palaeontological potential of the site.

3. HERITAGE RESOURCES

3.1 **The National Estate**

The NHRA (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
    - ancestral graves;
    - royal graves and graves of traditional leaders;
    - graves of victims of conflict;
    - graves of individuals designated by the Minister by notice in the Gazette;
    - historical graves and cemeteries; and
    - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects to which oral traditions are attached or which are associated with living heritage;
- ethnographic art and objects;
- military objects;
- objects of decorative or fine art;
- objects of scientific or technological interest; and
- books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 **Cultural significance**

In the NHRA, Section 2 (vi), it is stated that ‘‘cultural significance’’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

A matrix was developed whereby the above criteria were applied for the determination of the significance of each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar identified sites.

4. STUDY APPROACH AND METHODOLOGY

4.1 **Extent of the Study**

This survey and impact assessment covers the area as presented in Section 6 below and illustrated in Figure 2.

4.2 **Methodology**

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted – see list of references in Section 10.

- Information on events, sites and features in the larger region were obtained from these sources.

4.2.1.2 Data bases

The *Heritage Atlas Database,* the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

- Database surveys produced a number of sites located in the larger region of the proposed development.

4.2.1.3 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature were obtained from these sources

4.2.2 *Field survey*

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The area that had to be investigated was identified by Leap Environmental by means of maps and .k*ml* files indicating the development area. This was loaded onto a Nexus 7 tablet and used in Google Earth during the field survey to access the areas.

The site was visited on 15 April 2016. The area was investigated by travelling the existing road – see Fig. 1 below.

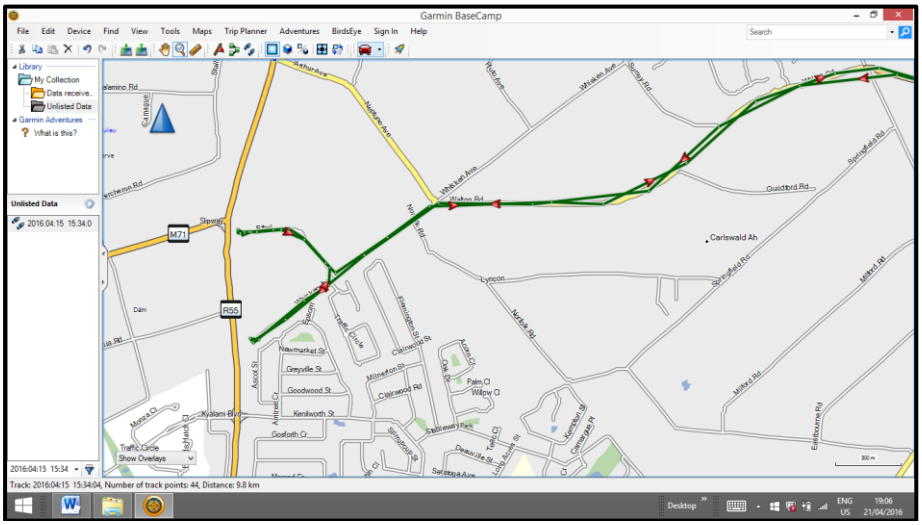


Fig. 1. Map indicating the track log of the field survey.

The following is relevant to the field survey:

- *During the site visit the archaeological visibility was slightly hindered by the vegetation encountered.*

4.2.3 *Documentation*

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the *Global Positioning System* (GPS) and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

The track log and identified sites were recorded by means of a Garmin Oregon 550 handheld GPS device. Photographic recording was done by means of a Canon EOS 550D digital camera.

Map datum used: Hartebeeshoek 94 (WGS84).

5. SITE SIGNIFICANCE AND ASSESSMENT

5.1 **Heritage assessment criteria and grading**

The National Heritage Resources Act, Act no. 25 of 1999, stipulates the assessment criteria and grading of heritage sites. The following grading categories are distinguished in Section 7 of the Act:

- **Grade I**: Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II**: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III**: Other heritage resources worthy of conservation on a local authority level.

A matrix was developed whereby the criteria, as set out in Sections 3(3) and 7 of the NHRA, were applied for each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the applicable of mitigation measures would allow the development activities to continue.

5.2 **Methodology for the assessment of potential impacts**

All impacts identified during the EIA stage of the study will be classified in terms of their significance. Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected and how it will be affected;
- The physical **extent**, wherein it is indicated whether:
  - 1 - the impact will be limited to the site;

  - 2 - the impact will be limited to the local area;
  - 3 - the impact will be limited to the region;
  - 4 - the impact will be national; or
  - 5 - the impact will be international;
- The **duration**, wherein it is indicated whether the lifetime of the impact will be:
  - 1 - of a very short duration (0–1 years);
  - 2 - of a short duration (2-5 years);
  - 3 - medium-term (5–15 years);
  - 4 - long term (> 15 years); or
  - 5 - permanent;
- The **magnitude** of impact, quantified on a scale from 0-10, where a score is assigned:
  - 0 - small and will have no effect;
  - 2 - minor and will not result in an impact;
  - 4 - low and will cause a slight impact;
  - 6 - moderate and will result in processes continuing but in a modified way;
  - 8 – high, (processes are altered to the extent that they temporarily cease); or
  - 10 - very high and results in complete destruction of patterns and permanent cessation of processes;
- The **probability** of occurrence, which describes the likelihood of the impact actually occurring and is estimated on a scale where:
  - 1 - very improbable (probably will not happen;
  - 2 - improbable (some possibility, but low likelihood);
  - 3 - probable (distinct possibility);
  - 4 - highly probable (most likely); or
  - 5 - definite (impact will occur regardless of any prevention measures);
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- The **status**, which is described as either positive, negative or neutral;
- The degree to which the impact can be reversed;
- The degree to which the impact may cause irreplaceable loss of resources; and
- The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) x P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are calculated as follows:

Table 1: Significance ranking

Significance of impact					
Extent	**Duration**	**Magnitude**	**Probability**	**Significance**	**Weight**
-	-	-	-	-	-

Points	**Significant Weighting**	**Discussion**
< 30 points	Low	where this impact would not have a direct influence on the decision to develop in the area
31-60 points	Medium	where the impact could influence the decision to

		develop in the area unless it is effectively mitigated
> 60 points	High	where the impact must have an influence on the decision process to develop in the area

6. PROJECT DESCRIPTION

6.1 **Site location**

The application site is located in the north eastern sector of the intersection between Lever Road and the proposed Road K56 in the Midrand region of Gauteng. For more information, please see the Technical Summary presented above (p. iii).

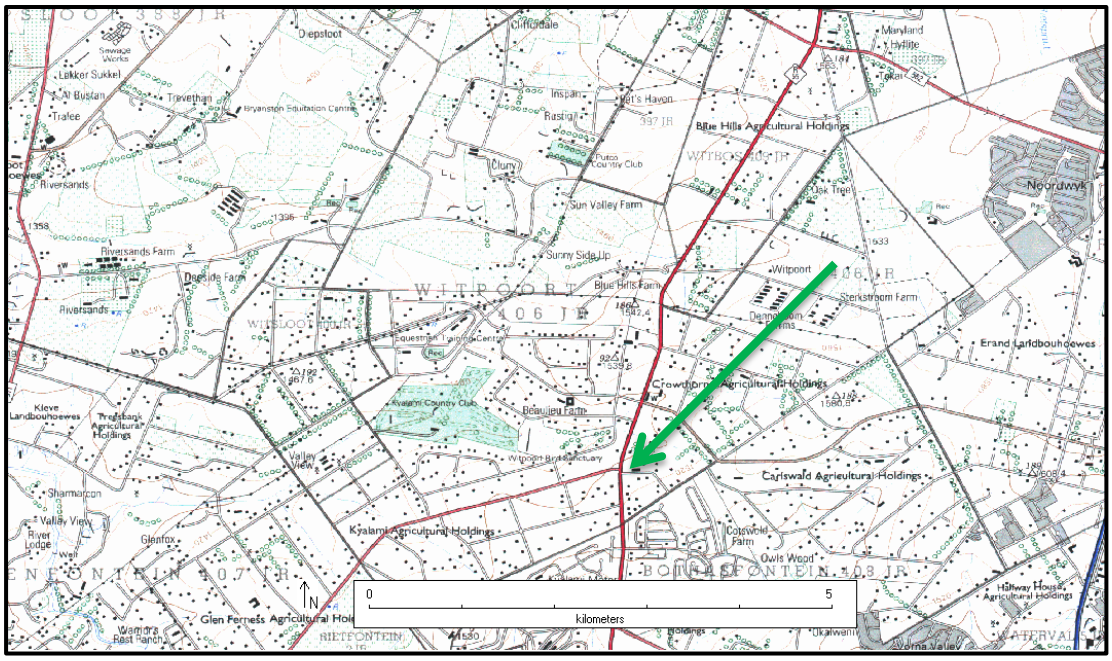


Fig. 2. Location of the study area (green arrow) in regional context.
(Map 2528: Chief Surveyor-General)

6.2 **Development proposal**

It is proposed to develop a section of land in order to create an access route (K56) for a development that is planned in the area known as The Whisken, City of Johannesburg Municipality, Gauteng Province.

Fig. 3. Layout of the proposed development, outlined in yellow.
(Image: Google Earth)

7. DESCRIPTION OF THE AFFECTED ENVIRONMENT

7.1 **Site description**

The geology is made up of granite and the original vegetation is classified as Rocky Highveld Grassland. However, most of the area was used for agricultural activities, which would have destroyed any heritage features that might have occurred here in the past. From the aerial photograph (Fig. 3), it can be determined that large sections of the area have been subjected to urban development.

Fig. 4. Views over the study area.

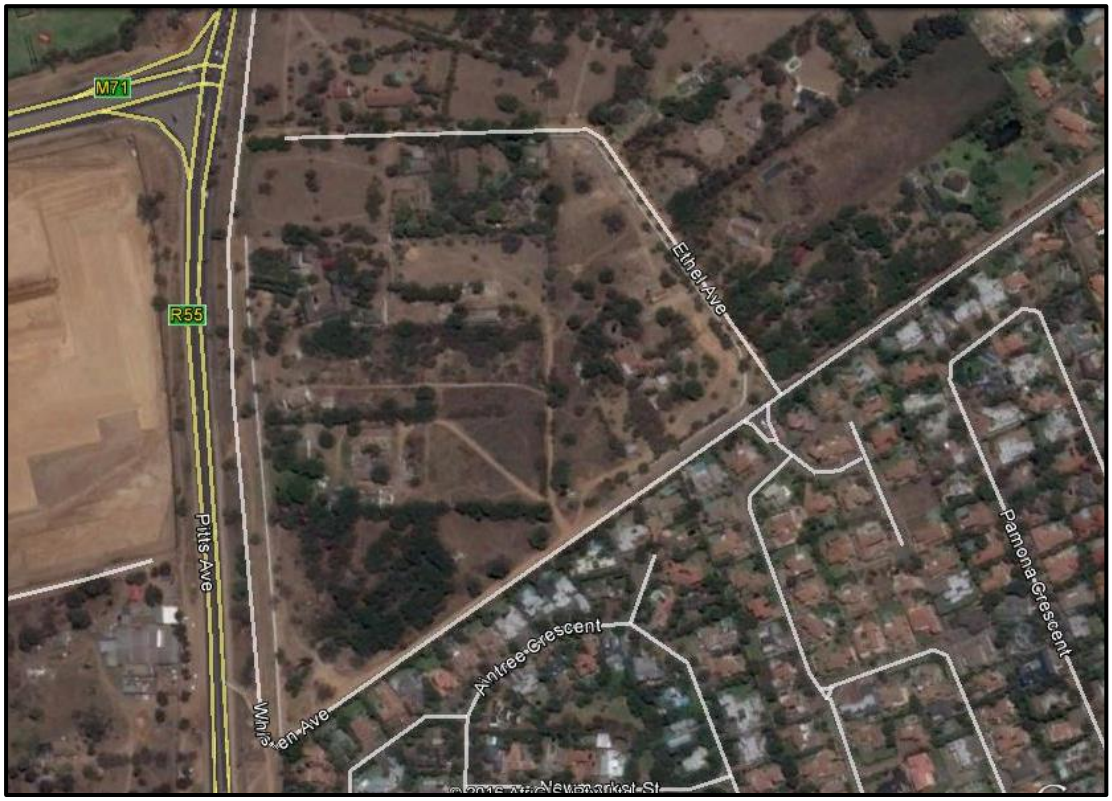


Fig. 5. Aerial view of the study area.
(Photograph: Google Earth)

7.2 **Overview of the region**

The aim of this section is to present an overview of the history of the larger region in order to eventually determine the significance of heritage sites identified in the study area, within the context of their historic, aesthetic, scientific and social value, rarity and representivity – see Section 3.2 and Appendix 1 for more information.

The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

A number of sites are known to occur in the region. These range from MSA sites on the farm Waterval, to Later Stone Age sites, located in small rock shelters near the Jukskei River (Glenferness shelter). Late Iron Age sites also occur, e.g. at Lone Hill and the Boulders Shopping Centre.

During the late 1990s Prof. Revil Mason excavated a Later Stone Age camp site to the north of the study area. The material obtained from this site is now stored at the Cultural History Museum in Pretoria (Mason 2012). The site was excavated as part of a mitigation project for the Midrand municipal authority. It also included work on Late Iron Age site at the Boulders Shopping Centre.

The study area falls within that zone usually located on the front edge of (city) urban-sprawl where the land previously used for agricultural use (only) have become subdivided into small holdings. What used to be a large single agricultural unit or farm now consists of tens of small properties. These units do not have their economic base in traditional agriculture but are sustained by a variety of land uses and economic activities with strong urban associations. This phenomenon happened in the past forty years. Therefore most of the built fabric, date from this period. The result was that any historic farmsteads older than 60 years that may have existed have either disappeared or have been 'upgraded'.

A large number of labourer homesteads used to occur in the region. Some of these have been studied by Hall (1997) and Behrens (2008) as they were to be impacted on by developments at Modderfontein as well as due to the Gautrain development. Fortunately, none of the remaining ones occur within the boundaries of the current development proposal.

The only heritage sites known from the region are a number of small family cemeteries. Fortunately, all of these are located well outside the area of the proposed development

From the 1939 version of the 1:50 000 topocadastral map it can be determined that very little development existed in the region. The implication is that very few, if any, structures older than 60 years would occur in the region.

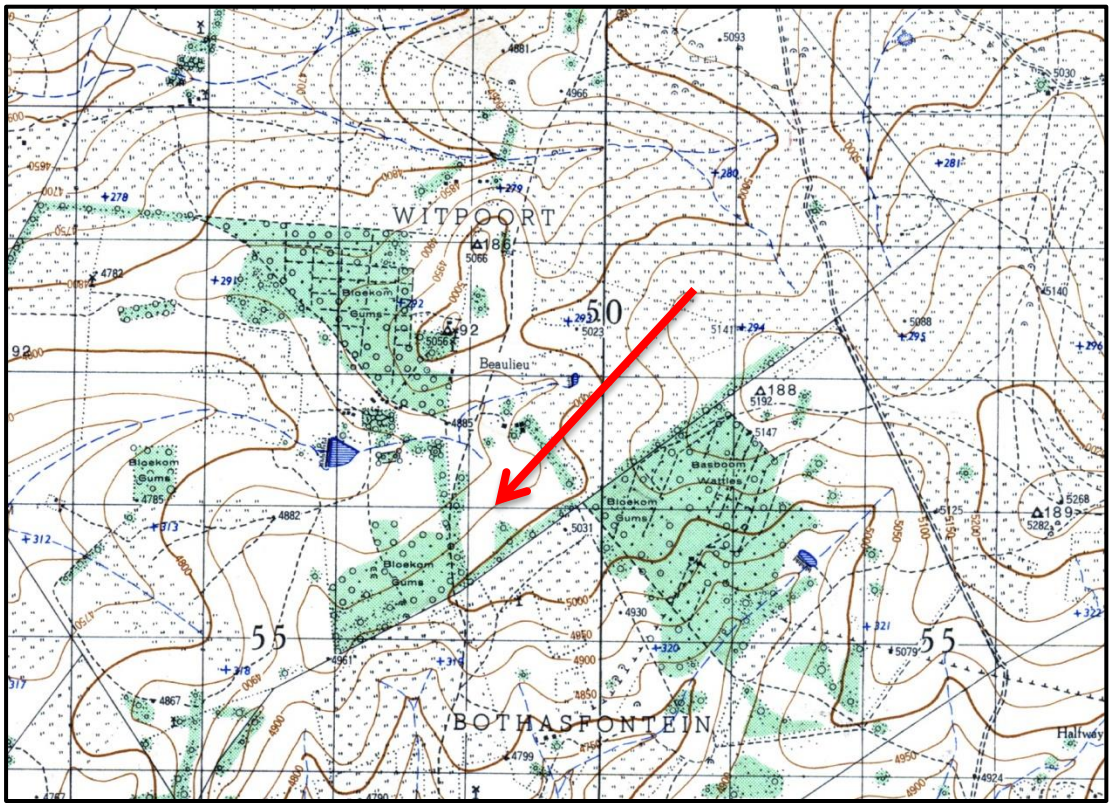


Fig. 6. The study area according to the 1939 1:50 000 topocadastral map.
(Map 2528CC: Chief Surveyor-General)

7.3 **Identified sites**

The following sites, features and objects of cultural significance were identified in the study area – see Appendix 5 for a discussion of each individual site.

In terms of Section 7 of the NHRA, all the sites currently known or which are expected to occur in the study area are evaluated to have a grading as identified in the table below.

Table 2. Summary of identified heritage resources in the study area.

Identified heritage resources		
Category according to NHRA	Number	Coordinates
Formal protections (NHRA)		
National heritage site (Section 27)	None	-
Provincial heritage site (Section 27)	None	-
Provisional protection (Section 29)	None	-
Place listed in heritage register (Section 30)	None	-
General protections (NHRA)		
Structures older than 60 years (Section 34)	None	-
Archaeological site or material (Section 35)	None	-
Palaeontological site or material (Section 35)	None	-
Graves or burial grounds (Section 36)	None	-
Public monuments or memorials (Section 37)	None	-
Other		
Any other heritage resources (describe)	None	-

7.3.1 *Stone Age*

- No sites, features or objects dating to the Stone Age were identified in the study area.

7.3 2 *Iron Age*

- No sites, features or objects dating to the Iron Age were identified in the study area.

7.3.3 *Historic period*

- No sites, features or objects dating to the historic period were identified in the study area.

7.4 **Impact assessment**

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- As no sites, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

8. MANAGEMENT MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be

avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

8.1 **Objectives**

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities.

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

8.2 **Control**

In order to achieve this, the following should be in place:

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

9. RECOMMENDATIONS

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which the development is proposed.

<u>Impact assessment</u>

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view it is recommended that the proposed development be allowed to continue.

Conditions for inclusion in the environmental authorisation:

- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

10. **REFERENCES**

10.1 **Data bases**

Chief Surveyor General
Environmental Potential Atlas, Department of Environmental Affairs and Tourism.
Heritage Atlas Database, Pretoria.
National Archives of South Africa
SAHRA Archaeology and Palaeontology Report Mapping Project (2009)

10.2 **Literature**

Acocks, J.P.H. 1975. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No. 40. Pretoria: Botanical Research Institute.

Behrens, J. 2008. *Archaeological investigation of a number of structures on Waterval 5IR*. Unpublished report. Pretoria: Unisa.

Mason, R.J. 1962. *Prehistory of the Transvaal*. Johannesburg: Witwatersrand University Press.

Van Schalkwyk, J.A. 2005. *Heritage impact assessment: Portions 56-58, Blue Hills 397JR*. Unpublished report 2005KH031.

Van Schalkwyk, J.A. 2007. *Heritage survey report for the proposed development on a Portion of the farm Witbos 409JR, in the Randburg magisterial district, Gauteng Province*. Unpublished report 2007KH052.

Van Schalkwyk, J.A. 2013a. *Heritage impact assessment for the proposed Blue Hills Extension 74 on Holding 25, 32-34, Blue Hills Agricultural Holdings, City of Johannesburg district municipality, Gauteng Province*. Unpublished report 2013/JvS/011.

Van Schalkwyk, J.A. 2013b. *Heritage impact assessment for the proposed Blue Hills Extension 75 on Portion 7 of the farm Witbos 409JR, Blue Hills Agricultural Holdings area, City of Johannesburg district municipality, Gauteng Province*. Unpublished report 2013/JvS/012.

Van Schalkwyk, J.A. 2013c. Basic cultural heritage assessment for the proposed Crowthorne underground electricity cable and new substation, Gauteng Province. Unpublished report 2013/JvS/24.

Van Schalkwyk, J.A. & De Jong, R. 1997. *A survey of cultural resources in the Midrand municipal area, Gauteng Province*. Unpublished report 1997KH021. Pretoria: National Cultural History Museum.

10.3 **Maps and aerial photographs**

1: 50 000 Topocadastral maps
Google Earth

APPENDIX 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF IDENTIFIED HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. Historic value			
Is it important in the community, or pattern of history			
Does it have strong or special association with the life or work of a person, group or organisation of importance in history			
Does it have significance relating to the history of slavery			
2. Aesthetic value			
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group			
3. Scientific value			
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage			
Is it important in demonstrating a high degree of creative or technical achievement at a particular period			
4. Social value			
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons			
5. Rarity			
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage			
6. Representivity			
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects			
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class			
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.			
7. Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific community			
8. Significance rating of feature			
1. Low			
2. Medium			
3. High			

APPENDIX 2. RELEVANT LEGISLATION

All archaeological and palaeontological sites, and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

The National Heritage Resources Act (Act no 25 of 1999) stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I**: Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II**: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III**: Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, consistent with the criteria set out in section 3(3), which must be used by a heritage resources authority or a local authority to assess the intrinsic, comparative and contextual significance of a heritage resource and the relative benefits and costs of its protection, so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated in terms of section 8.

Presenting archaeological sites as part of tourism attraction requires, in terms 44 of the Act, a Conservation Management Plan as well as a permit from SAHRA.

(1) Heritage resources authorities and local authorities must, wherever appropriate, co-ordinate and promote the presentation and use of places of cultural significance and heritage resources which form part of the national estate and for which they are responsible in terms of section 5 for public enjoyment, education. research and tourism, including-

(a) the erection of explanatory plaques and interpretive facilities, including interpretive centres and visitor facilities;
(b) the training and provision of guides;
(c) the mounting of exhibitions;
(d) the erection of memorials; and
(e) any other means necessary for the effective presentation of the national estate.

(2) Where a heritage resource which is formally protected in terms of Part l of this Chapter is to be presented, the person wishing to undertake such presentation must, at least 60 days prior to the institution of interpretive measures or manufacture of associated material, consult with the heritage resources authority which is responsible for the protection of such heritage resource regarding the contents of interpretive material or programmes.

(3) A person may only erect a plaque or other permanent display or structure associated with such presentation in the vicinity of a place protected in terms of this Act in consultation with the heritage resources authority responsible for the protection of the place.

APPENDIX 3. RELOCATION OF GRAVES

If the graves are younger than 60 years, an undertaker can be contracted to deal with the exhumation and reburial. This will include public participation, organising cemeteries, coffins, etc. They need permits and have their own requirements that must be adhered to.

If the graves are older than 60 years old or of undetermined age, an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. This is a requirement by law.

Once it has been decided to relocate particular graves, the following steps should be taken:

- Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.
- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- Once the permit has been received, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any items found in the grave.

Information needed for the SAHRA permit application

- The permit application needs to be done by an archaeologist.
- A map of the area where the graves have been located.
- A survey report of the area prepared by an archaeologist.
- All the information on the families that have identified graves.
- If graves have not been identified and there are no headstones to indicate the grave, these are then unknown graves and should be handled as if they are older than 60 years. This information also needs to be given to SAHRA.
- A letter from the landowner giving permission to the developer to exhume and relocate the graves.
- A letter from the new cemetery confirming that the graves will be reburied there.
- Details of the farm name and number, magisterial district and GPS coordinates of the gravesite.

APPENDIX 4. SPECIALIST COMPETENCY

Johan (Johnny) van Schalkwyk

J A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 30 years. Based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape, Northern Cape, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 60 papers, many in scientifically accredited journals. During this period he has done more than 2000 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, road-, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.

APPENDIX 5: INVENTORY OF IDENTIFIED CULTURAL HERITAGE SITES

Nil

Heritage impact assessment for the PROPOSED WHISKIN HOUSING ESTATE, CROWTHORN AGRICULTURAL HOLDINGS, MIDRAND REGION, GAUTENG PROVINCE

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED WHISKIN HOUSING ESTATE, CROWTHORN AGRICULTURAL HOLDINGS, MIDRAND REGION, GAUTENG PROVINCE

Report No: 2015/JvS/004
Status: Final
Revision No: 0
Date: February 2015

Prepared for:
LEAP
Representative: Mr J Botes

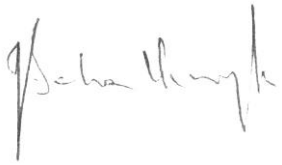
Postal Address: P O Box 13185, Hatfield, 0028
Tel: 012 343 2751
E-mail: jitske@telkomsa.net

Prepared by:
J van Schalkwyk (D Litt et Phil), Heritage Consultant
ASAPA Registration No.: 168
Principal Investigator: Iron Age, Colonial Period, Industrial Heritage

Postal Address: 62 Coetzer Avenue, Monument Park, 0181
Mobile: 076 790 6777
Fax: 012 347 7270
E-mail: jvschalkwyk@mweb.co.za

Declaration:

I, J.A. van Schalkwyk, declare that I do not have any financial or personal interest in the proposed development, nor its developers or any of their subsidiaries, apart from the provision of heritage assessment and management services.



J A van Schalkwyk (D Litt et Phil)
Heritage Consultant
February 2015

EXECUTIVE SUMMARY

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED WHISKIN HOUSING ESTATE, CROWTHORN AGRICULTURAL HOLDINGS, MIDRAND REGION, GAUTENG PROVINCE

The Applicant intends to develop a housing estate on portions 101 to 106 and 108 of the farm Witpoortjie 406JR, Crowthorn Agricultural Holdings in Midrand.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by **LEAP** to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the development is planned.

The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

- As no site, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

Therefore, from a heritage point of view we recommend that the proposed development can continue. We recommend that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage consultant so that an investigation and evaluation of the finds can be made.

J A van Schalkwyk
Heritage Consultant
February 2015

TECHNICAL SUMMARY

Property details						
Province	Gauteng					
Magisterial district	Randburg					
District municipality	City of Johannesburg					
Topo-cadastral map	2528CC					
Closest town	Midrand					
Farm name	Witpoortjie 406JR					
Coordinates	Centre pont					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 25.98381	E 28.07829			

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	Yes
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	No
Any other development category, public open space, squares, parks, recreation grounds	No

Development	
Description	Development of a housing estate
Project name	The Whiskin

Land use	
Previous land use	Agriculture
Current land use	Agriculture/urban

TABLE OF CONTENTS

LIST OF FIGURES

GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Study area: Refers to the entire study area as indicated by the client in the accompanying Fig. 1 and 2.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 000 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Late Stone Age	30 000 - until c. AD 200

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Late Iron Age	AD 1300 - AD 1830

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country

ABBREVIATIONS

ADRC	Archaeological Data Recording Centre
ASAPA	Association of Southern African Professional Archaeologists
CS-G	Chief Surveyor-General
EIA	Early Iron Age
ESA	Early Stone Age
LIA	Late Iron Age
LSA	Later Stone Age
HIA	Heritage Impact Assessment
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency

HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED WHISKIN HOUSING ESTATE, CROWTHORN AGRICULTURAL HOLDINGS, MIDRAND REGION, GAUTENG PROVINCE

1. INTRODUCTION

The Applicant intends to develop a housing estate on portions 101 to 106 and 108 of the farm Witpoortjie 406JR, Crowthorn Agricultural Holdings in Midrand.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), Act 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by **LEAP** to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the development is planned.

This HIA report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and is intended for submission to the South African Heritage Resources Agency (SAHRA).

2. TERMS OF REFERENCE

This report does not deal with development projects outside of or even adjacent to the study area as is presented in Section 5 of this report. The same holds true for heritage sites, except in a generalised sense where it is used to create an overview of the heritage potential in the larger region.

2.1 **Scope of work**

The aim of this HIA, broadly speaking, is to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where it is planned to develop the housing estate.

The scope of work for this study consisted of:

- Conducting of a desk-top investigation of the area, in which all available literature, reports, databases and maps were studied; and
- A visit to the proposed development area.

The objectives were to

- Identify possible archaeological, cultural and historic sites within the proposed development area;

- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

2.2 **Limitations**

The investigation has been influenced by the following factors:

- The unpredictability of buried archaeological remains.
- This report does not deal with the paleontological heritage of the region.

3. HERITAGE RESOURCES

3.1 **The National Estate**

The NHRA (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
    - ancestral graves;
    - royal graves and graves of traditional leaders;
    - graves of victims of conflict;
    - graves of individuals designated by the Minister by notice in the Gazette;
    - historical graves and cemeteries; and
    - other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
    - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
    - objects to which oral traditions are attached or which are associated with living heritage;
    - ethnographic art and objects;
    - military objects;
    - objects of decorative or fine art;
    - objects of scientific or technological interest; and
    - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 **Cultural significance**

In the NHRA, Section 2 (vi), it is stated that ‘‘cultural significance’’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- sites of significance relating to the history of slavery in South Africa.

A matrix was developed whereby the above criteria were applied for the determination of the significance of each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar identified sites.

4. STUDY APPROACH AND METHODOLOGY

4.1 **Extent of the Study**

This survey and impact assessment covers the area as presented in Section 5 and as illustrated in Figures 3 and 4.

4.2 **Methodology**

4.2.1 *Preliminary investigation*

4.2.1.1 Survey of the literature
A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological, historical sources and heritage impact assessment reports were consulted.

- Information of a very general nature was obtained from these sources.

4.2.1.2 Data bases

The *Heritage Atlas Database,* the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

- Database surveys produced a number of sites located in adjacent areas.

4.2.1.3 Other sources
Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature was obtained from these sources.

4.2.2 *Field survey*

The area that had to be investigated was identified by **LEAP** by means of maps. The site was visited on 5 February 2015 and surveyed by accessing the properties where possible (see Fig. 1).

4.2.3 *Documentation*

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the *Global Positioning System* (GPS) and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

The track log and identified sites were recorded by means of a Garmin Oregon 550 handheld GPS device. Photographic recording was done by means of a Canon EOS 550D digital camera.

Map datum used: Hartebeeshoek 94 (WGS84).

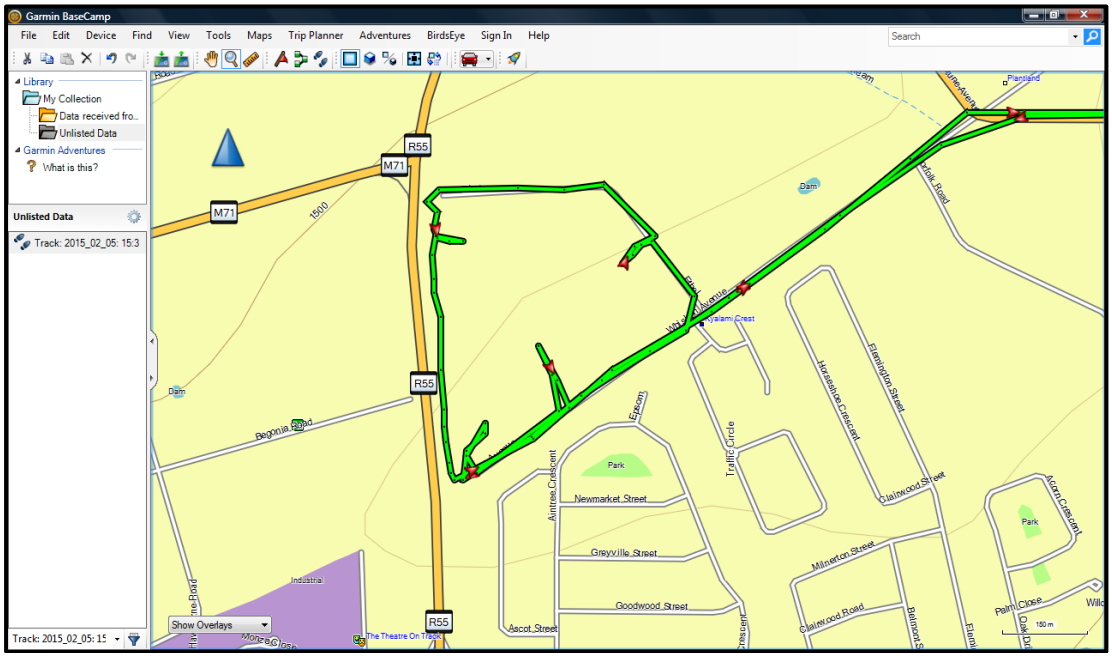


Fig. 1. Track log of the field survey.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 Site location and description

The site is located on an irregular section of land east of the R55 (Main Road) and north of The Whiskin Road in the Crowthorn Agricultural Holdings of the Midrand region (Fig. 2). For more information, please see the Technical Summary presented above (p. iv).

The geology is made up of granite. The topography of the area is described as strongly undulating plains. The original vegetation is classified a Rocky Highveld Grassland. However, very little of this original vegetation has remained as it was replaced first by farming activities and later by the development of small holdings, schools and other large scale developments.

From the 1939 topocadastral map it can be seen that very little development existed in the region of the study area (Fig. 3). The implication is that no structures older than 60 years exist on the properties.

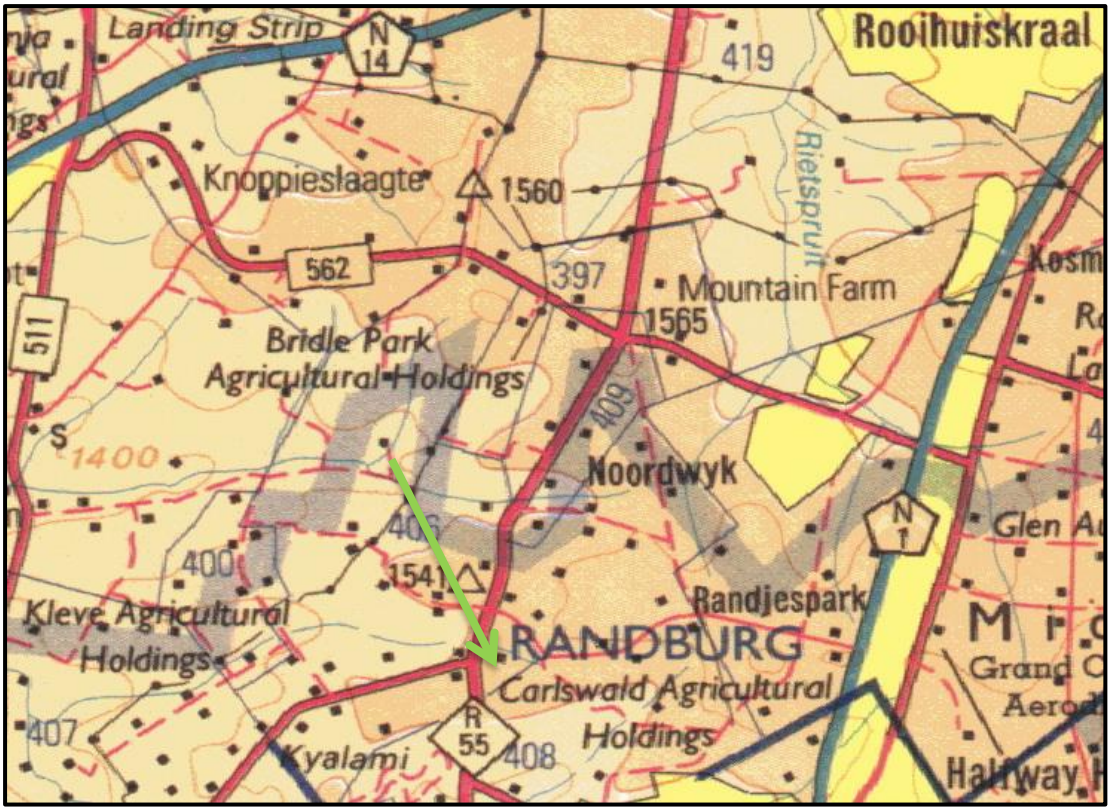


Fig. 2. Location of the study area in regional context.
(Map 2528: Chief Surveyor-General)

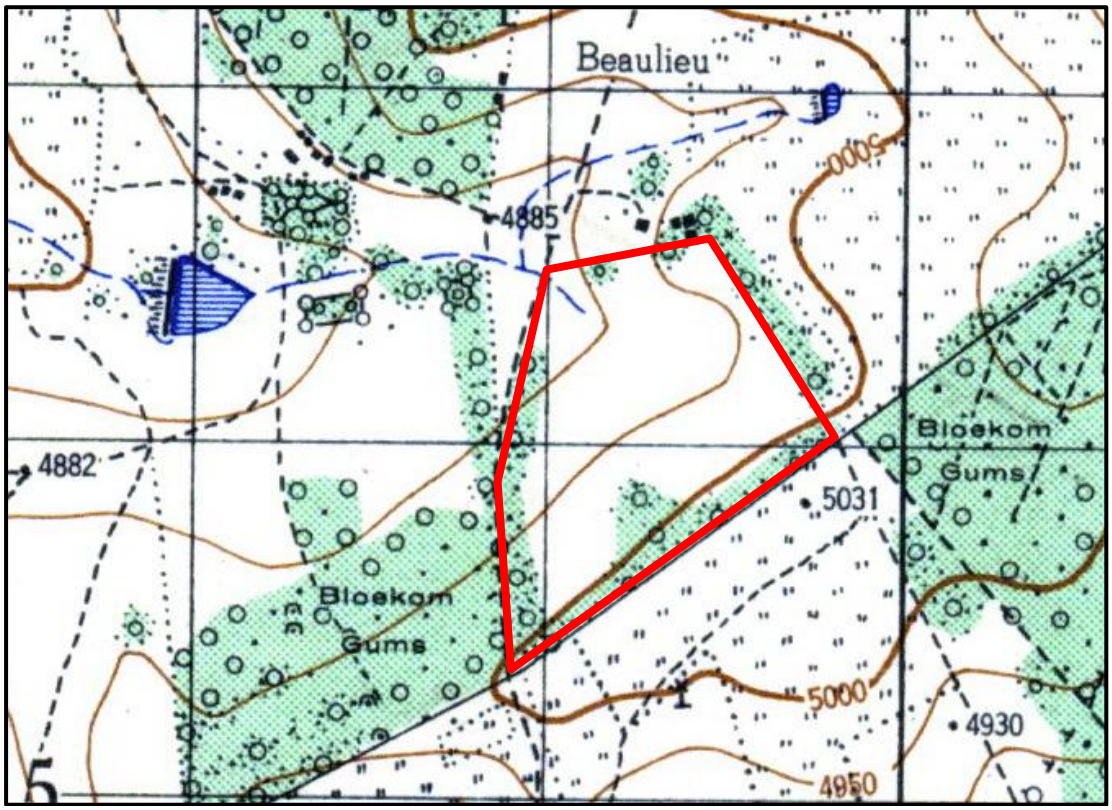


Fig. 3. The study area as indicated on the 1939 version of the 1:50 000 cadastral map. (Map 2528CC: Chief Surveyor-General)

The study area falls within that zone usually located on the front edge of (city) urban-sprawl where the land previously used for agricultural use (only) have become subdivided into small holdings. What used to be a large single agricultural unit or farm now consists of tens of small properties. These units do not have their economic base in traditional agriculture but are sustained by a variety of land uses and economic activities with strong urban associations. This phenomenon happened in the past forty years. Therefore most of the built fabric, date from this period. The result was that any historic farmsteads older than 60 years that may have existed have either disappeared or have been 'upgraded'.

However, during the last couple of years large scale urban development took place (Fig. 3) which would have had a big impact on any sites, features or object of cultural significance that might have occurred here in the past.

At present the open areas in the study area is densely overgrown and is used by unscrupulous people who dump building rubble and other rubbish on it.

Most of the properties show an eclectic mix of styles and material used in their construction. Coupled to this is in some cases haphazard extension of the associated structures, indicating a chronological development of expansion as more room was required due to expanding families or with the development of small business opportunities on some of the sites.

Although some of the properties are still occupied, others are abandoned and neglect and vandalism is taking its toll. Others are systematically being stripped of fixtures and in some cases even the bricks are being torn down for recycling (Fig. 4).

Fig. 4. Views over the study area.

5.2 **Development proposal**

The Applicant intends to develop a housing estate on portions 101 to 106 and 108 of the farm Witpoortjie 406JR, Crowthorn Agricultural Holdings in Midrand.

Fig. 5. Aerial view of the site in 2012.
(Photo: Google Earth)

5.3 **Regional overview**

The aim of this section is to present an overview of the history of the larger region in order to eventually determine the significance of heritage sites identified in the study area, within the context of their historic, aesthetic, scientific and social value, rarity and representivity – see Section 3.2 and Appendix 1 for more information.

The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

A number of sites are known to occur in the region. These range from MSA sites on the farm Waterval, to Later Stone Age sites, located in small rock shelters near the Jukskei River (Glenferness shelter). Late Iron Age sites also occur, e.g. at Lone Hill and the Boulders Shopping Centre.

During the late 1990s Prof. Revil Mason excavated a Later Stone Age camp site to the north of the study area. The material obtained from this site is now stored at the Cultural History Museum in Pretoria (Mason 2012). The site was excavated as part of a mitigation project for the Midrand municipal authority. It also included work on Late Iron Age site at the Boulders Shopping Centre.

The study area falls within that zone usually located on the front edge of (city) urban-sprawl where the land previously used for agricultural use (only) have become subdivided into small holdings. What used to be a large single agricultural unit or farm now consists of tens of small properties. These units do not have their economic base in traditional agriculture but are sustained by a variety of land uses and economic activities with strong urban associations. This phenomenon happened in the past forty years. Therefore most of the built fabric, date from this period. The result was that any historic farmsteads older than 60 years that may have existed have either disappeared or have been ‘upgraded’.

A large number of labourer homesteads used to occur in the region. Some of these have been studied by Hall (1997) and Behrens (2008) as they were to be impacted on by developments at Modderfontein as well as due to the Gautrain development. Fortunately, none of the remaining ones occur within the boundaries of the current development proposal.

5.4 **Identified sites**

The following cultural heritage resources were identified in the study area:

5.4.1 *Stone Age*

- No sites, features or objects dating to the Stone Age were identified in the study area.

5.4 2 *Iron Age*

- No sites, features or objects dating to the Iron Age were identified in the study area.

5.4.3 *Historic period*

- No sites, features or objects dating to the historic period were identified in the study area.

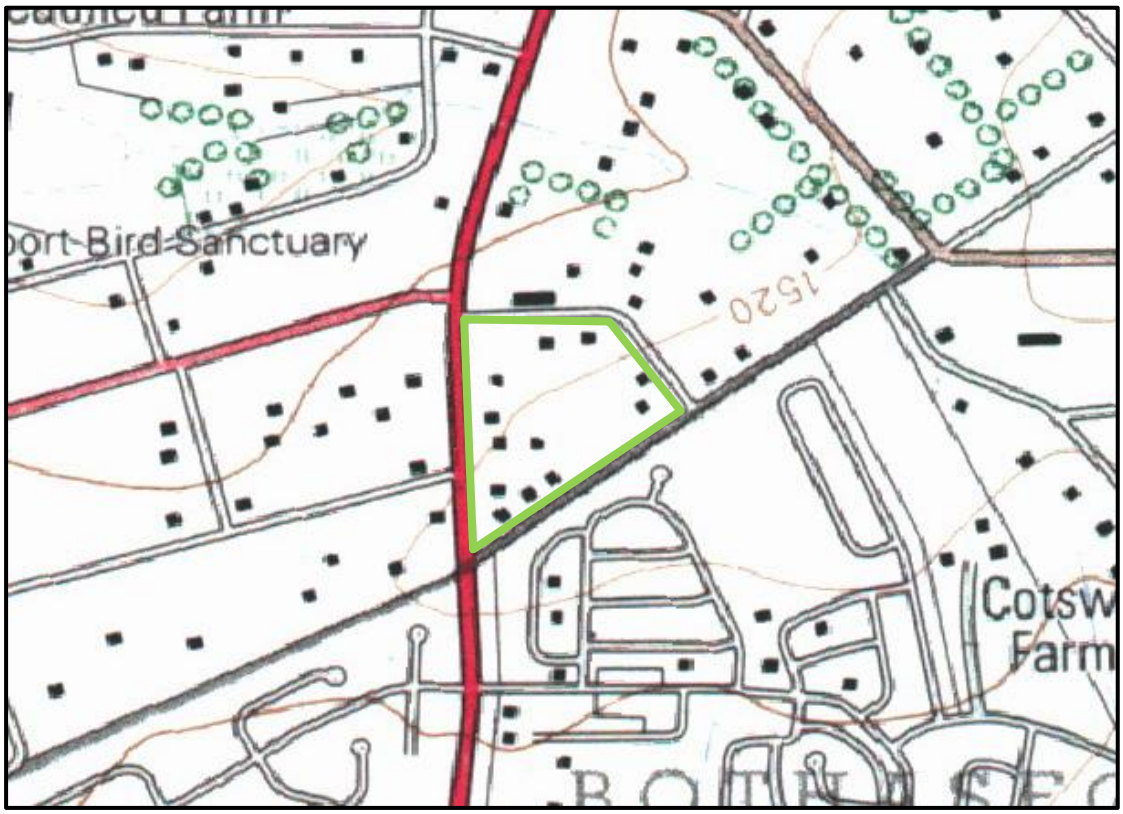


Fig. 6. The study area.
(Map 2528CC: Chief Surveyor-General)

6. SITE SIGNIFICANCE AND ASSESSMENT

6.1 **Heritage assessment criteria and grading**

The NHRA stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- **Grade I**: Heritage resources with qualities so exceptional that they are of special national significance;
- **Grade II**: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- **Grade III**: Other heritage resources worthy of conservation, on a local authority level.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the applicable of mitigation measures would allow the development activities to continue.

6.2 **Statement of significance**

A matrix was developed whereby the above criteria, as set out in Sections 3(3) and 7 of the NHRA, No. 25 of 1999, were applied for each identified site (see Appendix 1). This allowed some form of control over the application of similar values for similar sites. Three categories of significance are recognized: low, medium and high. In terms of Section 7 of the NHRA, all the sites currently known or which are expected to occur in the study area are evaluated to have a grading as identified in the table below.

Table 1. Summary of identified heritage resources in the study area.

Identified heritage resources	
Category, according to NHRA	*Identification/Description*
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	None
archaeological site or material (Section 35)	None
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	None
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

6.3 **Impact assessment**

Impact analysis of cultural heritage resources under threat of the proposed development, are based on the present understanding of the development.

- As no site, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

7. CONCLUSIONS

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which the development is proposed.

The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

- As no site, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

Therefore, from a heritage point of view we recommend that the proposed development can continue. We recommend that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage consultant so that an investigation and evaluation of the finds can be made.

8. REFERENCES

8.1 **Data bases**

Chief Surveyor General
Environmental Potential Atlas, Department of Environmental Affairs and Tourism.
Heritage Atlas Database, Pretoria.
National Archives of South Africa

8.2 **Literature**

Africa, No. 40. Pretoria: Botanical Research Institute.

Behrens, J. 2008. *Archaeological investigation of a number of structures on Waterval 5IR*. Unpublished report. Pretoria: Unisa.

Hall, S. 1997. *A Phase 1 archaeological assessment of Modderfontein*. Department of Archaeology. Johannesburg: University of the Witwatersrand.

Holm, S.E. 1966. *Bibliography of South African Pre- and Protohistoric archaeology*. Pretoria: J.L. van Schaik.

Mason, R.J. 1969. *Prehistory of the Transvaal*. Johannesburg: Witwatersrand University Press.

Mason, R.J. 2012. A built stone alignment associated with an LSA artefact assemblage on Mia Farm, Midrand, South Africa. *South African Archaeological Bulletin* 67(196):214-230.

Van Schalkwyk, J.A. 2005. *Scoping study for the development of a new landfill site for the northern areas of the Metropolitan Municipality of Johannesburg*. Unpublished report 2005KH09. Pretoria: National Cultural History Museum.

Van Schalkwyk, J.A. 2006. Heritage impact assessment: Summerset Extension 24. Unpublished report 2006KH099.

Van Schalkwyk, J.A. 2007a. *Heritage survey report for the proposed development on a Portion of the farm Witbos 409JR, in the Randburg magisterial district, Gauteng Province*. Unpublished report 2007KH052.

Van Schalkwyk, J.A. 2007b. *Heritage scoping report for the proposed expansion to the Northern Waste Water Treatment Works, Diepsloot 338JR, Randburg magisterial district, Gauteng Province*. Unpublished report 2007/JvS/077. Pretoria.

Van Schalkwyk, J.A. 2010. *Heritage impact assessment for the proposed Diepsloot pedestrian bridge development, Randburg magisterial district, Gauteng Province*. Unpublished report 2010/JvS/018. Pretoria.

Van Schalkwyk, J.A. 2012. *Heritage impact assessment for the proposed Diepsloot reservoir development, Pretoria magisterial district, Gauteng Province*. Unpublished report 2012/JvS/007.

Van Schalkwyk, J.A. & De Jong, R. 1997. *A survey of cultural resources in the Midrand municipal area, Gauteng Province*. Unpublished report 1997KH021. Pretoria: National Cultural History Museum.

8.3 **Maps and aerial photographs**

1: 50 000 Topocadastral maps: 2528CC
Google Earth

APPENDIX 1: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE RESOURCES

Significance

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. Historic value			
Is it important in the community, or pattern of history			
Does it have strong or special association with the life or work of a person, group or organisation of importance in history			
Does it have significance relating to the history of slavery			
2. Aesthetic value			
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group			
3. Scientific value			
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage			
Is it important in demonstrating a high degree of creative or technical achievement at a particular period			
4. Social value			
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons			
5. Rarity			
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage			
6. Representivity			
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects			
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class			
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.			
7. Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific community			
8. Significance rating of feature			
1. Low			
2. Medium			
3. High			

APPENDIX 2. RELEVANT LEGISLATION

All archaeological and palaeontological sites and meteorites are protected by the National Heritage Resources Act (Act no 25 of 1999) as stated in Section 35:

(1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and the maritime cultural zone shall be the responsibility of SAHRA.

(2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collection policy acceptable to the heritage resources authority and may in so doing establish such terms and conditions as it sees fit for the conservation of such objects.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority-

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

In terms of cemeteries and graves the following (Section 36):

(1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority-

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

Annexure F

MOTIVATING MEMORANDUM IN SUPPORT OF THE APPLICATION FOR THE ESTABLISHMENT OF A TOWNSHIP ON HOLDINGS 92 AND 101, CROWTHORNE AGRICULTURAL HOLDINGS

(PROPOSED CROWTHORNE EXTENSION 24)

Table of Contents

1 Introduction

Application is made in terms of Section 26 of the City of Johannesburg Municipal Planning By-Law, 2016, to establishment a residential township on Holdings 92 and 101 Crowthorne Agricultural Holdings, proposed Crowthorne Extension 24 (hereafter referred to as "the site").

This memorandum argues the need and desirability for the establishment of the township on the site as well as the suitability of the site therefore.

2 Legal Aspects

2.1 Ownership

The holdings that constitute the site are owned as follows:

Property Description	Deed Number	Owner
Holding 92 Crowthorne A.H	T58961/2016	Balwin Properties Ltd
Holding 101 Crowthorne A.H	T100388/2016	Balwin Properties Ltd

2.2 Mortgage Bonds

The holdings that constitute the site are not affected by any mortgage bonds.

3 Locality and Surrounding Developments

The site is located along the P66-1 (Pitts Avenue) on either side of its intersection with Ethel Avenue and to the immediate south of the intersection of Pitts Avenue and the proposed K56. This is shown on the Locality Plan, attached as Annexure A.

The P66-1 links Woodmead in the south, through Sunninghill and Waterfall, past the application site and to the N14 and Pretoria in the north.

The surrounding uses and land uses are shown on Annexures B (Use Zones) and C (Land Use) respectively.

To the north the site is bisected by the proposed K56. Further to the immediate north lies Holding 93 Crowthorne A.H.

To the north-east the site lies opposite Holdings 91, 90 and 89 Crowthorne A.H.

To the immediate east and south the site abuts the proposed township of Crowthorne Extension 20. An application to develop 1100 residential units has been submitted in respect of this township.

To the west the site abuts the P66-1. This is a major proclaimed provincial road and is a dual carriage way along the length of the site. Across the P66-1 a shopping centre is under construction (Kyalami Ridge Extension 3) at the intersection of the P66-1 and Main Road).

Kyalami Ridge Extension 3 forms part of the Kyalami Specialist Node. The site is located within 100m of the Kyalami Specialist Node.

The site is not only well located in relation to the Kyalami Specialist Node, the P66-1 and Main Road, but it is also well located in relation to the K73 (Allandale Road). Further to the south, along Allandale Road, lies the new Waterfall City Regional node, comprising offices, shopping and residential uses, as well as other places of employment.

4 Existing Zoning

In terms of the Halfway House and Clayville Town Planning Scheme, 1976, the holdings that constitute the site are all zoned "Agricultural".

5 Size

The size of the site is 4,4063 Ha and is made up as follows:

Property Description	Deed Number	Size
Holding 92 Crowthorne A.H	T58961/2016	2,2700 Ha
Holding 101 Crowthorne A.H	T100388/2016	2,1363 Ha
TOTAL		4,4063 Ha

6 Proposed Development

It is proposed to develop a high-density residential scheme and uses ancillary and subservient thereto.

The proposed township layout plan is attached as Annexure D.

The following land use development controls are proposed:

6.1 Proposed Erf 1 & 2

- **Zoning**: "Residential 3" and uses ancillary and subservient thereto, including a community centre and Private Open Space
- **Density**: A maximum of 300 units shall be developed
- **Height**: The height of all buildings shall be restricted to 4 storeys
- **Coverage**: The coverage shall not exceed 50%

6.2 General

- **Access**: Access shall be to the satisfaction of the local authority, provided that a line of no access shall apply along Pitts Avenue.
- **Parking**: Parking shall be provided for the use of tenants in the ratio of 1 bay per single bedroom unit and 0,5 bays for every additional bedroom for every dwelling unit. Parking for visitors shall be provided in the ratio of 1 bay for every 4 units.
- **SDP**: A Site Development Plan shall be submitted prior to the approval of any building plans.

7 Proposed access and road upgrades

A Traffic impact Assessment has been prepared and is based on 1300 residential units.

To mitigate against the traffic impact of the development, alleviate congestion along other parts of the road network and accommodate latent demand various upgrades are proposed:

- The construction of a link road to connect Ethel/Whisken Avenues with Pitts Avenue, across Holding 92. This will effectively result in the creation of a new signalised intersection at Pitts Avenue/Main Road. This link road will provide an alternate to the congested Main Road/Arthur Road intersection.
- A short right turn lane on Neptune Avenue
- A short right turn lane on Walton Road
- A short right turn lane on Whisken Avenue (eastbound)
- A short right turn lane on Whisken Avenue (westbound)
- Signalising the intersection of Neptune Avenue/ Walton Road/ Whisken Avenue

8 Motivation in support of the application

8.1 Spatial Development Framework 2040

Council approved the Spatial Development Framework 2040 (SDF 2040) during June 2016.

8.1.1 Implications of the SDF 2040

The provisions of the SDF 2040 have a strong bearing on the application. These include:

- The Nodal Guidelines which promote densification, diversification and development.
- The Density Regulations which aim to facilitate higher density development within defined areas, promoting mixed use developments and improved connectivity.

The Nodal Guidelines and Density Regulations recognise that residential opportunities, with all of the requisite urban amenities, should be promoted within nodes and within close proximity to nodes in order to reduce travel times, curb urban sprawl, locate the City's residents close to urban amenities, jobs, economic opportunities and social infrastructure.

The site is located directly opposite the Kyalami Specialist Node. The Kyalami Specialist Node was recognised as such in the SDF 2010-2011. The SDF 2040 does not include alterations of any nodes (district, specialist, metropolitan, local or industrial).

Table 6 in the SDF 2040 sets out the density and land use mix regulations applicable to the various nodes. In terms of Table 6, densities of between 50 du/ha and 100 du/ha should be supported within 100m walking distance of District nodes/ Specialist nodes.

The proposed density is consistent with the provisions of the Nodal Guidelines and Density Regulations.

8.1.2 Status of the SDF 2040

The SDF 2040 should be read in conjunction with Regional Spatial Development Frameworks (RSDFs) and other localised spatial policy documents including Urban Development Frameworks (UDFs) and Precinct Plans (PPs) that have been approved by council (SDF 2040, p23).

Notwithstanding this, in respect of the application site, the SDF 2040 overrides the guidelines and sub-area tables of the Regional Spatial Development Framework, including the density guidelines along mobility spines.

"For areas explicitly covered by this SDF including Transformation Zones and economic nodes (Chapter 7), density regulations (Table 6 p.160) and urban performance measures (section 8.3); this SDF will apply, with the exception to regulations of the approved Strategic Area Frameworks (2014) and PPs/UDFs approved **since and including** 2015" (SDF 2040, p24).

The application site does not form part of an approved Strategic Areas Framework, nor does it form part of a Precinct Plan or Urban Development Framework approved since 2015.

8.1.3 Conclusion

The application is entirely consistent with the SDF 2040.

8.2 Recent developments

The construction of the mixed-use development on Kyalami Ridge Extension 3 has commenced. This development comprises:

- 17 608m^2 of office floor area
- 100 residential units
- 35 698m^2 floor area for a shopping centre
- A gym of 3 636m^2
- 818m^2 floor area for drive-through restaurants

The proposed development on the application site will strengthen the new centre as it will lead to better utilisation of the various uses and services offered.

It furthermore ensures that the residents of the scheme are close to urban amenities, jobs, economic opportunities and social infrastructure, as promoted in the SDF 2040.

8.3 City-wide contribution

As part of the development, extensive upgrades to the road network in the area will be undertaken. These are discussed more fully in the revised Traffic Impact Assessment (See 7 above).

The development, through the upgrades proposed in the TIA, will not only accommodate the traffic generated by the development, but will also help alleviate the current congestion, specifically at the Main Road/Arthur Avenue/Papenfus Drive intersections. In so doing it will help meet the infrastructure needs of the broader area and will alleviate the pressure on the City to incur the costs of upgrading the infrastructure on its own.

8.4 Site specific considerations

In summary the site has unique locational and site specific considerations that justify the density proposed:

- It is well located in relation to major roads, transport routes and places of employment, being well located in relation to the Kyalami Specialist Node and the mixed-use development on Kyalami Ridge Extension 3.
- The mobility function of the Road Network will be protected and enhanced where possible. There will be no access onto the P66-1 and the holdings in the township will be with a single access point.
- The proposed development will have no impact on any adjoining or surrounding property as it is large enough to allow for the proposed density, height, landscaping and parking, without it impacting on any adjoining property.
- The orientation of the site is such that all of the units will be facing north.
- The site is surrounded by roads on three sides (P66-1, the K56 link road and Ethel Road) which will further protect the amenity of the surrounding properties.

It is therefore evident that owing to its size, shape and location, the site is unique and is ideally suited for the proposed increase in densities.

8.5 Impact on surrounding developments

The proposed development will have no impact on any of the surrounding properties:

- The holdings to the west are separated from the site by the P66-1.
- Holdings to the east are separated from the site by the width of Ethel Road (15m) and a proposed further 10m building line.
- The holdings to the north are separated from the site by the width of the K56 link road.
- The orientation of the site is such that the units will all be north facing, mitigating against any overlooking impact.

There will therefore be no overlooking or overshadowing as a result of the development.

8.6 Availability of infrastructure

Higher densities on the site will also have the advantage of helping meet the infrastructure needs of the broader area and will alleviate the pressure on the City to incur the costs of upgrading the infrastructure on its own. As part of meeting its obligations, the developer will incur significant expenses to provide bulk water, sewer and electricity infrastructure to the site, as well as upgrade several roads and intersections in the area. These improvements will not only benefit the site, but will also meet the needs of existing developments.

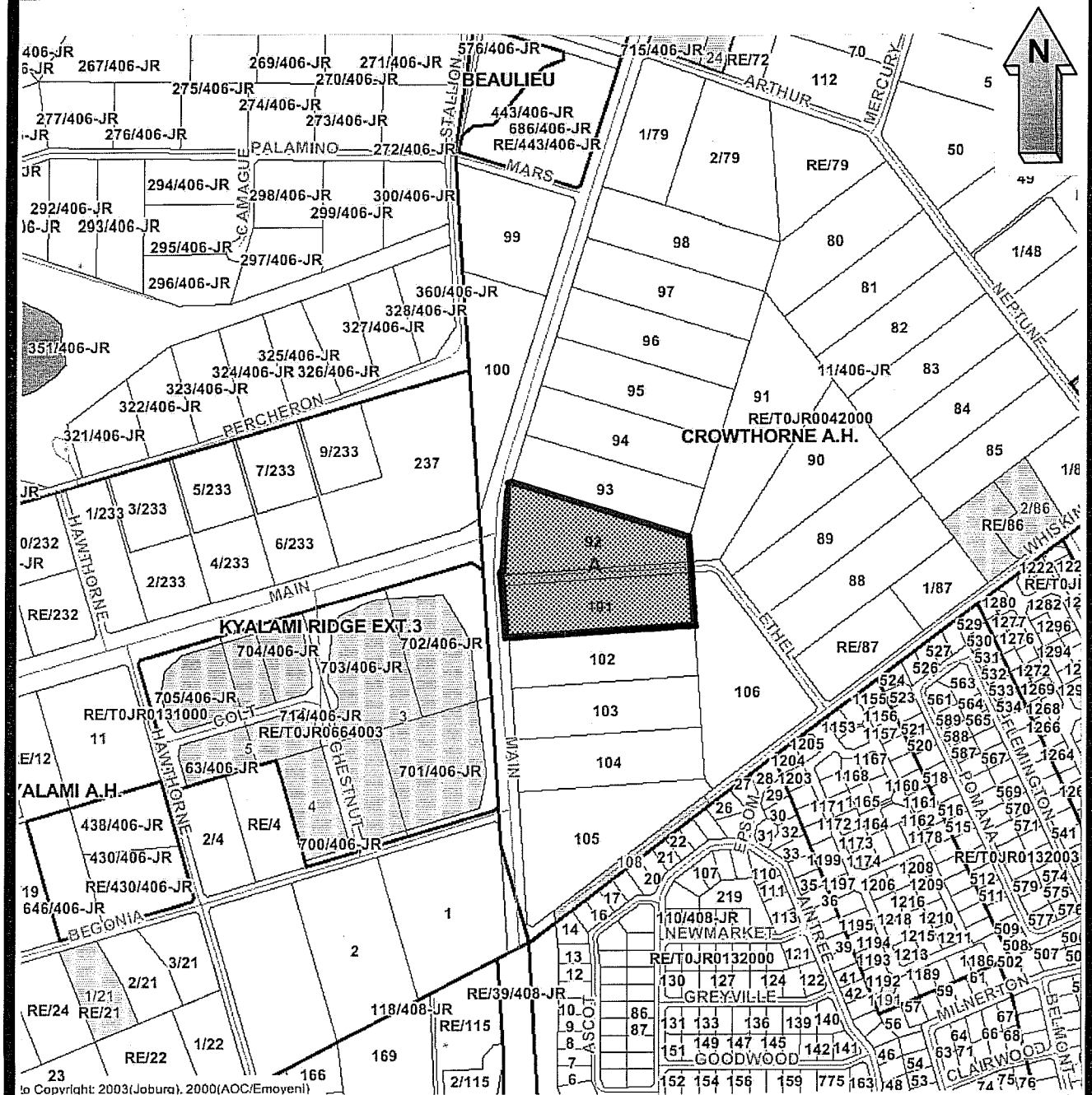
9 Summary and Conclusion

In light of the considerations highlighted in the preceding sections of this report, it is respectfully requested that the application to establish a township on Holdings 92 to 101 Crowthorne A.H. be supported. Specifically,

- The proposed development is in line with applicable Council development policies, particularly the SDF.
- The site is well located in relation to major roads, transport routes and places of employment, being well located in relation to the Kyalami Specialist Node and the mixed-use development on Kyalami Ridge Extension 3
- The proposed development will have a positive city-wide impact

- The proposed development will meet the need for higher densities in the area in general.
- The proposed development will have no impact on any adjoining property
- Infrastructure for the development can be provided

ANNEXURE A



REFERENCE

THE SITE

CROWTHORNE A.H.

ERVEN 92 & 101

LOCALITY MAP

NOT TO SCALE	DATE NOV. 2016	

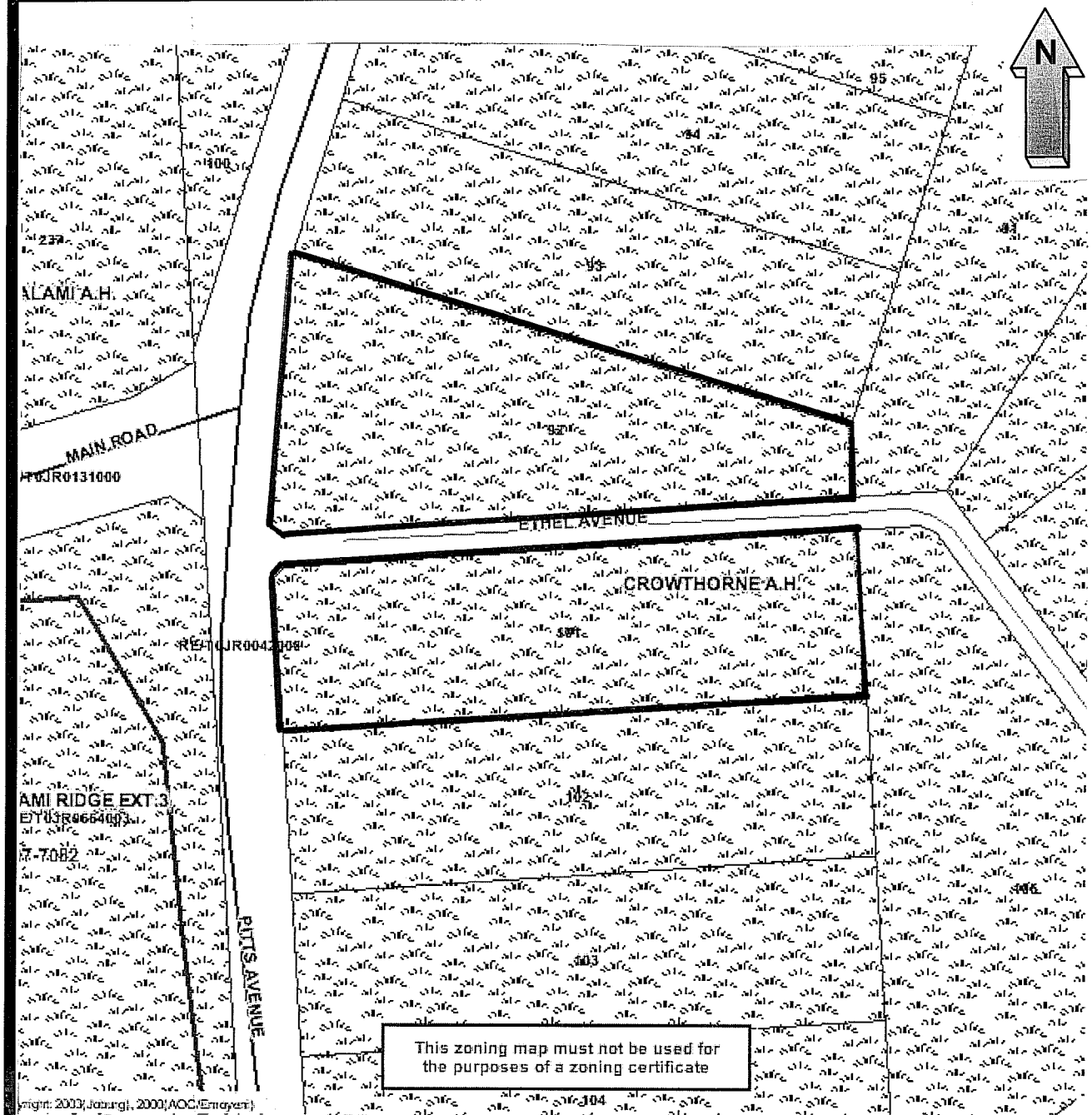
PLANNING WORX

Mark Roux

P O Box 130316
BRYANSTON
2021

Cell: 083 281 7239
email : markroux@planwrx.co.za

ANNEXURE B



REFERENCE

THE SITE

AGRICULTURAL

CROWTHORNE A.H.

ERVEN 92 & 101

EXISTING USE ZONES

NOT TO SCALE	DATE DEC. 2016	

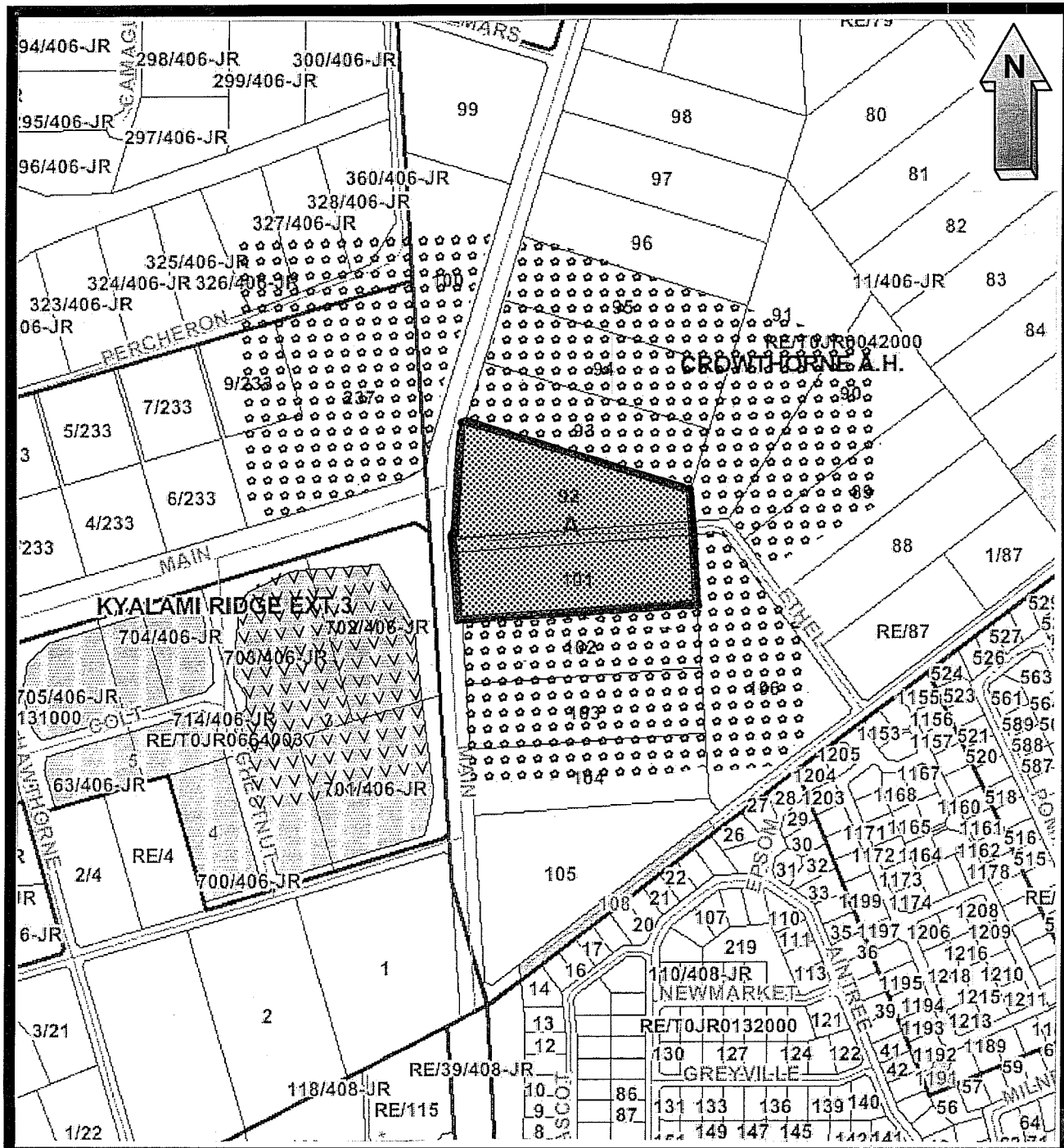
PLANNING WORX

Mark Roux

P O Box 130316
BRYANSTON
2021

Cell: 083 281 7239
email : markroux@planwrx.co.za

ANNEXURE C



REFERENCE

- THE SITE
- RURAL RESIDENTIAL
- VACANT

CROWTHORNE A.H.

ERVEN 92 & 101

EXISTING LAND USE

NOT TO SCALE	DATE DEC. 2016	

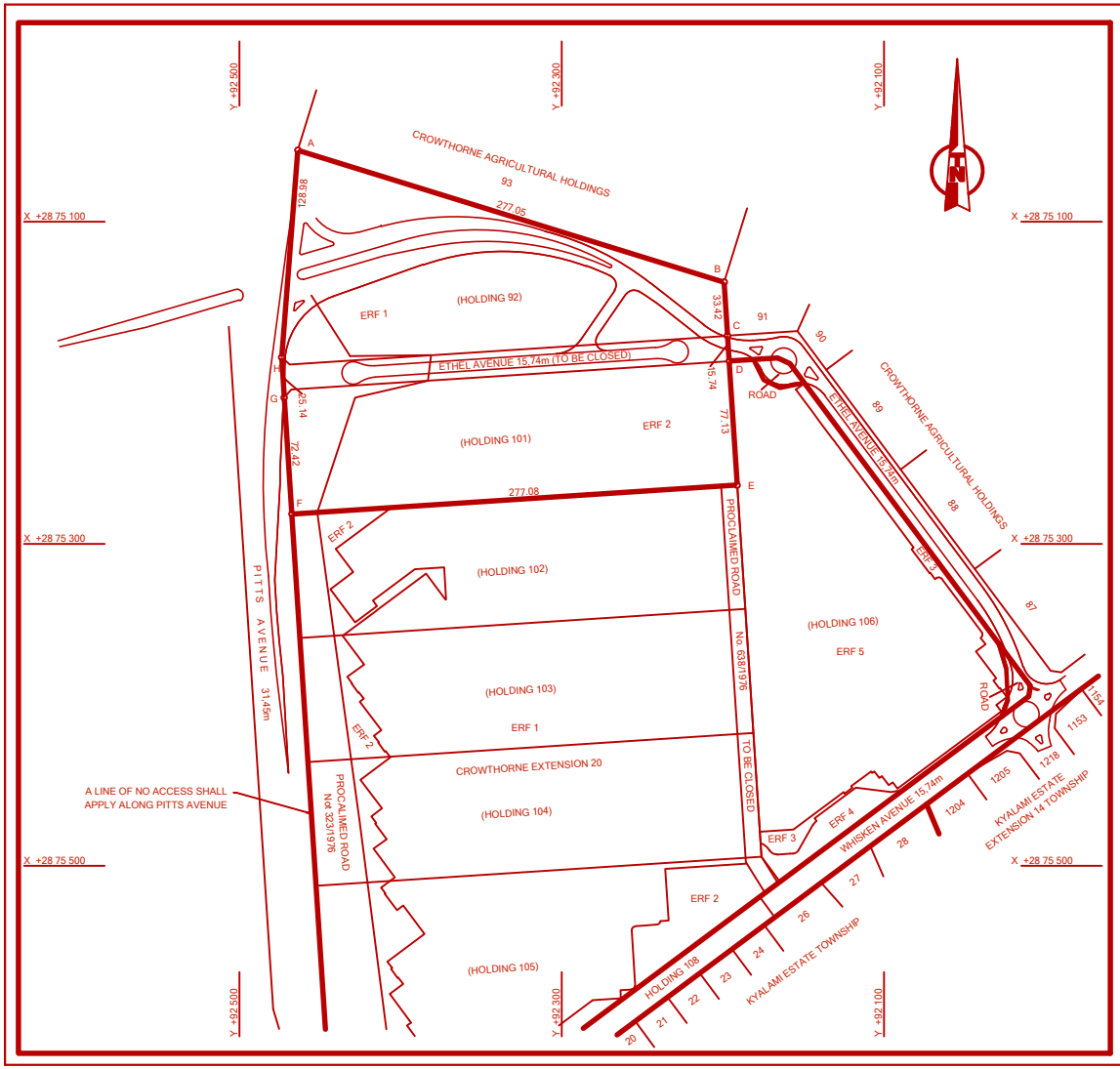
PLANNING WORX

Mark Roux

P O Box 130316
BRYANSTON
2021

Cell: 083 281 7239
email : markroux@planwrx.co.za

ANNEXURE D



PROPOSED TOWNSHIP:

CROWTHORNE EXTENSION

SITUATED ON PORTION
OF THE FARM
WITPOORT No. 406 - JR

LOCALITY PLAN

USE TABLE

USE ZONE	ERVEN	No. OF ERVEN	AREA (ha)	% OF TOTAL
RESIDENTIAL 3	1	1	2,1363	
RESIDENTIAL 3	2	1	2,2700	
ETHEL ROAD - TO BE CLOSED			0,4367	
TOTAL		2	4,8430	100.00%

NOTES

* THE TOWNSHIP IS DENOTED BY THE FIGURE 'ABCDEFGH'.
* ALL DIMENSIONS ARE APPROXIMATE AND SUBJECT TO FINAL SURVEY.

AMENDMENTS

DATE	DETAILS	PLAN	DATE

PLANNING WORX
PO Box 130316
Bryanston
2021
Tel: 083 281 7239
Fax: 086 684 2799
E-mail: markr@planwrx.co.za

DATE: 7 DECEMBER 2016
SCALE: 1 : 2500
PLAN No. R2453_TA_X

Annexure G

PROPOSED RESIDENTIAL DEVELOPMENT: CROWTHORNE EXT 20 (ERVEN 92 & 101 CROWTHORNE A/H, GAUTENG)

FOR

Balwin PROPERTIES

Stormwater Management Report
Report no: 6752D

Rev 0
NOVEMBER 2016

REPORT TO:

Balwin PROPERTIES

Block 1
Townsend Office Park
No.1 Townsend Avenue
Bedfordview

Private Bag X13 Bertsham 2013

Tel: (011) 608-4551
Fax: (011) 680-4595

REPORT BY:

K&T
KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

410 Jan Smuts Avenue
9 Burnside Island
Craighall
2024

P.O.Box 412541, Craighall 2024

Tel: (011) 501 - 4760
Fax: (011) 501 - 4769
E-Mail:fbain@jhb.kanteys.co.za
Website: www.kanteys.co.za

PROPOSED RESIDENTIAL DEVELOPMENT: CROWTHORNE EXT 20 (ERVEN 101 & 92, CROWTHORNE A/H, GAUTENG)

FOR

BALWIN PROPERTIES LIMITED

Stormwater Management Report

Report no: 6752D

By:

W.N.Rihlampfu ND (CIV)

Reviewed by:

F.B.Bain Pr Eng

Rev 0
NOVEMBER 2016

Balwin Properties Limited
Block 1
Townsend Office Park
No.1 Townsend Avenue
Bedfordview

Private Bag X13 Bertsham 2013

Tel: (011) 608-4551
Fax: (011) 680-4595

Kantey & Templer (Pty) Ltd
P.O.Box 412541
Craighall
2024

Tel: (011) 501 - 4760
Fax: (011) 501 - 4769
E-Mail: fbain@jhb.kanteys.co.za
Website: www.kanteys.co.za

INDEX

List of annexures

Annexure A - Drawings:

6752D -SW-01 -A	Site Locality Plan
6752D -SW-02 -A	Site Surrounds and Services
6752D -SW-03 -A	SDP & Stormwater Layout
6752D -SW-04 -A	Layout and details of Attenuation Tank

Annexure B - Stormwater Calculations Internal to Site

Annexure C - Summary of Attenuation Results and Hydrographs

1 INTRODUCTION

1.1 SCOPE OF REPORT

A ***'Res 3'* zoned residential development of 290 sectional title residential units**, is planned for **Holdings 92 & 101, Crowthorne A/H, Gauteng**. This report serves as the stormwater management and attenuation plan for the proposed development and illustrates its compliance with JRA stormwater management and peak flood attenuation requirements. The site area is 3.2ha of developable area. This excludes land required for Gautrans servitudes.

This site is owned and being developed by Balwin Properties. Kantey and Templer have been appointed for the Civil Engineering Services. The Architect is DHK Architects. The town planner is Mark Roux of Planworx.

Included in this report are detailed construction drawings of the proposed attenuation structure.

2 SITE

2.1 LOCATION

The proposed ***Res 3*** development is located on **Holdings 92 & 101, Crowthorne A/H, Gauteng** and is hereinafter called "**the site**". The site is situated immediately south east of the intersection of Pitts Avenue-R55 (Gautrans Road K71.02/P66-1) and Kyalami Main Road (M71).

The site is bounded by:

- **Pitts Avenue-R55 (Gautrans Road K71.02/P66-1**) to the west.
- **Erven 5 to 10 of Kyalami A/H** is situated on the opposite of **Pitts Avenue, to the west thereof.** A shopping centre, **"*The Kyalami Retail Centre*"** is currently being planned for and constructed on these holdings.
- **Crowthorne Ext 20** to the south and south east of the site.
- **Ethel Avenue** currently runs through the site in an east-west direction. It is to be de-proclaimed and closed and a 3m servitude is to be kept over its route for the outfall sewer extension which will service properties to the east and south east of the site.
- **Holdings 91 & 93 Crowthorne A/H's** consisting of undeveloped agricultural holdings are situated to the north and north east of the site.

The locality plan of the site is shown on drawing **6752D -SW-01: Locality Plan (Annexure A).**

2.2 DESCRIPTION OF SITE

The site:
The Site has a total area of approximately 3.11 ha. The terrain is relatively flat and falls fairly evenly in a north-westerly direction with a gradient of approximately 2.8% (1:36). The site is currently largely undeveloped and no terracing is evident on site. The western boundary of the site is affected by the basic planning of the Gautrans Road K71.02/P66-1 along the current route of Pitts Avenue. The northern boundary of the site is affected by the basic planning of the Gautrans Road K56. The proposed alignment of these roads has affected the configuration of the proposed buildings and the layout of civil services and in particular the stormwater outlet pipes.

Access to the site for ingress and egress is via Whiskin Avenue.

A October 2015 aerial photograph with the site and existing services is shown on the drawing **6752D-SW-02: Site Surrounds & Existing Stormwater (Annexure A).**

The undeveloped site **(pre-developed stage)** is currently grass covered veld with dispersed to fairly dense shrubs and trees and contains only scattered buildings and structures. Since there are no rock outcrops evident and very little previously paved areas on this site, the percentage of impervious areas was determined to be 7%.

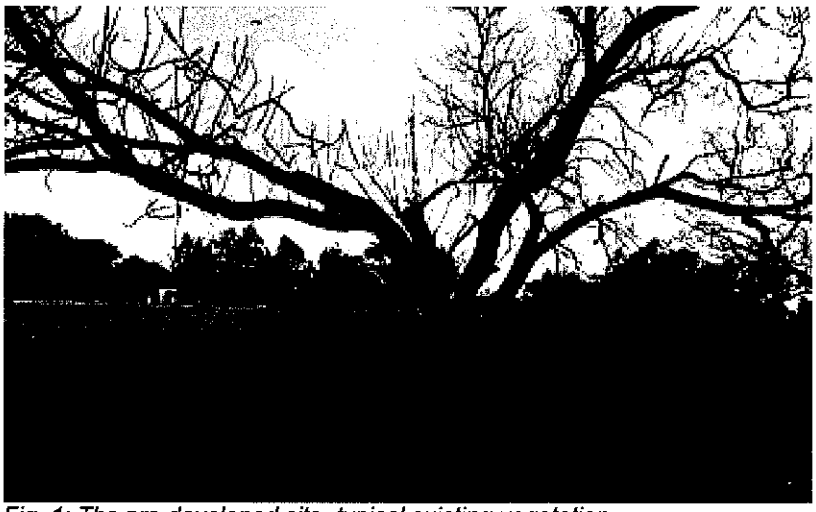


Fig. 1: The pre-developed site -typical existing vegetation – grass and well established shrubs and trees

Fig. 2: The pre-developed site -typical existing vegetation – Well established shrubs and trees

The site slopes at a gradient of between 2% and 3% in a north-westerly direction – an average gradient of 2.8% can be assumed. No terracing currently exists on the site.

A cadastral plan with contours of the existing terrain is shown on drawing **6752D -SW-02: Site Surrounds & Existing Stormwater**, Annexure A.

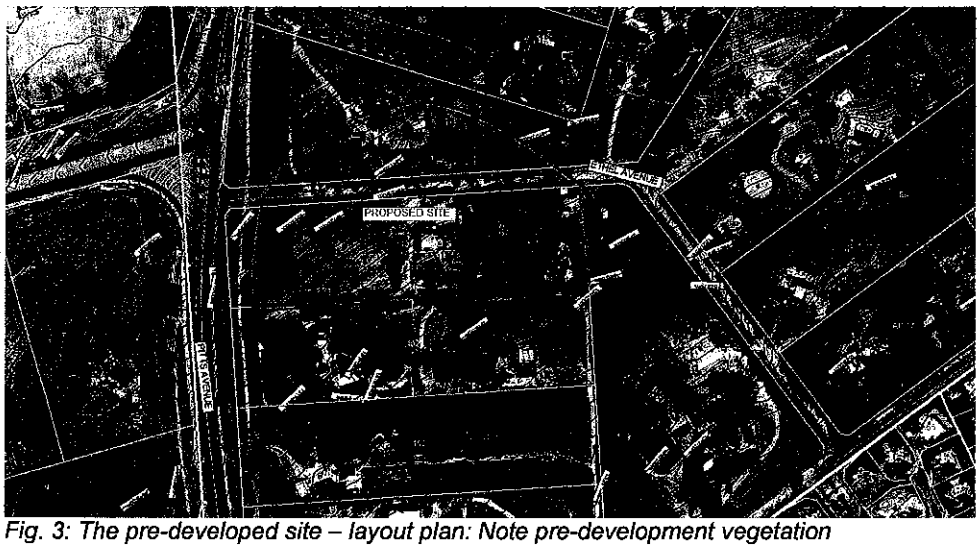


Fig. 3: The pre-developed site – layout plan: Note pre-development vegetation

2.3 TOWN PLANNING

2.3.1 CURRENT ZONING RIGHTS

The Erven making up the site are currently either unused or being utilised for agricultural purposes and were all previously zoned 'agricultural'.

The zoning details being applied for related to the site for the current proposed development are as follows:

HOLDINGS 92 AND 101 CROWTHORNE A/H'S	
ZONING	Res 3
PRIMARY RIGHTS	Residential
HEIGHT OF BUILDINGS	4 Storeys
DENSITY	290 Units Maximum
COVERAGE	50%

Table 1: Proposed zoning details.

A sketch of the proposed developed site is shown below.

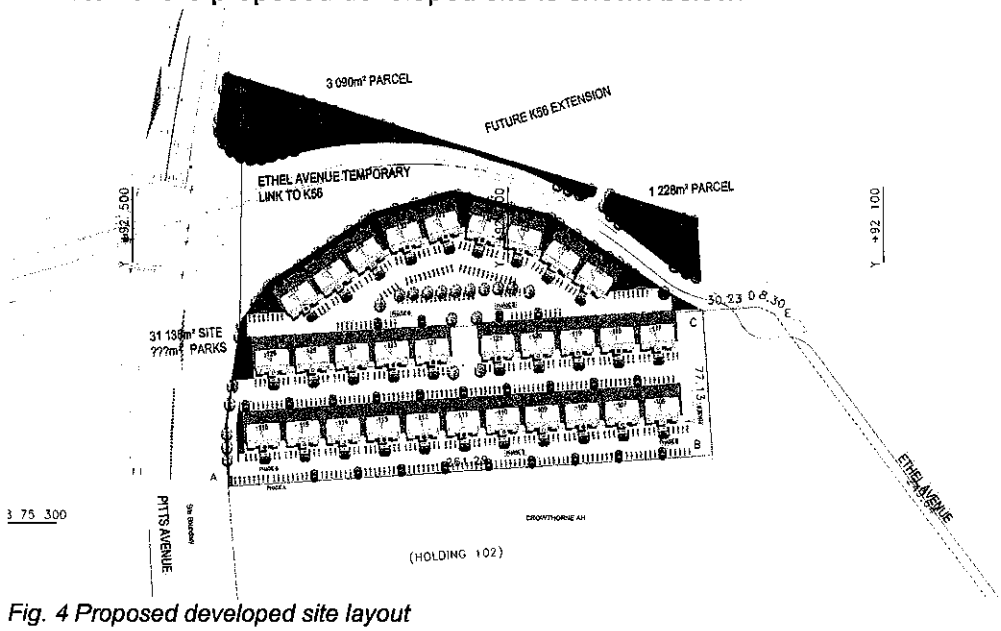


Fig. 4 Proposed developed site layout

3 EXISTING INTERNAL STORMWATER

3.1 INTERNAL

No natural or manmade watercourses are present on site and currently the runoff is discharged as overland sheet flow.

4 EXISTING EXTERNAL STORMWATER

4.1 DOWNSTREAM INFRASTRUCTURE FOR CONNECTION POINTS

An embankment and "V"-shaped earth channel has been shaped along the western boundary between the site and Pitts Avenue-R55 (Gautrans Road K71.02/P66-1). Runoff is diverted along this towards a stone pitched lined channel which diverts the stormwater into a concrete lined "V"-shaped road edge channel running along Pitts Avenue and falling in a northerly direction. Runoff is then captured in a catchpit along this road length and it ultimately discharges in the riverine area about 450m to the north of the site.

There is no formal stormwater drainage infrastructure along Ethel Avenue. Ethel Avenue however acts as a stormwater channel in its current state and diverts stormwater towards the west and onto Pitts Avenue-R55 (Gautrans Road K71.02/P66-1).

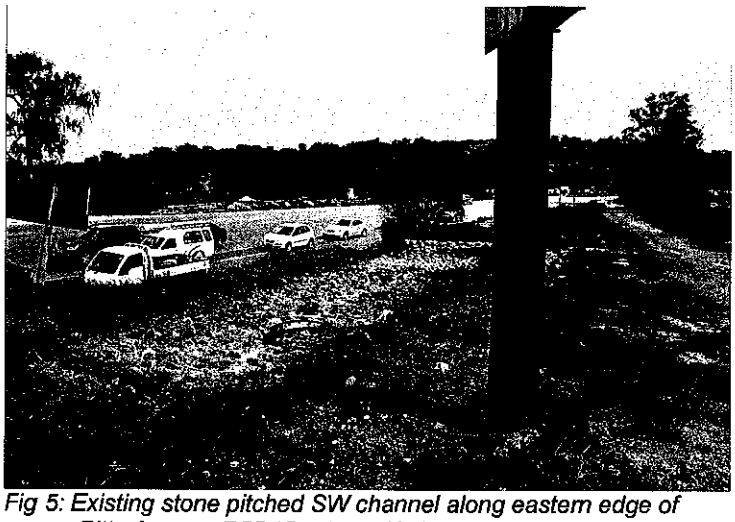


Fig 5: Existing stone pitched SW channel along eastern edge of Pitts Avenue-R55 (Gautrans K71.02)

Fig 6: Existing road edge SW channel and catchpits along eastern edge of Pitts Avenue-R55 (Gautrans K71.02)

Stormwater runoff generated on the site currently flows as sheet flow in a north to north-westerly direction. The runoff flows onto Ethel Avenue, from where it is diverted as channel flow in a westerly direction to the formalised stormwater infrastructure along the eastern edge of Pitts Avenue-R55 (Gautrans Road K71.02/P66-1).

4.2 UPSTREAM INGRESS OF STORMWATER RUNOFF

Stormwater from Crowthorne Ext 20 is attenuated on site and then managed past Holdings 92 and 101 in piped and surface infrastructure. A watershed exists along the old Whiskin Avenue road to the south of Crowthorne Ext 20 and therefore there is no ingress of stormwater from south of the site.
Since the southern border (higher side) of The Site runs along Crowthorne Ext 20 there will be no ingress of stormwater runoff from upstream sources.

4.3 FLOODLINES

Since there are no natural or manmade water courses evident, there are no floodlines impacting on the site and its proposed development. The proposed development is thus not affected by 1:100 year flood lines as specified by Chapter 14, Part 3 of the Water Act (Act 36 of 1998), as required in terms of the Town Planning and Townships Ordinance (Ordinance 15 of 1986).

4.4 PRE-DEVELOPMENT FLOWS

The run-off for the pre-developed site was determined by the **Hydrosim** programme and verified with the **Rational Method** carried out by the Civil Designer programme. The results from **Hydrosim** were used for the runoff peak attenuation calculations. Input data as follows:

SITE PARAMETERS		
Catchment Name		
Catchment Area	3.110	ha
Average catchment slope	2.8	%
% impervious area - pre-development	2.0	%
% impervious area - post development	80	%
Overland Manning factor - impervious	0.020	
Overland Manning factor - pervious	0.350	
Critical Storm duration for attenuation	Pre 32, Post 50	min

Table 2: Pre-development site parameter data

The results are as follows:

PRE-DEVELOPMENT STAGE						
Node Id	El-Type	R.I	Dur	Qr m3		Qm3/ha
KATPRE	Catch	2		0.095	3.110	0.031
KATPRE	Catch	5		0.146	3.110	0.047
KATPRE	Catch	25	21	0.311	3.110	0.098

Table 3: Pre-development flows

The calculations are included in **Annexure C**

5 PROPOSED STORMWATER

In terms of the JRA stormwater management plan it was determined that attenuation for peak storm discharges is required on this site due to the development. The stormwater runoff from the site **post development** for the **1:5 and 1:25 year recurrence period** will **not exceed** the **pre-development 1:5 year** and **1:25 year recurrence period** storms, respectively. Furthermore the attenuation facilities are of an adequate size and sufficiently **robust to accommodate a 1:50 year storm flow**.

Attenuation of the stormwater peak-flow generated by the development will be provided by **a single attenuation tank.**

Attenuation Tank: The attenuation tank is a covered tank, situated beneath the parking area that is situated in the current Ethel Avenue road reserve. This tank is approximately **1,170m³** in volume. From here a new **375mmØ** pipe which will exit at the north east corner of the site and will **discharge** into the new stormwater pipework that will be constructed as part of the proposed Ethel Link road. It will then run towards and connect into the exisitng stromwater infrastructure along the Pitts Avenue (Gautrans Road K71.02/P66-1).

The **total attenuation** volume is **1,170 m³.** This amounts to a storage volume of approximately **365m³ per hectare** of development.

5.1 MINOR SYSTEM DESIGN

The run-off will be captured by kerb and grid inlets and conveyed to an attenuation tank by an underground stormwater pipe network. The internal stormwater pipe network, referred to as the minor system, will be designed to accommodate the runoff generated by storm events with a recurrence interval of up to 5 years. The velocities in the pipes will range from a minimum of 0.7m/s to a maximum of 4.0m/s.

5.2 MAJOR SYSTEM DESIGN

The major system acts as a backup emergency system in case of major storm events with a recurrence interval of greater than 5 years. Its function is to protect the properties and infrastructure from damage and flooding during such events.

The major system consists of overland flow paths by means of dedicated channels created within the internal roads, which fall towards the attenuation tanks. The internal roads will divert and convey the run-off of larger storm events of greater than 1:5 years mean return period to the attenuation tank. At their low points the kerbs have been designed to overflow and divert stormwater into the attenuation tanks at a storm recurrence interval of more than 5 years and will include for the 25 year and 50 year mean return period storm events.

The attenuation tanks have been designed with sufficient robustness to withstand up to a 1:50 year mean return period storm event.

5.3 MANAGEMENT OF STORMWATER RUNOFF FROM UPSTREAM SOURCES.

As stormwater from Crowthorne Ext 20 is attenuated on site and effectively managed past The Site, there is no notable upstream ingress of stormwater onto The Site. Stormwater from the outlet in the north west corner of Crowthorne Ext 20 will be managed as surface flow, on site and into the Gautrans reserve in a north westerly direction and will not be allowed to flow onto Holding 101 Crowthorne A/H's.

The intention not to accommodate any ingress of stormwater from upstream sources on the site, post-development, is thus met.

5.4 POST-DEVELOPMENT FLOWS

5.4.1 IMPERVIOUS AREAS

The percentage of impervious areas for the post-development stage was conservatively set at 80% to allow for buildings, roads, parking area, sidewalks and other paved and sealed areas. The post-development Manning factor is set at 0.02 for impervious areas and 0.3 for pervious areas.

5.5 ATTENUATION

5.5.1 JRA REQUIREMENTS

The aim of the stormwater management plan is to satisfy the requirements set out by the JRA by means of attenuation of the stormwater peak-flow generated by the development.

The attenuation requirement by JRA is stated as the following:

- *'The run-off associated with the development is to be attenuated such that the predevelopment flows for the 1:5 as well as the 1:25 year storm events are not exceeded. The attenuation structure must be able to withstand the 1:50 storm event.'*

5.5.2 STORMWATER MODEL

A model of the internal stormwater system was set up and analysed with the aid of the '**Hydrosim**' programme:

To **match the attenuation solutions for Crowthorne Ext 20** to which the site will eventually be notarially tied, it was decided to also accommodate the stormwater from the site to be attenuated in **one single underground tank**, situated under the parking area north of the site. A bulk earthworks procedure will ensue the desired falls are achieved to enable a strategic low point of this catchment area at the proposed tank position. **(refer Annexure A: drawing6752D -SW-03 –A SDP & Stormwater Layout).**
This tank has been designed that its post-development 1: 5 and 1:25 year mean return period storm discharge is less than the pre-development 1: 5 and 1:25 year mean return period storm discharge.

The input and output sheets for the model is included in **Annexure B**. The summary of the attenuation results and hydrographs is attached at **Annexure C**.

5.6 DESIGN SUMMARY OF MODEL

- **An attenuation tank** is proposed for this catchment area. Refer **Annexure A: Drawing 6752D-SW-03-A: SDP and Stormwater Layout** and **6752D-SW-04-A Layout and details of Attenuation Tank.**
- **The Tank** is situated **beneath the northern roadway and parking** paving. The **attenuated runoff** emanating from this tank will be **piped in a 375mm dia pipe** some 70m within the site boundary towards the north where it joins with the **new 450 dia SW pipe in The Ethel road link**. From here stormwater will flow into the **existing stormwater pipework** running **along Pitts Avenue-R55**.
- The **storage volume** of the **Tank** is **1134m³**, which amounts to approximately **365m³ per hectare**. Refer **6752AD-SW-04-A: Layout and Details of Attenuation Tank.**

- The attenuation tank is **sufficiently robust** to withstand a **1:50 year** mean return period storm flood.
- The **roofslab** of the tank will be constructed of **pre-cast hollowcore slabs** and will be designed for a **wheel loading of a fully loaded construction truck** and will be covered by **layerworks and paving** in the **final constructed state**.
- The **outer walls** will be constructed of **reinforced concrete filled cavity masonry retaining wall** type structures.
- There will be **no above ground drainage structures** built within the **Gautrans K71 and K56 road reserves**.

5.7 OUTLET STRUCTURES OF PONDS

- The **outlet structure** consists of two open topped chambers with outlet openings (orifices) at the bottom.
- The **smaller chamber** (1.0m x 1.0m) will control the outflow for storm events up to **1:5 year mean return period**.
- At recurrence intervals of greater than the 1:5 year mean return period, this chamber will become submerged and the outflow will be controlled by the outlet pipe of the **larger chamber** (1.5m x 1.5m). This chamber will overflow at recurrence intervals greater than **1:25 year mean return period.**

6 SUMMARY

The following is summarized from the body of this report.

1. The existing **Holdings 92 & 101 Crowthorne A/H, Gauteng** (agricultural holdings) are to be **consolidated and rezoned** to create one large township with **29 four storey Res 3 blocks** with a total of **290 residential units** all of which will form part of a single sectional title development. A permissible **coverage** of **50%; a maximum density** of **290 units** and a **maximum building height** of **4 storeys** is being applied for regarding this site.
2. The **alignment of the outlet pipes** is in accordance with the **Gautrans planning for Gautrans Road K71.02/P66-1** (Pitts Avenue-R55) and the **K56.**
3. The **terrain falls** at about **2.8%** in a roughly **north westerly direction. The developable area, excluding Gautrans servitudes is 3.110ha.**
4. The **increase in peak runoff** will be **significant** as the current site is largely undeveloped with an agricultural use.
5. **A single stormwater attenuation tank** is proposed to match what was approved for Crowthorne Ext 20 to which the site will be notarially tied. It will be a **covered tank** situated beneath the parking area located in the current Ethel Avenue road route. This part of Ethel Avenue is to be de-proclaimed and decommissioned. This tank is approximately **1,170m³** in volume. From here a new **375mmØ** pipe will exit at the **north east corner of the site** and will discharge the attenuated stormwater into the new Ethel link road stormwater pipework which in turn leads into the existing stormwater pipework along Pitts Avenue (Gautrans Road K71.02/P66-1).
6. **Permission from Gautrans will be required for the stormwater discharge.**
7. The **5 year reoccurrence storm outflow** of the development **will not exceed** the **5 year reoccurrence storm outflow** of the **pre-developed site** and the **25 year reoccurrence storm outflow** of the development **will not exceed** the **25 year reoccurrence storm outflow** of the **pre-developed site.**
8. The **attenuation tank** proposed is approximately 45m long, 12m wide, 2,1m deep with a **volume of 1134m³**, which amounts to **365 m³ per hectare.**
9. The system has also been analysed to ensure that it is **sufficiently robust** that the **1:50 year storm event** can be safely catered for.
10. There is **no upstream runoff entering the site** due to the attenuated flows from Crowthorne Ext 20 being effectively managed past the site and the watershed to the

south of Crowthorne Ext 20 negating any further ingress of stormwater from upstream sources onto the site.

7 CONCLUSION

1. **A single underground stormwater attenuation tank** will be provided.
2. The following **storage capacities** are provided for the developed site:

Area to be developed: 3.110 ha

	Attenuation Tank	**Storage m³**	**Res-Pipe flow**
o	1:2 year:	522	167.8 m³/ha
o	1:5 year:	742	238.6 m³/ha
o	1:25 year:	1077	346.3 m³/ha
o	**Total Capacity :**	1134	**364.6 m³/ha**

3. The total proposed attenuation capacity is **1134 m3** which translates to **364.6 m³/ha**

4. The following discharges will emanate from the developed site:

	Pre m3/s	Post m3/s
1:2 year:	0.095	**0.088**
1:5 year:	0.146	**0.107**
1:25 year:	0.306	**0.289**

5. The proposed stormwater design thus complies with the condition whereby the **discharge** from the developed site for a **1:2 year, 1:5 year and a 1:25 year storm does not exceed** the flow generated from a **1:2 year, 1:5 and 1:25 storm** respectively under the present pre-developed site conditions and hence will **satisfy JRA requirements.** Copies of the **attenuation results and hydrographs** are contained in **Annexure C** to this report.
6. The **alignment of the outlet pipes** is in accordance with the **Gautrans planning for Gautrans Road K71.02/P66-1** (Pitts Avenue-R55) and the **K56.**
7. There will be **no above ground drainage structures** built within the **Gautrans K71 and K56 road reserves**.

Provided the proposed attenuation structure (tank) and the new underground piped stormwater system are installed, the JRA attenuation requirements will be met and the site will safely be able to handle the 1:50 year storm event.

For further information please contact the authors of this report.

Report by: **Wisani Rihlampfu**
ND Civil

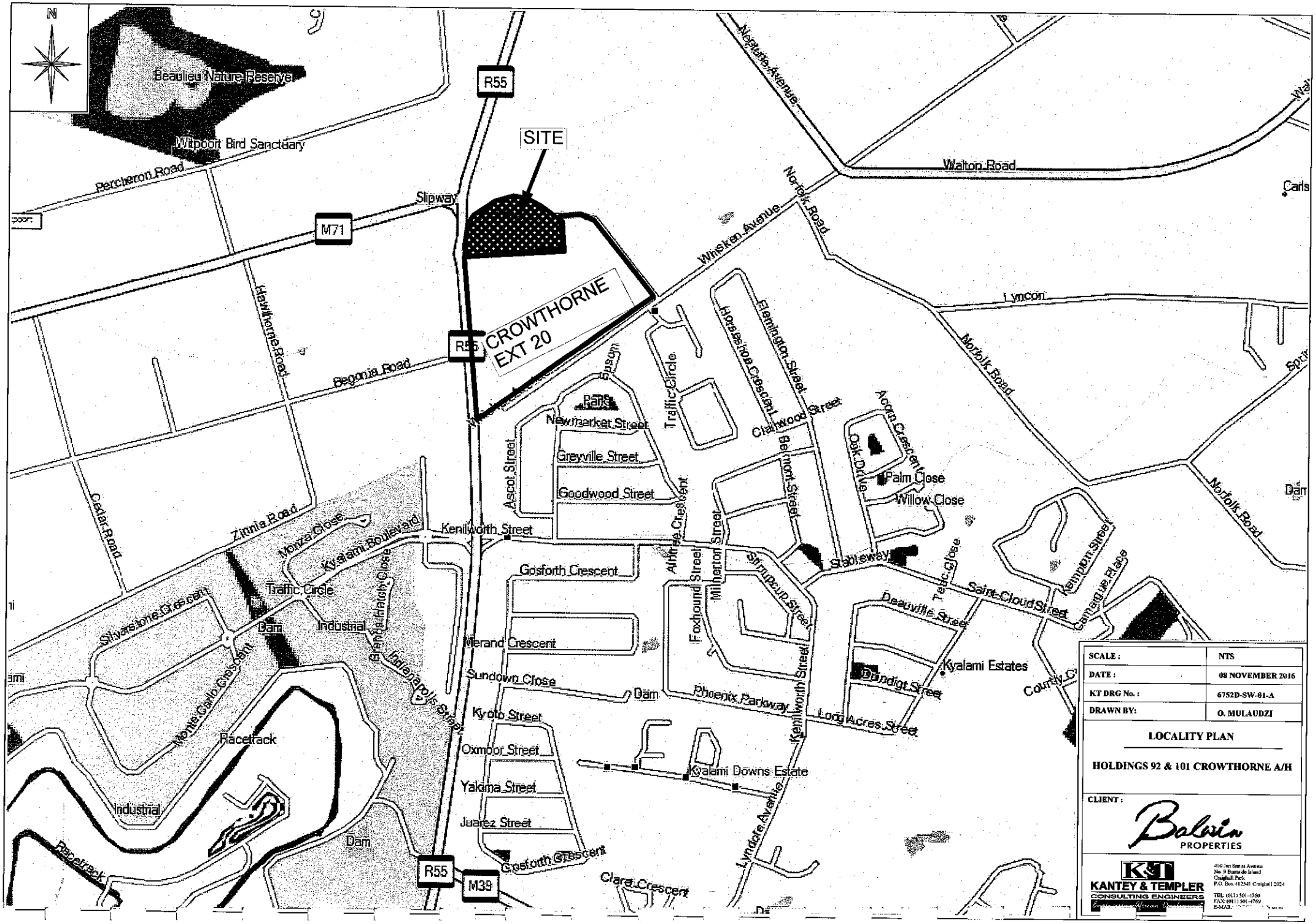
Reviewed by: **Francois Bain** Pr Eng
Pr.no. 980344

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
November 2016
Tel: (011) 501-4760
Fax: (011) 501-4769
Email: jhb@jhb.kanteys.co.za

ANNEXURE A

DRAWINGS

6752D-SW-01:	**LOCALITY PLAN**
6752D-SW-02:	**SITE SURROUNDS & SERVICES**
6752D-SW-03:	**SDP & STORMWATER LAYOUT**
6752D -SW-04	**LAYOUT AND DETAILS OF ATTENUATION TANK**



SCALE :	NTS
DATE :	08 NOVEMBER 2016
KT DRG No. :	6752D-SW-01-A
DRAWN BY:	O. MULAUDZI

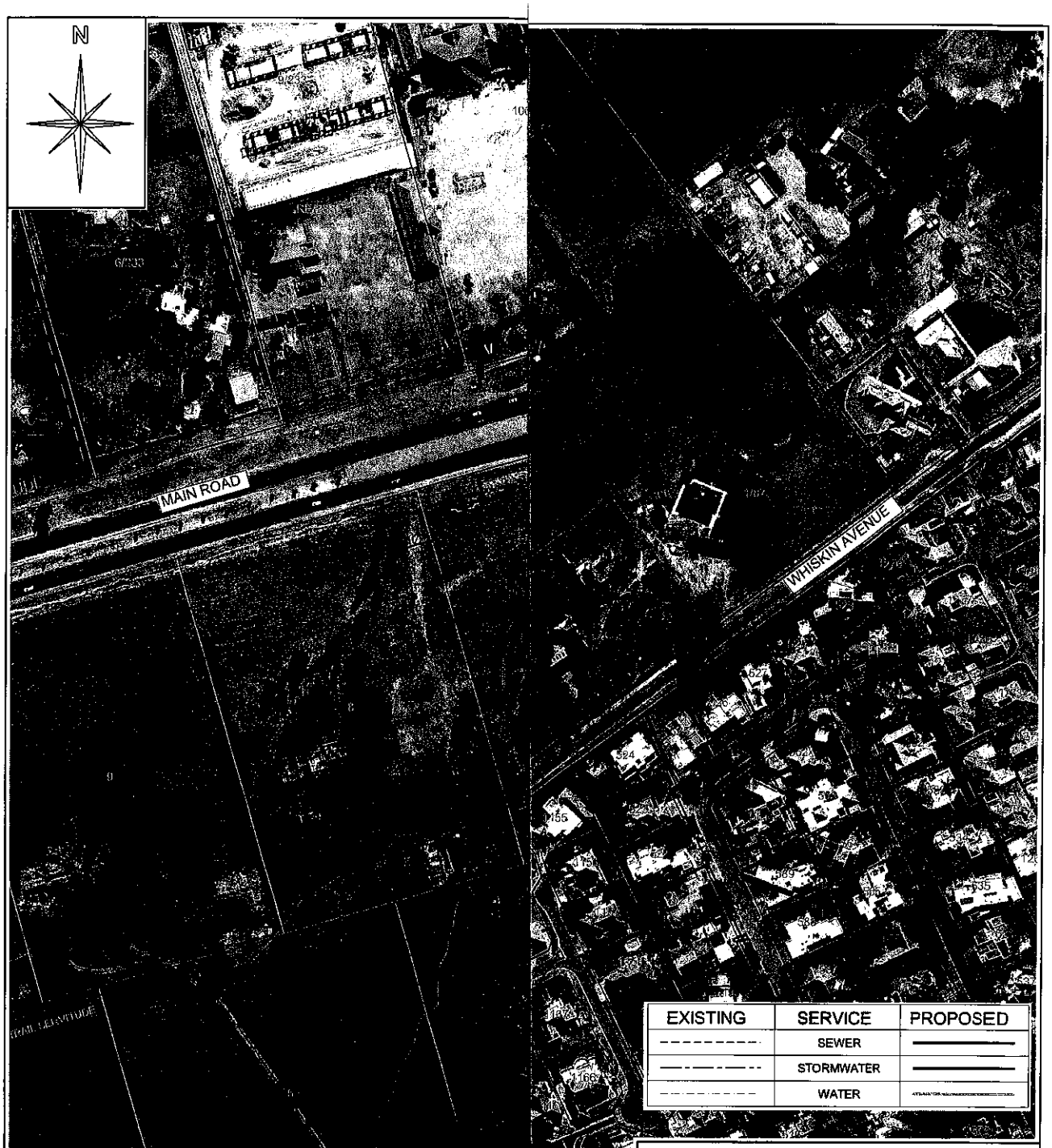
LOCALITY PLAN

HOLDINGS 92 & 101 CROWTHORNE A/H

CLIENT :

Balwin PROPERTIES

KANTEY & TEMPLER
CONSULTING ENGINEERS
410 Jan Smuts Avenue
No. 9 Barnside Island
Craighall Park
P.O. Box 412541 Craighall 2024
TEL: (011) 501-1760
FAX: (011) 501-1769
E-MAIL:



EXISTING	SERVICE	PROPOSED
- - - - - - - - - -	SEWER	———
——·——·——	STORMWATER	———
- - - - - - - - - -	WATER	———

SCALE :	**1:1500**
DATE :	**08 NOVEMBER 2016**
DATE OF PHOTOGRAPHY :	**OCTOBER 2015**
KT DRG No. :	**6752D - SW -02 - A**
DRAWN BY:	**O. MULAUDZI**

PROPOSED SITE & EXISTING SERVICES

HOLDINGS 92 & 101 CROWTHORNE A/H

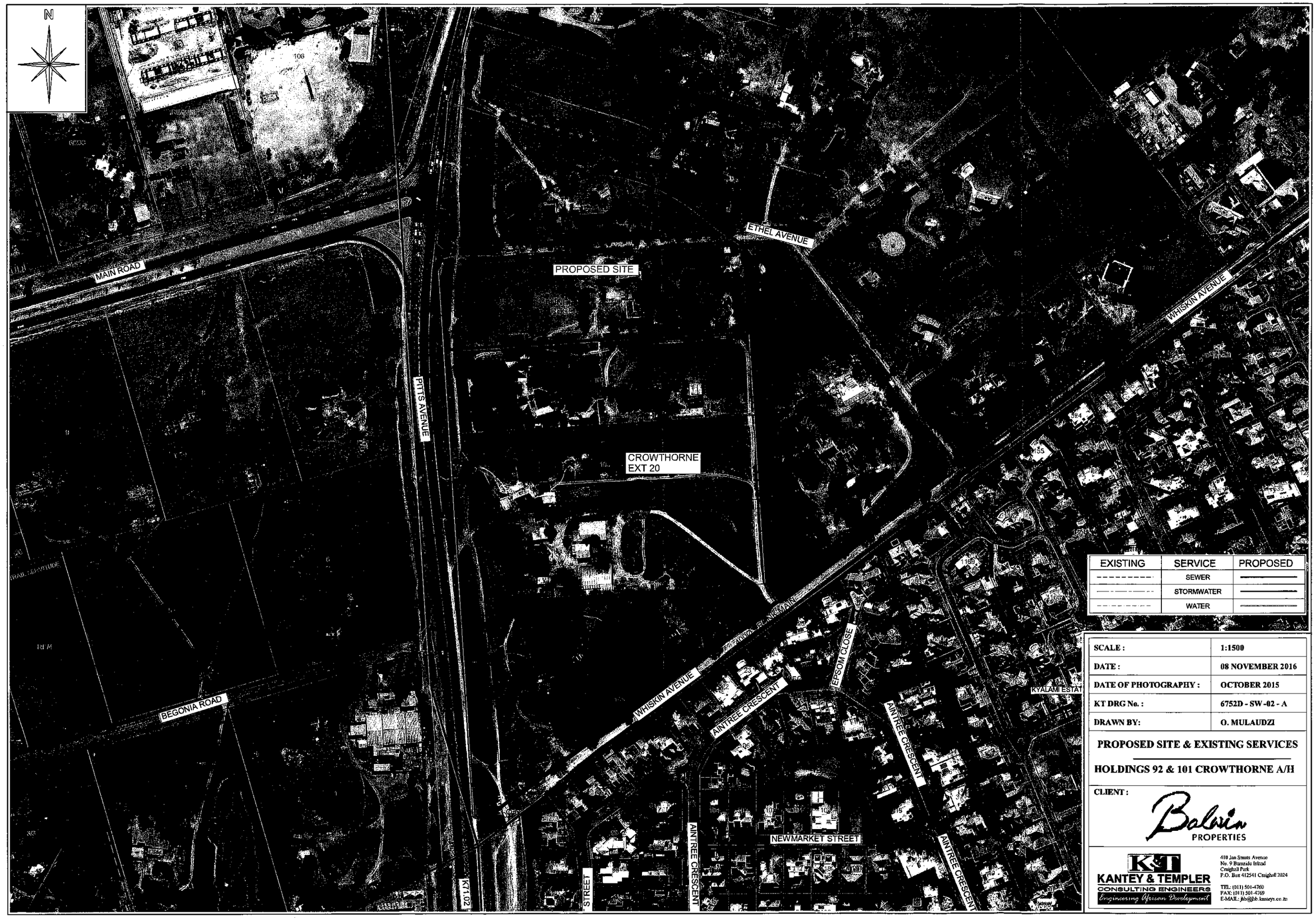
CLIENT :

Balwin PROPERTIES

K&T
KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

410 Jan Smuts Avenue
No. 9 Burnside Island
Craighall Park
P.O. Box 412541 Craighall 2024

TEL: (011) 501-4760
FAX: (011) 501-4769
E-MAIL: jhb@jhb.kanteys.co.za



EXISTING	SERVICE	PROPOSED
----------	SEWER	————
—·—·—·—·—	STORMWATER	————
- - - - - -	WATER	————

SCALE :	**1:1500**
DATE :	**08 NOVEMBER 2016**
DATE OF PHOTOGRAPHY :	**OCTOBER 2015**
KT DRG No. :	**6752D - SW -02 - A**
DRAWN BY:	**O. MULAUDZI**

PROPOSED SITE & EXISTING SERVICES

HOLDINGS 92 & 101 CROWTHORNE A/H

CLIENT :

Balwin PROPERTIES

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

410 Jan Smuts Avenue
No. 9 Barnacle Island
Craighall Park
P.O. Box 412541 Craighall 2024

TEL: (011) 501-4760
FAX: (011) 501-4769
E-MAIL: jhb@jhb.kmeys.co.za

PROPOSED RESIDENTIAL DEVELOPMENT: (HOLDINGS 92 & 102, CROWTHORNE A/H, GAUTENG)

FOR

Balwin PROPERTIES

Outline Scheme Report

Report no: 6752D – REV 0

November 2016

REPORT TO:

Balwin PROPERTIES

Block 1
Townsend Office Park
No.1 Townsend Avenue
Bedfordview

Private Bag X13 Bertsham 2013

Tel: (011) 450 2818
Fax: (086) 461 8848

REPORT BY:

K&T KANTEY & TEMPLER CONSULTING ENGINEERS
Engineering African Development

410 Jan Smuts Avenue
No.9 Burnside Island
Craighall Park

P.O.Box 412541, Craighall 2024
Tel: (011) 501 – 4760
Fax: (011) 501 – 4769
E-Mail: jhb@jhb.kanteys.co.za
Website: www.kanteys.co.za

PROPOSED RESIDENTIAL DEVELOPMENT: (HOLDINGS 92 & 102, CROWTHORNE A/H, GAUTENG)

FOR

BALWIN PROPERTIES

Outline Scheme Report

By:

W.N. RIHLAMPFU
ND (Civ.) Engineering

Reviewed by:

F. Bain (Pr. Eng.)
Pr. No. 890344

Report No.: 6752D – REV 0

NOVEMBER 2016

Balwin Properties
Block 1, Townsend Office Park
No.1 Townsend Avenue
Berdfordview
Germiston
2008

Tel: 011 450 2818
Fax: 086 461 8848
Email: michaell@balwin.co.za

Kantey & Templer (Pty) Ltd
P.O.Box 412541
Craighall
2024

Tel: (011) 501 – 4760
Fax: (011) 501 – 4769

E-Mail: jhb@jhb.kanteys.co.za
Website: www.kanteys.co.za

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

Client Name	Balwin Properties
Document Title	Proposed Residential Development situated on Holdings no 92 & 102 Crowthorne A/H
Document Reference	Crowthorne A/H Outline Scheme Report (Revision 0)
K&T Project Reference	6752D
File Name	6752D_OSR REV 0
Prepared by	W.N. Rihlampfu
Reviewed by	F. Bain (Pr. Eng. 980344)
Final Approval by	F. Bain (Pr. Eng. 980344)

Report Revision Record

Revision	Date	Description
0	November 2016	Issued to the relevant Authorities for approval.

This report has been prepared by Kantey & Templer (Pty) Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

For and on behalf of: **Kantey & Templer (Pty) Ltd**

Approved by: Mr. Francois B Bain

Signed: (Pr. Eng. 980344)

Position: Executive Associate

Date:

Table of Contents

List of Annexures

Annexure A - Drawings:

6752D-OSR-01-A – Locality Plan
6752D-OSR-02-A – Proposed Site & Existing Services
6752D-OSR-03-A – Proposed Site and Services Layout
6752D-OSR-04-A – Combined Services Layout

Annexure B - Capacity Calculation

- Potable Water Consumption Design calculations
- Sewer Design Flow calculations

Annexure C - Civil Service Costing

Annexure D - Bulk Outfall Sewer construction issue drawings and JW Approval letter dated 06 March 2015

Annexure E - TIA Approval letters JRA & Gautrans

- Gautrans Approval letter dated 2016-09-14
- JRA Approval letter dated 2016-07-14

Annexure F - Road upgrades - 6752-FIG 20-A

Annexure G - Crowthorne Ext 20 Water Connection – JW Approval Letter and Drawing

Annexure H - Outfall Sewer Connection Beneath Pitts Avenue Drawings

PROPOSED RESIDENTIAL DEVELOPMENT: (HOLDINGS 92 & 101, CROWTHORNE A/H)

1. Introduction & Background

Kantey & Templer Consulting Engineers (K&T) have been appointed by Balwin Properties Limited to compile an Outline Scheme Report in support of the rezoning and development of the above site. The report is for Civil Engineering aspects pertaining to the residential development to **Gauteng** be zoned *"Residential 3"*. **The total number of residential units is approximately 290.**

In this report, the impact of consolidation and rezoning the property will be assessed with regard to Potable Water, Sewage and Stormwater. Note that a Traffic Impact Assessment has been prepared by WSP and has been approved by both JRA and Gautrans, and that report already covers these additional 290 units. Refer to Annexure E: TIA Approval letters JRA & Gautrans (Gautrans Approval letter dated 2016-08-14 & JRA Approval letter dated 2016-10-6)

Balwin Properties Limited recently purchased Holding 92 Crowthorne A/H's and a portion of this property will be used to accommodate the first leg of the K56 to act as part of a link road joining the Gautrans Road K71.02/P66-1(Pitts Avenue) and Ethel Avenue. The developable area of Holding 92 Crowthorne A/H's is therefore reduced in order to accommodate this planned alignment of the K56 Gautrans road.

The contents of this report is based upon on the information obtained from Johannesburg Water (Water and Sanitation) and the Johannesburg Roads Agency (JRA), the City of Johannesburg's Development Planning Department, the City of Johannesburg's GIS system and Gautrans.

The Town planner for this application is Mr Mark Roux of Planworx and the Architect is DHK Architects.

1.1 Site Description and Locality

The proposed ***Res 3*** development is located on **Gauteng** and is hereinafter called "**the site**". The site is situated immediately south east of the intersection of Pitts Avenue-R55 (Gautrans Road K71.02/P66-1) and Kyalami Main Road (M71) and consists of Holding 101 Crowthorne A/H's and part of Holding 92 Crowthorne A/H's which remains after the road reserve for the portion of the K56 to be constructed as part of the TIA conditions related to Crowthorne Ext 20 has been removed.

The site is bounded by:

- **Pitts Avenue-R55 (Gautrans Road K71.02/P66-**1) to the west. Erven 5 to 10 of Kyalami A/H is situated on the opposite of Pitts Avenue, to the west thereof. They are currently zoned 'agricultural'. A shopping centre, "*The Kyalami Retail Centre*" is currently being constructed on these erven.
- **Crowthorne Ext 20** to the south east.
- **Ethel Avenue** runs through the site in an East-West direction, and is to be de-proclaimed and closed, and 3m servitude is to be kept for the outfall sewer which will run in the current road reserve of Ethel Avenue. Erven 91 & 93 consisting of undeveloped agricultural holdings are situated to the north and north east of the site.

The western boundary of the site is affected by the basic planning of future upgrades to Pitts Avenue (Gautrans Road K71.02/P66-1). The proposed alignment of this road has affected the configuration of the proposed buildings and the layout of civil services such as stormwater outlet pipes.

Access to the site for ingress and egress is via Whiskin Avenue, through the Crowthorne Ext 20. The site has an area totalling approximately **3.2 ha**. The terrain is relatively flat and falls in a north-

westerly direction with a gradient of approximately **2.8%** (1:36). The site is currently largely undeveloped. A number of houses with a few outbuildings are present and evenly distributed over the site. Some access roads to these residences exist. The vegetation consists of a mixture of veld grass and areas with scattered shrubs and trees.

1.2 Current Zoning and Land Use

The Erven making up the site are currently either unused or being utilised for agricultural purposes and were all previously zoned 'agricultural'. The proposed development zoning is **Res 3**, blocks are proposed at **4 storeys high** and a maximum of **290 units** are planned for the development. Site access will be provided through Crowthorne Ext 20 as per approved TIA as a shared access, as the site and the Crowthorne Ext 20 erven will ultimately be notarially tied.

2. Potable Water

2.1 Existing Water Infrastructure

According to GIS data from Johannesburg Water, there is a **90mm Ø municipal water** supply pipe and a **400mm Ø trunk main** running along Whiskin Avenue. The 90mm Ø line is currently supplying the neighbouring stands (agricultural holdings) in the greater Crowthrone A/H area. This line is supplied from a 110mm Ø main at a connection point some 570m to the east, at the junction of Whiskin Avenue and Walton Road and is fitted with a PRV at this point. We understand from the JW Midrand Region Office personnel that the PRV's in this area are generally set to a maximum of about 3 bar static pressure.

The **400mm Ø trunk main** is situated on the opposite side of Whiskin Avenue from Crowthorne Ext 20 (southern road reserve). A series of 110mm and 160mm Ø pipes are connected to it and supply water to the Kyalami Estates extensions to the south of Whiskin Avenue. One of the **160mm Ø pipes** is fitted with a **PRV** and is situated adjacent to the boundary between **Erven 524 and 525, Kyalami Estates Extension 14** – about 145 meters to the east of the south eastern corner of the site. It appears that the **160mm Ø supply pipe** between **Erven 23 and 24 Kyalami Estates** and then 110mm Ø supply pipe between Erven 1205 and 1153 Kyalami Estates **have not been fitted with PRV's**. These later two supply connections feeding Kyalami Estates are situated **opposite the southern boundary of the site**.

2.2 Domestic Consumption

For this residential development of 290 units the JW standard is 800 litres per unit of Res 3 building area per day, this results in an average daily demand is **2.69 L/s.** Applying a **peak factor of 4** the calculated peak demand is **10.74 L/s**. For Crowthorne Ext 20 this residential development of 1050 units the average daily demand was identified as **9.74 L/s and with a peak factor of 4** the calculated peak demand is **39.0 L/s**. The total average daily demand for both the site and Crowthorne Ext 20 is thus **12.43 L/s and with a peak factor of 4** the calculated peak demand is **49.74 L/s**.

When considering a 160mm Ø supply link, it is confirmed that this will have sufficient capacity for the combination of the site and Crowthorne Ext 20, as shown in the table below:

Nominal pipe size main pipe	160	Dia.
Wall thickness Class 16	9	mm
Internal diameter	0.142	Int Dia.
Cross sectional area	0.015836302	A m2
Max. Flow Velocity in pipe	**3.14**	m/s
Permissible maximum flow velocity	1.0 - 3.5	m/s

2.3 Fire flow

The fire installation will be compliant in terms of Johannesburg Water regulations and will include a combined 160 mm Ø council connection with a fire hydrant, a non-return valve and booster facility at the main entrance gate (within the Whiskin Road reserve) and will include fire hydrants at a maximum of 180m spacing internally all with a minimum hydrant **flow rate of 25 L/s** at a **minimum pressure of 15m (1.5 bar)** and a design **fire duration of 4 hours**.

A total of **two (2) fire hydrants** are required to adequately protect the proposed development. These fire hydrants are situated on the internal **110mm Ø & 75mm Ø pipes. Fire hose reels** will be required for the **4 storey walk up units**. The suitable positions of the reels will be clearly shown on the drawings to be submitted for approval by the architect.

It should be noted that a specialist fire consultant would address the fire plan in detail and will confirm these recommendations.

2.4 Proposed Water Connection and Layout

The existing **90mm Ø** water supply network feeding the Crowthorne A/H area is **insufficient** to cater for these requirements.

It is proposed to connect onto the proposed **160mm Ø water main** that will run through Crowthorne Ext 20 along the boulevard that will be constructed as part of the development of Crowthorne Ext 20 and create a ring main that will sufficiently supply the site. This 160mm Ø water main in turn feeds off the **160mm Ø supply pipe** between **Erven 23 and 24 Kyalami Estates** via a new 160m long water supply link which culminates near the proposed site entrance on Whiskin Avenue in the site connection to Crowthorne Ext 20. The site connection is fitted with a water meter and private PRV here and is at the highest point of the Crowthorne Ext 20 development. This water supply link was approved by JW (refer Annexure G) and has already been constructed although not yet commissioned, at the time of writing this report.

On site, internally, a combination of **110mm Ø and 75mm Ø pipes** forming a **network** is sufficient. Since there is 10m fall across the site and a 10m fall across Crowthrone ext 20, should the **PRV** be set to a **reduced pressure of 3 bar**, the **static pressure** should be about **5.0 bar** at the lowest point of the site, in the north east corner, which is within acceptable limits. Each new 4 storey residential block will then be provided with a **50mm connection**. The site and Crowthorne Ext 20 will have one **bulk water meter,** due to their Erven ultimately being **notarially tied**. We do not foresee any water pressure and supply flow problems related to this site. It is confirmed that detailed design drawings will be submitted to Johannesburg Water in order to obtain construction approval.

2.5 Flow and Pressure Data

Kantey & Templer (Pty) Ltd had previously approached the JW Midrand Region Office personnel to determine what water pressures exist in the various relevant reticulation infrastructures at the writing of the OSR for Crowthorne Ext 20.

The following was confirmed:

- The static pressure in the **400mm Ø** trunk main is **8 bar**
- The static pressure in the **160mm Ø** supply pipe between **Erven 23 and 24 Kyalami Estates** and in the **110mm Ø** supply pipe in the road reserve between **Erven 1205 and 1153 Kyalami Estates Ext 14** will also be **8 bar**.
- The **static pressure** in the **160mm Ø** supply pipe between **Erven 524 and 525 Kyalami Estates Ext 14** after the pressure reducing valve (PRV) is **3.6 bar.**
- The static pressure in the **90mm Ø supply pipe** to the **Crowthorne A/H** is approximately **3 bar.**

- **Crowthorne Ext 20** development has installed a **160m water supply link** with a **privately owned PRV** valve after the JHB Water meter to protect the internal reticulation from excessive pressures.

We do not foresee any flow rate and peak pressure problems due to the significant infrastructure that it is intended connecting to as well the suitable site topography. Currently we are thus of the opinion that adequate flow and pressure thus exists for this development.

2.6 Cost of Services

The construction cost for the new potable water layout for the proposed development is **provisionally estimated** as follows: -

WATER						
Item	**Unit**	**Quantity**	**Rate**		**Total**	
110 Ø uPVC Pipe	m	505	R	350.00	R	176 750.00
75 Ø uPVC Pipe	m	520	R	280.00	R	145 600.00
65mm Fire Hydrant	No	2	R	5 000.00	R	10,000.00
Valves	No	9	R	5 900.00	R	53,100.00
Total Costs Water					**R**	**385,450.00**
Total excavation	m^3	620				
Estimated rock excavation	m^3	31	R	750.00	*R*	*23,250.00*
Total Costs Water Incl. Estimated rock excavation					**R**	**408,700.00**

Construction Cost				R	408,700.00
P&G's 12 %				R	49,044.00
Total				R	457,744.00
Add Professional Fees				R	45,774.40
Total (Excl 14% VAT)				**R**	**503,518.40**

Note that detailed calculations are included in Appendix C of this report

3. Sewerage Drainage

3.1 Existing and Proposed Sewer Infrastructure

There is currently no formal sewer reticulation servicing the erven making up the site, which is situated slightly to the north of the local watershed, the highpoint of which is situated roughly along Whiskin Avenue in the vicinity of the site. The areas to the south of the watershed (Kyalami Estates and various Extensions) are serviced in terms of sewer. However, due to the topography at the site, sewerage from this site and Crowthorne Ext 20 is unable to be routed towards this reticulation. We understand from the Johannesburg Water regional office staff that, as a result, the erven making up the site are presently making use of septic tank type systems.

It was a condition of Johannesburg Water that before the proposed Kyalami Retail Centre project (Erven 5 to 10 of Kyalami A/H's) and the development of Crowthorne Ext 20 may precede, **a new outfall sewer**, to cater for the significant increase in waste water that would be generated by these developments, was to be constructed.

Presently the proposed outfall sewer ranging from **250mm Ø to 560mm Ø** is to run from the north west corner of Holding 101 Crowthorne A/H's in a roughly westerly direction to connect into the **existing 1200mm Ø Bruma Outfall Sewer**. The total length of this proposed outfall sewer link is

to be in excess of 5km's. This outfall sewer is currently being constructed and will be completed by March 2017.

In order to facilitate the sewer drainage from the site and Crowthorne Ext 20, this outfall sewer was constructed to extend beneath **Pitts Avenue-R55 (Gautrans Road K71.02/P66-1)** by means of **directional drilling**, terminating at the north western corner of Holding 101 Crowthorne A/H's. Since the connection manhole here will be quite deep, discharge from both Holdings 92 and 101 can be accommodated in the new outfall sewer. (Refer Annexure H: Outfall Sewer Connection Drawings)

Detail design drawings for this new outfall sewer have been prepared by ADA Consulting Engineers and have been assessed and approved by JHB Water Development Control. Refer Annexure D:

3.2 Design Discharge & Sewer Analysis

The Johannesburg Water Guidelines and Standards were used to determine sewer discharge rates and design parameters. Based on this, for a Res 3 development of 290 units the total **average daily discharge** from the site is anticipated to be approximately **2.35L/s**. With a general **peak factor** of **2.3** multiplied by the average daily discharge determines a **peak discharge** from the site as **5.41 L/s** (2.3 x 2.35L/s).

For the Res 3 development of 1050 units for Crowthorne Ext 20, the total **average daily discharge** from the entire site is anticipated to be approximately **8.52L/s** and with a **peak factor** of **2.3** the **peak discharge** from the Crowthorne Ext 20 is **19.65 L/s** (2.3 x 8.52L/s).

For the combination of the site and Crowthorne Ext 20, the total **average daily discharge** is anticipated to be approximately **10.87L/s** and with a **peak factor** of **2.3** the **peak discharge** from the site and Crowthorne Ext 20 is 25.06 **L/s.** The new outfall sewer has been designed to accommodate this flow.

In line with the JW Guidelines and Standards, the **minimum design flow velocity** for full-flow conditions of **0.7m/s** and **maximum velocity** of **3.0m/s** will be complied with.

3.3 Proposed Internal Sewer Connection and Network

It is proposed that sewerage generated on site will be reticulated in a network consisting of new **160mm Ø sewer pipework internally**, which was determined to be adequate for the design flows and site parameters. This sewer pipework will run parallel to the internal roads and connect into the new municipal sewer manhole on Holding 101 Crowthorne A/H's which forms the eastern-most terminating point of the new outfall sewer system previously discussed. There will be an additional **200/250mm Ø Outfall Sewer Pipe** that will be constructed from the municipal outfall sewer manhole on Holding 101 Crowthorne A/H's to service the sites east of the site. This will run in the current Ethel Avenue road reserve position. A 3m wide sewer servitude will be created in favour of JW to accommodate this.

The internal sewer network will be constructed using a 160 mm Ø uPVC pipe with a **minimum fall of 1:80** and a **minimum cover of 1000 mm** in all areas. The **minimum velocity of 0.7m/s** and a **maximum velocity of 3.0m/s** will not be exceeded, as per JW Guidelines and Standards requirements. Individual sewerage connections to residential units will be using 110mm Ø pipes.

3.4 Proposed External Link Sewer

Both Crowthorne Ext 20 and the site will drain to the new municipal manhole on Holding 101 Crowthorne A/H's to which connects to the new outfall sewer currently being constructed. New **160mm Ø and 200mm Ø sewer pipework** will be constructed as part of the project and will link with the new 250mm Ø section of the proposed outfall sewer, discussed previously. This link will

be constructed of uPVC pipe with a **minimum fall** of **1:200** and a **minimum cover** of **1400 mm beneath roads and paved areas** and **1000mm** below **other areas**, as per the JW Guidelines and Standards. This link sewer will include a road crossing under Pitts Avenue which is being done using directional drilling. It is acknowledged that Gautrans wayleaves will be required for this road crossing.

The pipe is sized to act as a **communal conduit**, able to accommodate future flows from prospective developments within the greater applicable catchment area.

For both internal and external sewer reticulation, to comply with good engineering principles and Johannesburg Water standards for sewer maintenance **manholes** will be constructed at all changes of **horizontal direction**, changes in **gradient** and at **junctions** as well as, in general, at a **maximum spacing** of **80 m** on **straight lengths**. It is confirmed that detailed design drawings will be submitted to JHB Water in order to obtain construction approval.

3.5 Cost of Services

The construction cost for the new Internal Sewer layout for the proposed development is **provisionally estimated** as follows: -

SEWER		**INTERNAL**				
Item	**Unit**	**Quantity**		**Rate**		**Total**
160 Ø uPVC Pipe	m	640	R	290.00	R	185,600.00
Manholes	No	16	R	6 500.00	R	104,000.00
Protect & Relocate services	Sum	1	R	5 000.00	R	5,000.00
Total Costs Sewer					**R**	**294,600.00**
Total excavation	m^3	400				
Estimated rock excavation	m^3	20	R	750.00	*R*	*15,000.00*
Total Costs Sewer Incl. Estimated rock excavation					**R**	**309,600.00**

Construction Cost				R	309,600.00
P&G's 12 %				R	37,152.00
Total				R	346,752.00
Add Professional Fees				R	34,675.20
Total (Excl 14% VAT)				**R**	**381,427.20**

The construction cost for the new External outfall Sewer layout for the proposed development is **provisionally estimated** as follows: -

SEWER		**EXTERNAL**				
Item	**Unit**	**Quantity**		**Rate**		**Total**
250 Ø uPVC Pipe	m	320	R	400.00	R	128,000.00
Manholes	No	7	R	7 500.00	R	52,000.00
Protect & Relocate services	Sum	1	R	5 000.00	R	15,000.00
Total Costs Sewer					**R**	**195,500.00**
Total excavation	m^3	410				
Estimated rock excavation	m^3	20.5	R	750.00	*R*	*15,375.00*
Total Costs Sewer Incl. Estimated rock excavation					**R**	**210,875.00**

Note that detailed calculations are included in Appendix C of this report

4. Stormwater Drainage

4.1 Existing Stormwater Network

There is limited formalized stormwater management in the area. The stormwater currently flows as surface sheet flow over the area as per the current fall towards the north.

4.2 Internal Stormwater Management

Currently the stormwater runoff is discharged as **sheet flow** over the grasslands of the site, internally and onto the **road reserve of Pitts Avenue-R55 (Gautrans Road K71.02/P66-1) and Ethel Avenue.**

4.3 External Stormwater Management

An **embankment** and **"V"-shaped earth channel** has been shaped along the western boundary of the site between the site and **Pitts Avenue-R55** (Gautrans Road K71.02/P66-1). Runoff is diverted along this towards two stone pitched lined channels which divert the stormwater into a **concrete lined "V"-shaped road edge channel** running along Pitts Avenue and falling in a northerly direction. Runoff is captured in catchpits along this road length and it ultimately discharges in the **riverine area** about **450m** to the **north** of the site.
There is **no formal stormwater drainage infrastructure** along **Ethel Avenue**.

4.4 Upstream Stormwater Flows

The **boundary on the high side** of the site is formed by **Crowthorne Ext 20**. Crowthorne Ext 20 in turn is bounded by a **watershed** on its southern boundary. **Stormwater** from **Crowthorne Ext 20** is to be captured on the site and **attenuated on site** before being discharged in the proposed formalised stormwater pipework that is planned to run in the road reserve of the Ethel link road and then crossing beneath the Gautrans Road K71.02/P66-1 and ultimately discharging into the piped stormwater system along Pitts Avenue and ultimately discharging into the **riverine area** about **450m** to the **north** of the site. For this reason there is **no notable upstream ingress** of stormwater onto the site.

4.5 Proposed Site Stormwater Management

Internally the stormwater will be managed using a combination of **shaped roads** to act as **drainage channels** and **piped stormwater reticulation**.
It is proposed that **a new attenuation tank** be constructed on the site to reduce the flood flows to acceptable levels and not to exceed pre-development discharge rates. The **attenuation tank** will be situated **below the parking** that is to be situated where the **east-west portion** of the **current Ethel Road** reserve is situated, which will be **de-proclaimed and decommissioned.**

4.6 Proposed Minor System

The run-off generated by the **paved areas** and **roofs** will run onto the **internal roads** and parking areas and captured by **kerb and grid inlets** and conveyed to the **attenuation tank** by a **stormwater pipe network**. It will be designed to accommodate the runoff generated by storm events with a **recurrence interval** of up to **5 years**. For storm events with a recurrence of more than **5 years up to 1:25 years**, the excess discharge not able to be accommodated by the piped system will be **channelled in the roadways** towards the attenuation facility provided.

The **velocities** in the pipes will range from a **minimum of 0.7m/s** to a **maximum of 4.0m/s**.

4.7 Proposed Major System

In the event of an unusually large storm the attenuation tank, outlet structure, roads and parking will be sufficiently rigid to be able to **withstand a 50 year recurrence storm**. The internal roads fall towards the attenuation facility and this will include inlets in their roofs to allow for ingress of major storm runoff. **Weepholes** will be provided in the **boundary walls** at the lower parts of the site.

4.8 Proposed Stormwater Attenuation

In terms of the JRA stormwater management plan it was determined that attenuation for peak storm discharges is required on this site due to the development. The stormwater runoff from the site **post development** for the **1:5 and 1:25 year recurrence period** will **not exceed** the **pre-development 1:5 year** and **1:25 year recurrence period** storms, respectively. Furthermore the attenuation facilities are of an adequate size and sufficiently **robust to accommodate a 1:50 year storm flow**.

Attenuation of the stormwater peak-flow generated by the development will be provided by **an attenuation tank.**

Attenuation Tank: The attenuation tank is a covered tank, situated beneath the parking area. From here a new **375mmØ** outlet pipe will be included which will exit at the north east corner of the site and will **discharge** into the proposed new piped stormwater system to be constructed along the Ethel link road. **Attenuated stormwater** will **ultimately flow** into the existing stormwater pipework running along the Gautrans Road K71.02/P66-1 and from there into the **riverine area** about **450m** to the **north** of the site.

The **total attenuation** volume is thus **1,170 m³.** This amounts to a storage volume of **365m³ per hectare** of development.

Consequently, downstream stormwater infrastructure needs not be upgraded as there will not be an increase in stormwater runoff from the development.

This stormwater management and attenuation requirements will be further advanced and ratified in the stormwater management study and report process.

4.9 Cost of Services

The construction cost for the new potable water layout for the proposed development is **provisionally estimated** as follows: -

STORMWATER (initial design)				
Item	**Unit**	**Quantity**	**Rate**	**Total**
300mmØ Stormwater Pipe	m	490	R 400.00	196,000.00
375mmØ Stormwater Pipe	m	195	R 500.00	97,500.00
Manholes	No	6	R 6 000.00	36,000.00
2m Grid Inlet	No	12	R 5 000.00	60,000.00
Total Costs Stormwater				**389,500.00**
Total excavation	m³	460		
Estimated rock excavation	m³	46	R 750.00	*34,500.00*
Total Costs Stormwater Incl. Estimated rock excavation				**424,000.00**
STORMWATER ATTENUATION (initial design)				
Attenuation tank	m³	1170	R 1 200.00	1,404,000.00

Total Costs Stormwater attenuation				**1,404,000.00**
Total excavation	m^3	1200		
Estimated rock excavation	m^3	240.00	R 750.00	*180,000.00*
Total Costs Attenuation Incl. Estimated rock excavation				**1,584,000.00**

Construction Cost				2,008,000.00
P&G's 12 %				240,960.00
Total				2,248,960.00
Add Professional Fees				224,896.00
Total (Excl. 14% VAT)				**2,473,856.00**

Note that detailed calculations are included in Appendix C of this report

5. Roads

5.1 Construction Cost

ROADWORKS (internal to site)					
Item	**Unit**	**Quantity**	**Rate**	**Total**	
Internal roadways and paving	m^2	14460	R550.00	R	7,953,00.00
Protect & Relocate services	No	1	R300,000.00	R	300,000.00
Total Costs Roadwork's (Excl. 14% Vat)				**R**	**8,253,000.00**

6. Cost Summary

6.1 Construction Cost

The construction cost for the internal civil services for the proposed development is **provisionally estimated** as follows: -

Item	**Amount**
Potable water	R 408 700.00
Sewer	R 309 600.00
Storm water	R 2 008 000.00
Internal Roadworks	R 8 253 000.00
Total(Excl. VAT)	**R 10 979 300.00**

The construction cost for the external roadworks for Crowthorne Ext 20 & Holdings 92 &101 Crowthorne A/H is **provisionally estimated** as follows: -

Item	**Amount**
External Roadworks	R 31 782 722.50
Total(Excl. VAT)	**R 31 782 722.50**

The following items are excluded for these cost estimates: -

a) Professional Fees including survey, detailed design, project management, contract administration, legal etc. (Allow 15%)
b) Demolishing and removing of buildings and structures.
c) External roadworks as per the TIA.
d) Minimal allowance has been made for rock.
e) Individual water meters and council deposits.
f) Cost of registration of servitudes.
g) Cost for Electrical and Telkom supply.
h) Any contingency items.
i) Prices exclude VAT and escalation.

j) Internal services for buildings.

6.2 Bulk Services Contributions

These figures for Residential and Business development are based on the City of Johannesburg March 2016 formulae and exclude rebates for bulk contributions paid for existing rights and are calculated on the proposed rights of **290 Units Residential development**. **(Note that no rebates for existing rights over and above the existing rights have been considered).**

These bulk contribution figures are revised from time to time with new contribution figures applicable wef 1 July 2015.

Note that the City of Johannesburg Technical Co-ordination Department will prepare the final calculations.

Potable Water (Excl. VAT)

Res3: 290 units @ 0.8kl/day = 224kl/day

Total = 224kl/day @ R4,824.00/kl/day **R 1 080 752.00**

Sewage (Excl. VAT)

Res3: 290 units @ 0.68kl/day = 197.2kl/day

Total = 197.2kl @ R8,584.00/kl/day **R 1 692 764.80**

Roads and Storm water (No VAT applicable) (Holdings 92 & 101 Crowthorne A/H only)

218 trips generated @ **R10 000.00** per trip generated. **R 2 180 000.00**

Total Bulk Contributions (Excl. VAT)	**R 4 953 516.80**

It is the intention of the developer to enter into negotiations with the JHB Roads Agency and to sign an Engineering Services Agreement (ESA) to facilitate the offset of bulk contributions against the cost of the required new roads & stormwater that have been identified. In terms of the ESA, the provision of various infrastructure items may be classified as external infrastructure in that they resolve and address existing capacity problems and may therefore be offset against the applicable bulk contributions.

7. Summary and Conclusion

The following is summarized from the body of this report.

1. The site is situated immediately south east of the intersection of Pitts Avenue-R55 (Gautrans Road K71.02/P66-1) and Kyalami Main Road (M71).

2. The site consists of Holding 101 Crowthorne A/H's and part of Holding 92 Crowthorne A/H's which remains after the road reserve for the portion of the K56 to be constructed as part of the TIA conditions related to Crowthorne Ext 20 has been removed. The site has an area totalling approximately **3.2 ha**. The terrain is relatively flat and falls in a north-westerly direction with a gradient of approximately **2.8%** (1:36). The site is currently largely undeveloped and is currently either unused or being utilised for agricultural purposes and the holdings were all previously zoned 'agricultural'. A number of houses with a few outbuildings are present and evenly distributed.

3. The existing agricultural holdings are to be consolidated and rezoned to create one large township with 29 four storey Res 3 blocks with a total of 290 residential units, all of which will

form part of a single sectional title development. The development will be named Holdings 92 &101 Crowthorne A/H and will be notarially tied to the Erven of Crowthorne Ext 20. The western boundary of the site is affected by the basic planning of Pitts Avenue which is the Gautrans Road K71.02/P66-1 which affects the configuration of the proposed buildings and the layout of civil services such as stormwater outlet pipes.

4. This report addresses the requirements for this development for Potable Water, Sewerage and briefly describes Stormwater Management and Attenuation. A separate comprehensive stormwater management report will be generated and submitted for approval.

5. A full Traffic Impact Assessment Report (TIA) has been separately submitted by WSP and has been approved by both Gautrans and the JRA. The report deals with site access requirements and traffic implications of both the site and Crowthorne Ext 20.

6. This report details the external sewer, potable water and stormwater links to connect into the municipal services. It is confirmed that all internal services will be privately owned and maintained by the body corporate that will be formed for this sectional title development.

7. In terms of potable water supply, it is the intention to **connect to the 160mm Ø supply main** which will be constructed through **Crowthorne Ext 20** as part of that development, which in turn feeds off the newly completed **160mm Ø water supply link connection** which feeds off the off the existing **400mm Ø municipal trunk main** adjacent to Erven 23 and 24 Kyalami Estates. This will **adequately supply** the peak demand of 10.74 L/s for the site and 39.0 L/s for Crowthorne Ext 20 and **49.74L/s for the combination of the site and Crowthorne Ext 20**. A **private PVR** has been included at the **entrance to Crowthorne Ext 20** which will regulate the water pressure in the site to a maximum standing pressure of **5.0 bar**. A **single water meter** will service both Crowthorne Ext 20 & the Holding 92 & 101 as the Erven making up these properties will ultimately be notarially tied.

8. A **combined system** will be used for **fire and potable water supply** to the site. A series of external fire hydrants and a privately owned internal reticulation is proposed internal to this site.

9. In terms of sewerage, the area of the site is **currently poorly developed** and there is no existing infrastructure on site. As part of the conditions imposed upon Crowthorne Ext 20 and the adjacent Kyalami Retail centre on (Erven 5 to 10 Kyalami A/H's), an approximately **5km long new outfall sewer**, linking the sites in the area with the **existing 1200mm Ø Bruma Outfall Sewer** is **currently under construction**. The proposed outfall sewer is to be transferred to Johannesburg Water once completed and commissioned. This new outfall sewer is programmed to be **completed and commissioned by March 2017.** The design consultant for this sewer is ADA Consulting Engineers and detail design drawings have been submitted to JHB Water and have been approved.

10. The **peak sewerage discharge** calculated is **5.41 L/s** for **the site** and **19.65 L/s** for **Crowthorne Ext 20** and **25.06 L/s** for the combination of **the site and Crowthorne Ext 20**. The new outfall sewer has sufficient capacity to accommodate this sewerage volume. The internal privately owned sewer network will consist of 160mm Ø pipes.

11. The area of the proposed site is fairly **poorly developed** as far as the **existing stormwater infrastructure** is concerned. It is the intention to manage stormwater on site as per **JRA stormwater attenuation requirements**. The 5 year recurrence storm runoff will be accommodated in a piped stormwater system and the 25 year recurrence floods will be accommodated by channelling flows in roadways. Stormwater will be diverted to an **attenuation tank facility** with a volume of **1,170m³** which amounts to **365m³ per hectare** of development. This will discharge from the site in such a manner that the **5 year and 25 year**

recurrence period post-development discharges **do not exceed** the **5 year and 25 year recurrence period pre-development** discharges respectively.

12. The **attenuated stormwater** will be discharged into the **new stormwater pipework** to be constructed as part of the **Ethel-link road**, which in turn will discharge will then flow into the **existing stormwater pipework** running along the **Gautrans Road K71.02/P66-1** (Pitts Avenue) and from there into the **riverine area** about **450m** to the **north** of the site. The stormwater attenuation infrastructure will be sufficiently robust to withstand a 50 year recurrence period flood.

13. A **combined services plan** has been developed and is included as part of **Annexure A** to this document.

14. The **site access point** for ingress and egress is via **Whiskin Avenue**. No direct access will be gained from Pitts Avenue, either during construction or post development as this road is subject to a **Gautrans line of no access restriction**.

15. The developer herewith applies for p[permission to offset water and sewer bulk services contribution s against their portion of the new bulk services construction cost.

Provided the above infrastructure is constructed, this development and rezoning should be supported by the local authority, as there will be sufficient capacity in the existing and/or proposed municipal infrastructure.

For further information please contact the authors of this report.

Prepared by W N Rihlampfu
ND (Civ) Engineering

Reviewed by F Bain (Pr Eng)
Pr. No. 890344

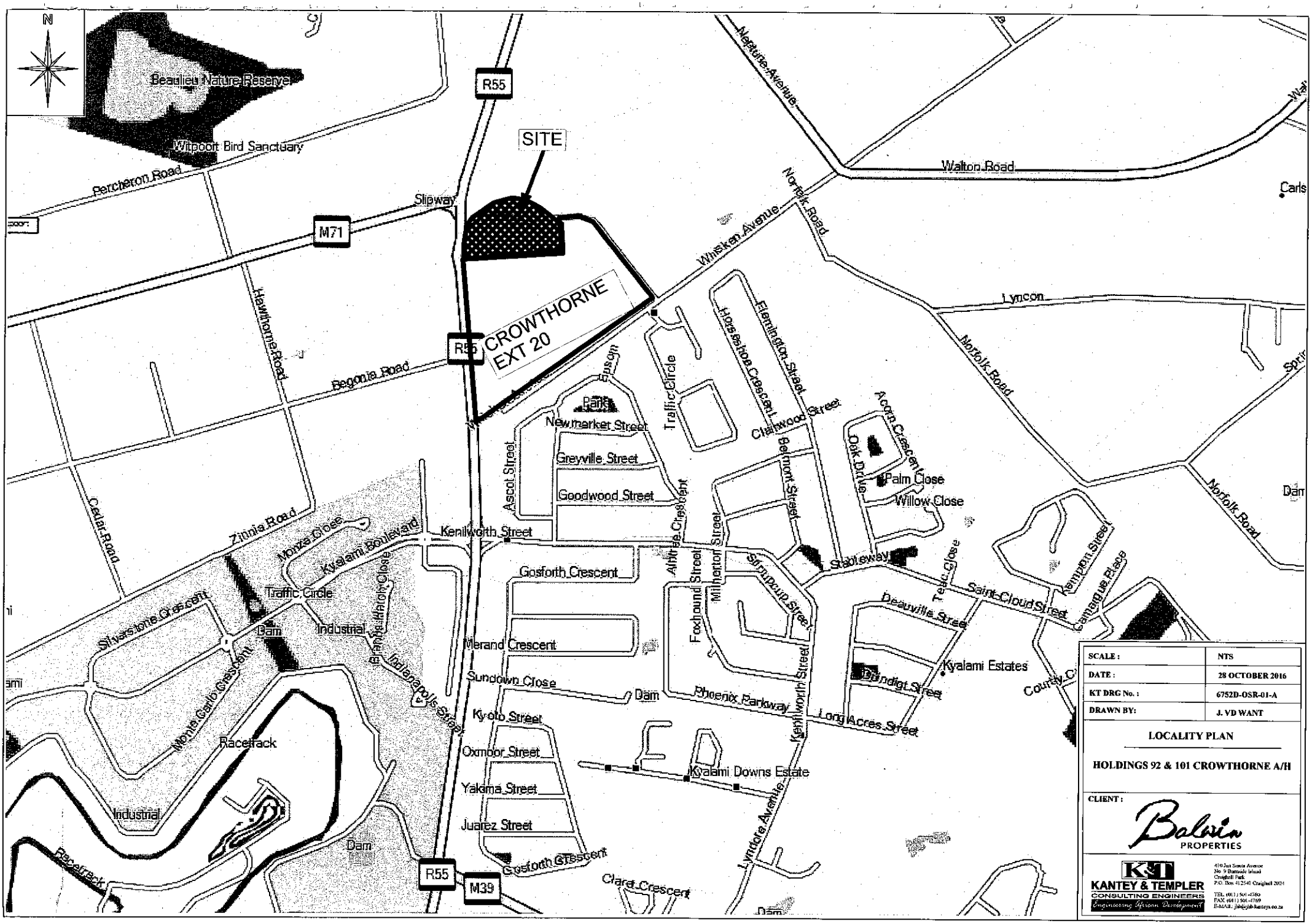
K&T
KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

November 2016
Tel: (011) 501-4760
Fax: (011) 501-4769
Email: jhb@jhb.kanteys.co.za

ANNEXURE A

DRAWINGS

6752D-OSR-01-A: LOCALITY PLAN
6752D-OSR-02-A: SITE SURROUNDS & EXISTING SERVICES
6752D-OSR-03-A: PROPOSED SITE & SERVICES LAYOUT
6752D-OSR-04-A: COMBINED SERVICES LAYOUT



SCALE :	NTS
DATE :	28 OCTOBER 2016
KT DRG No. :	6752D-OSR-01-A
DRAWN BY:	J. VD WANT

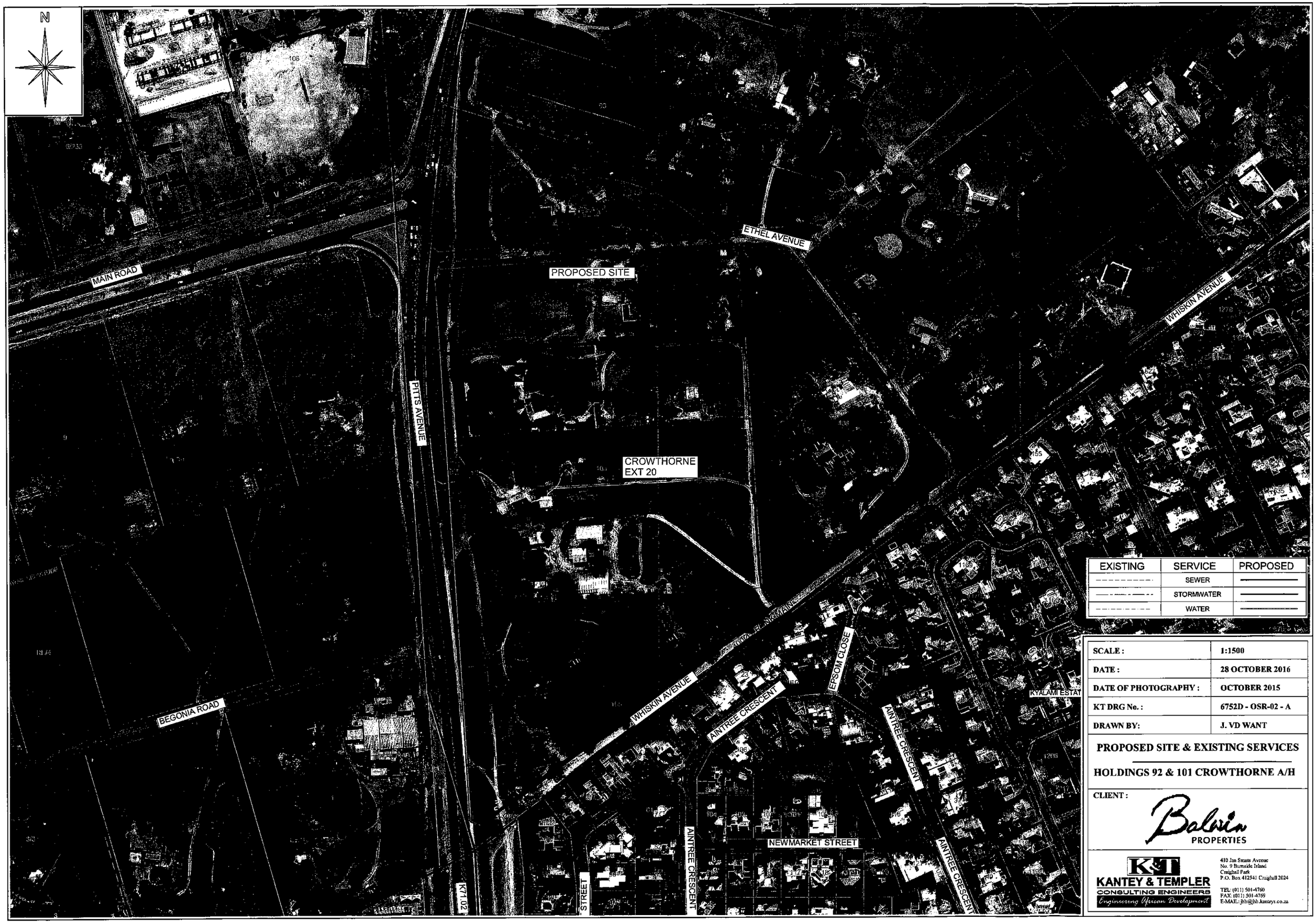
LOCALITY PLAN

HOLDINGS 92 & 101 CROWTHORNE A/H

CLIENT :

Balwin PROPERTIES

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
416 Jan Smuts Avenue
No. 9 Barnside Island
Craighall Park
P.O. Box 412541 Craighall 2024
TEL: (011) 501-4760
FAX: (011) 501-4769
E-MAIL: jhb@jhb.kantey.co.za



EXISTING	SERVICE	PROPOSED
- - - - - - - - - -	SEWER	————
——— · ——— · — —	STORMWATER	————
- - - - - - - - - -	WATER	————

SCALE :	**1:1500**
DATE :	**28 OCTOBER 2016**
DATE OF PHOTOGRAPHY :	**OCTOBER 2015**
KT DRG No. :	**6752D - OSR-02 - A**
DRAWN BY:	**J. VD WANT**

PROPOSED SITE & EXISTING SERVICES

HOLDINGS 92 & 101 CROWTHORNE A/H

CLIENT : Balwin PROPERTIES

K&T KANTEY & TEMPLER CONSULTING ENGINEERS
Engineering African Development

410 Jan Smuts Avenue
No. 9 Burnside Island
Craighall Park
P.O. Box 412541 Craighall 2024

TEL: (011) 501-4760
FAX: (011) 501-4769
E-MAIL: jvb@jhb.kanteys.co.za

SUMMARY OF ATTENUATION RESULTS AND HYDROGRAPHS

HydroCube HQ3.005 Ser:3859638918 Owner:Kantley & Templer Consulting Engineers
Project: Crowthorne Ext.20
StormShape: Triangular M.A.P: 750

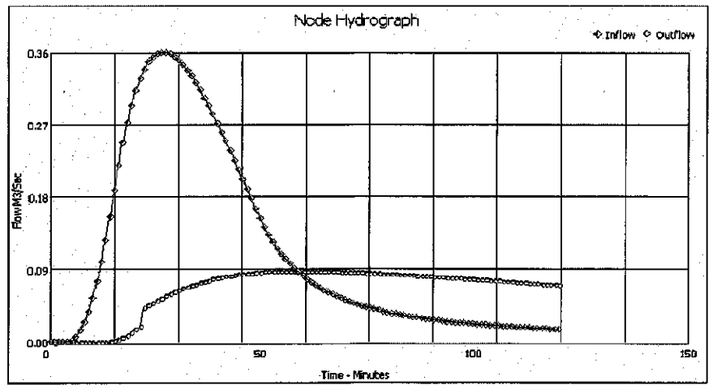
PRE-DEVELOPMENT STAGE					
Node Id	**R.I**	**Dur**	**Q m3/s**	**A ha**	**Q /ha**
KATPRE	2		0.095	3.110	0.031
KATPRE	5		**0.146**	3.110	0.047
KATPRE	25	21	0.306	3.110	0.098

SITE PARAMETERS			
Catchment Area		3.110	ha
Average catchment slope		2.8	%
% impervious area - pre-development		2	%
% impervious area - post development		80	%
Overland Manning factor - impervious		0.020	
Overland Manning factor - pervious		0.350	
Critical Storm duration		Pre: 32, Post: 50	min

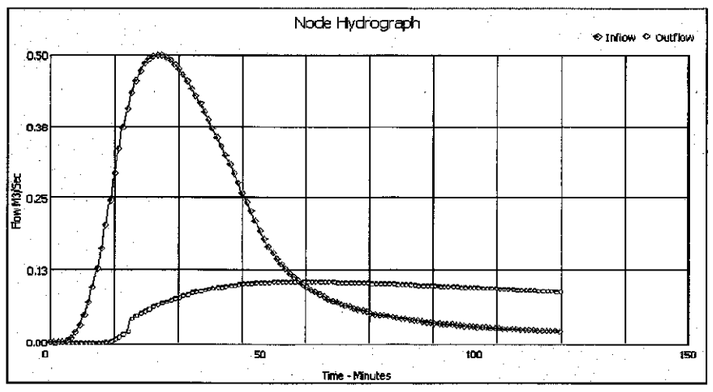
POST DEVELOPMENT STAGE										
							Res-Pipe	Res-Spillway		
Node Id	**R.I**	**Dur**	**Pk-Inlet**	**Pk-Outlet**	**FlwDpth**	**Storage**	**Flow**	**Size**	**Flow**	**Height**
RES1	2	50	0.359	0.088	0.830	522.0	0.088	1/200Ø	-	1.30
						167.8	*m3/ha*			
RES1	5	50	0.501	**0.107**	1.270	742.0	0.107	1/200Ø	-	1.30
						238.6	*m3/ha*			
RES1	25	50	0.883	0.289	1.840	1077.0	0.289	1/300Ø	-	1.85
						346.3	*m3/ha*			

ATTENUATION TANK				
L	45.0	m		
W	12.000	m		
D	2.100	m		
V	**1134.0**	m3	***364.6***	*m3/ha*

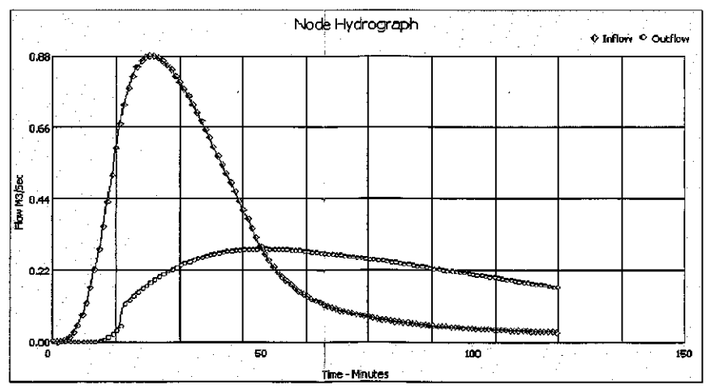
Td	Pk-Outlet	V (m3)
45	0.260	1111
50	**0.264**	**1125**
55	0.264	1125



HYDROGRAPH RESB 1:2Y



HYDROGRAPH RESB 1:5Y



HYDROGRAPH RESB 1:25Y

ANNEXURE B

CAPACITY CALCULATIONS

- **POTABLE WATER CONSUMPTION DESIGN CALCULATION**
- **SEWER DESIGN FLOW CALCULATION**

6752D REZONING OF NEW DEVELOPMENT ON HOLDINGS 92 101 CROWTHORNE A/H
IMPACT ON WATER SERVICES

6752D The Whisken, Holdings 92 & 101 Crowthorne A/H Pre-Development Water Demand			
Area	12.827	ha	
Total	**5**	Units	SDP
Typical demand	2500	l/du/d	JW
Total floor area	N/A	m2	SDP
Total floor area/500/m2	N/A	m2/100	
Total average demand units	12500	l/d	
	520.8333333	l/h	
	0.14	l/s	
Clubhouse ave persons per day	0	No	
Gatehouse ave persons per day =	0	No	
ave persons per day	0	No	
Typical demand	70	l/person/day	JW
Total average demand clubhouse & guardhouse	0	l/d	
	0.00	l/h	
	0.00	l/s	
JW Peak factor	4		
Total average peak demand	**0.58**	l/s	
	0.00058	m3/s	
Nominal pipe size main pipe	90	Dia.	
Wall thickness Class 16	8	mm	
Internal diameter	0.074	Int Dia.	
Cross sectional area	0.004300714	A m2	
Max. Flow Velocity in pipe	**0.135**	m/s	
Permissable maximum flow velocity	1.0 - 3.5	m/s	

6752D The Whisken, Holdings 92 & 101 Crowthorne A/H Post Development Water Demand			
Area	3.2	ha	
Total	**290**	Units	SDP
Typical demand	800	l/u/d	JW
Total floor area	N/A	m2	SDP
Total floor area/500/m2	N/A	m2/500	
Total average demand units	232000	l/d	
	9666.666667	l/h	
	2.69	l/s	
Clubhouse ave persons per day		No	
Gatehouse ave persons per day =		No	
ave persons per day		No	
Typical demand		l/person/day	JW
Total average demand clubhouse & guardhouse		l/d	
		l/h	
		l/s	
JW Peak factor	4		
Total average peak demand	**10.74**	l/s	
	0.011	m3/s	
Nominal pipe size main pipe	160	Dia.	
Wall thickness Class 16	9	mm	
Internal diameter	0.142	Int Dia.	
Cross sectional area	0.015836302	A m2	
Max. Flow Velocity in pipe	**0.68**	m/s	
Permissable maximum flow velocity	1.0 - 3.5	m/s	ok

6752D REZONING OF NEW DEVELOPMENT ON HOLDINGS 92 101 CROWTHRONE A/H
IMPACT ON SEWER SERVICES

6752D The Whisken, Holdings 92 & 101 Crowthorne A/H Pre-Development Sewer Demand			
Total	*N/A	Units	SDP
Typical demand	*N/A	l/u/d	JW
Total floor area	*N/A	m2	SDP
Total floor area/500/m2	*N/A	m2/100	
Total average demand units	*N/A	l/d	
	*N/A	l/h	
	*N/A	l/s	
Clubhouse ave persons per day	*N/A	No	
Gatehouse ave persons per day =	*N/A	No	
ave persons per day	*N/A	No	
Typical demand	*N/A	l/person/day	JW
Total average demand clubhouse & guardhouse	*N/A	l/d	
	*N/A	l/h	
	*N/A	l/s	
JW Peak factor	*N/A		JW
Total average peak demand	*N/A	l/s	
	*N/A	m3/s	

6752D The Whisken, Holdings 92 & 101 Crowthorne A/H Post Development Sewer Demand			
Total	**1050**	Units	SDP
Typical demand	700	l/u/d	JW
Total floor area	N/A	m2	SDP
Total floor area/500/m2	N/A	m2/500	
Total average demand units	735000	l/d	
	30625.0	l/h	
	8.51	l/s	
Clubhouse ave persons per day	20	No	
Gatehouse ave persons per day =	3	No	
ave persons per day	23	No	
Typical demand	50	l/person/day	JW
Total average demand clubhouse & guardhouse	1150	l/d	
	47.92	l/h	
	0.01	l/s	
JW Peak factor	2.3		JW
Total average peak demand	**19.6**	l/s	
	0.020	m3/s	

*Pre-development not applicable - currently using soak-away system

ANNEXURE C

CIVIL SERVICE COSTING

1. Internal

- Stormwater (Internal Design)
- Stormwater Attenuation
- Water
- Sewerage
- Sewerage outfall sewer (Ethel Avenue)
- Summary

2. External Roads

3. External bulk sewer

6752D - HOLDINGS 92 & 102 CROWTHORNE A/H

Approximate - CIVIL SERVICES COSTING - November 2016

Refer to KT drawing: 6752D - OSR -03 - A

STORMWATER (initial design)						
Item	**Unit**	**Quantity**		**Rate**		**Total**
300mmØ Stormwater Pipe	m	490	R	400.00	R	196 000.00
375mmØ Stormwater Pipe	m	195	R	500.00	R	97 500.00
Manholes	No	6	R	6 000.00	R	36 000.00
2m Grid Inlet	No	12	R	5 000.00	R	60 000.00
Total Costs Stormwater					**R**	**389 500.00**
Total excavation	m^3	460				
Estimated rock excavation	m^3	46	R	750.00	R	34 500.00
Total Costs Stormwater Incl. Estimated rock excavation					**R**	**424 000.00**

STORMWATER ATTENUATION (initial design)						
Attenuation tank 1	m^3	1170	R	1 200.00		1 404 000.00
Total Costs Stormwater attenuation					**R**	**1404 000.00**
Total excavation	m^3	1200				
Estimated rock excavation	m^3	240.00	R	750.00	R	180 000.00
Total Costs Attenuation Incl. Estimated rock excavation					**R**	**1584 000.00**

WATER						
Item	**Unit**	**Quantity**		**Rate**		**Total**
110 Ø uPVC Pipe	m	505	R	350.00	R	176 750.00
75 Ø uPVC Pipe	m	520	R	280.00	R	145 600.00
65mm Fire Hydrant	No	2	R	5 000.00	R	10 000.00
Valves	No	9	R	5 900.00	R	53 100.00
Total Costs Water					**R**	**385 450.00**
Total excavation	m^3	620				
Estimated rock excavation	m^3	31	R	750.00	R	23 250.00
Total Costs Water Incl. Estimated rock excavation					**R**	**408 700.00**

SEWER	INTERNAL TO SITE					
Item	**Unit**	**Quantity**		**Rate**		**Total**
160 Ø uPVC Pipe	m	640	R	290.00	R	185 600.00
Manholes	No	16	R	6 500.00	R	104 000.00
Protect & Relocate services	Sum	1	R	5 000.00	R	5 000.00
Total Costs Sewer					**R**	**294 600.00**
Total excavation	m^3	400				
Estimated rock excavation	m^3	20	R	750.00	R	15 000.00
Total Costs Sewer Incl. Estimated rock excavation					**R**	**309 600.00**

SEWER	EXTERNAL TO SITE					
Item	**Unit**	**Quantity**		**Rate**		**Total**
250 Ø uPVC Pipe	m	320	R	400.00	R	128 000.00
Manholes	No	7	R	7 500.00	R	52 500.00
Protect & Relocate services	Sum	1	R	15 000.00	R	15 000.00
Total Costs Sewer					**R**	**195 500.00**
Total excavation	m^3	410				
Estimated rock excavation	m^3	20.5	R	750.00	R	15 375.00
Total Costs Sewer Incl. Estimated rock excavation					**R**	**210 875.00**

ROADWORKS (internal to site)					
Item	**Unit**	**Quantity**	**Rate**		**Total**
Internal roadways and paving	m^2	14460	R 550.00	R	7953 000.00
Protect & Relocate services	No	1	R300,000.00	R	300 000.00
Total Costs Roadwork's (Excl. 14% Vat)					**R 8 253 000.00**

SUMMARY

Total Costs Stormwater				389 500.00
Total Costs Stormwater Attenuation				1 404 000.00
Total Costs Water				385 450.00
Total Costs Sewerage				490 100.00
Total Costs Roadworks				R 8 253 000.00
Total Costs Services				**10 922 050.00**
Total Cost for estimated rock excavation				*268 125.00*
Total Cost Services Incl Estimated Rock Excavation				**11 190 175.00**
P&G's 12 %				1 342 821.00
Total (Excl 14% VAT)				**12 532 996.00**

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
P O BOX 412541 CRAIGHALL SOUTH AFRICA 2024 TEL +27 11 501 4760
Email: jhb@jhb.kanteys.co.za Web: www.kanteys.co.za

Approximate - ROADWORKS COSTING - 30 Aug 2016 -

REFER: 6752A-TIA

PROPOSED FOURTH LEG: P66-1 & MAIN ROAD INTERSECTION ROADWORK (4TH LEG WITHIN THE GAUTRANS ROAD RESERVE) (RW1)

Item	Unit	Quantity	Rate	Total
P66-1 & Main Intersection	m²	6400	R 1 200.00	R 7680 000.00
Median Island (Solid)	m²	1100	R 530.00	R 583 000.00
Earthworks	m³	7800	R 150.00	R 1170 000.00
New Street lighting	Sum	1	R 500 000.00	R 500 000.00
New Roadmarkings & Sign Posts	Sum	1	R 200 000.00	R 200 000.00
New Traffic Signal Posts	Sum	1	R 300 000.00	R 300 000.00
New Traffic Signal Timing Diagram	Sum	1	R 100 000.00	R 100 000.00
Traffic Accommodation	Sum	1	R 200 000.00	R 200 000.00
Allowance for Stormwater	Sum	1	R 1500 000.00	R 1500 000.00
Protecting and relocate services	Sum	1	R 500 000.00	R 500 000.00
Total (Excl. VAT)				12 733 000.00
P&G's 15 %				1 909 950.00
Total				14 642 950.00
Professional fees 10%				1 464 295.00
Total				**16 107 245.00**
14% Vat				2 255 014.30
TOTAL Incl Vat				**18 362 259.30**

PROPOSED FOURTH LEG: ETHEL ROAD BTWEEN K56 & TRAFFIC CIRCLE 1 ROADWORK (100m FROM GAUTRANS ROAD)(RW2)

Item	Unit	Quantity	Rate	Total
New Ethel Road to K56	m²	1800	R 1 200.00	R 2160 000.00
Median Island (Solid)	m²	125	R 530.00	R 66 250.00
2m Sidewalk	m²	240	R 220.00	R 52 800.00
Earthworks	m³	2000	R 150.00	R 300 000.00
New Roadmarkings & Sign Posts	Sum	1	R 80 000.00	R 80 000.00
Traffic Accommodation	Sum	1	R 150 000.00	R 150 000.00
Allowance for Stormwater	Sum	1	R 80 000.00	R 80 000.00
Protecting and relocate services	Sum	1	R 200 000.00	R 200 000.00
Total (Excl. VAT)				3 089 050.00
P&G's 15 %				463 357.50
Total				3 552 407.50
Professional fees 10%				355 240.75
Total				**3 907 648.25**
14% Vat				547 070.76
TOTAL Incl Vat				**4 454 719.01**

PROPOSED ETHEL ROAD (BTWEEN TRAFFIC CIRCLR 1 TO WHISKEN TRAFFIC CIRCLE) (RW3)

Item	Unit	Quantity	Rate	Total
New Ethel Road	m²	3700	R 1 200.00	R 4440 000.00
2m Sidewalk	m²	850	R 220.00	R 187 000.00
Median Island (Solid)	m²	70	R 530.00	R 37 100.00
Earthworks	m³	1000	R 180.00	R 180 000.00
New Roadmarkings & Sign Posts	Sum	1	R 120 000.00	R 120 000.00
Allowance for Stormwater	Sum	1	R 80 000.00	R 80 000.00
Traffic Accommodation	Sum	1	R 80 000.00	R 80 000.00
Protecting and relocate services	Sum	1	R 100 000.00	R 100 000.00
Total (Excl. VAT)				5 224 100.00
P&G's 15 %				783 615.00
Total				6 007 715.00
Professional fees 10%				600 771.50
Total				**6 608 486.50**
14% Vat				925 188.11
TOTAL Incl Vat				**7 533 674.61**

PROPOSED NEPTUNE AVE & WHISKIN AVE INTERSECTION UPGRADES (RW4)

Item	Unit	Quantity	Rate	Total
Roadworks	m²	2700	R 1 500.00	R 4050 000.00
Median Island (Solid)	m²	100.0	R 530.00	R 53 000.00
2m Sidewalk	m²	1600	R 220.00	R 352 000.00
New Roadmarkings & Sign Posts	Sum	1	R 120 000.00	R 120 000.00
New Traffic Signals	Sum	1	R 350 000.00	R 350 000.00
New Traffic Signal Timing Diagram	Sum	1	R 100 000.00	R 100 000.00
Allowance for Stormwater	Sum	1	R 80 000.00	R 80 000.00
Traffic Accommodation	Sum	1	R 80 000.00	R 80 000.00
Total (Excl. VAT)				5 185 000.00
P&G's 15 %				777 750.00
Total				5 962 750.00
Professional fees 10%				596 275.00
Total				**6 559 025.00**
14% Vat				918 263.50
TOTAL Incl Vat				**7 477 288.50**

PROPOSED WHISKIN AVE ROAD REHABILITATION (BETWEEN ETHEL AND NEPTUNE AVENUE) (RW5)

Whisken / Neptune Rehabilitation	m²	5400	R 250.00	1 350 000.00
Taxi Lay-bye	m²	140	R 400.00	R 56 000.00
Total (Excl. VAT)				1 406 000.00
P&G's 15 %				210 900.00
Total				1 616 900.00
Professional fees 10%				161 690.00
Total				**1 778 590.00**
14% Vat				249 002.60
TOTAL Incl Vat				**2 027 592.60**

Summary	Total
P66-1 & Main Intersection (Gautrans road)	14 642 950.00
Ethel Road (100m From Gautrans Road)	3 552 407.50
Ethel Road 100m Away from Gautrans road to Whisken Avenue	6 007 715.00
Neptune Avenue & Whisken Avenue Intersection	5 962 750.00
Proposed Whiskin Avenue Road Rehab	1 616 900.00
Total	31 782 722.50
Professional fees 10%	3 178 272.25
Total	**34 960 994.75**
14% Vat	4 894 539.27
TOTAL	**39 855 534.02**

6752B

Kyalami Outfall Sewer Cost Estimate Breakdown

KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development

Prepared By: FBB 30-Sep-16

	Original Estimated Cost per Agreement (Brookehave Tender)	Current Estimated Cost with Full Tender Amount	Current Estimated Cost with Current Estimated Construction Value	
Bulk Sewer Construction	R 19 928 367.00	R 19 928 367.00	R 19 000 000.00	* Note this amount may come down still
Contingency	R 498 209.00			
Escalation	R 0.00			
Project Management Fee	R 543 295.00	R 543 295.00	R 543 295.00	
Civil Engineer Fee	R 1 374 426.00	R 1 374 426.00	R 1 374 426.00	
QS Fee	R 753 398.00	R 753 398.00	R 753 398.00	
Expropriation Cost	R 1 000 000.00	R 2 150 000.00	R 2 150 000.00	
Expropriation Attourney Fee	R 75 000.00	R 2 000 000.00	R 2 000 000.00	
Environemntal Fees	R 120 000.00	R 282 543.00	R 282 543.00	
Health and Safety	R 30 000.00	R 30 000.00	R 30 000.00	
Survey and Drone Video and Photo's	R 75 000.00	R 208 240.00	R 208 240.00	
Geotech	R 50 000.00			
Plan approval and Wayleaves	R 50 000.00			
Totals (Excl 14% Vat)	**R 24 497 695.00**	**R 27 270 269.00**	**R 26 341 902.00**	

Based on "*Current Estimated Cost with current Estimated Construction Value*"

Case 1: Only Balwin and Abland Contributing:

i.t.o agreement:	% Proportion :	Cost Contribution: (per agreement)	Estimated Bulk Services Contribution:	Difference:
Balwin Contribution:	50%	R 13 170 951.00	R 10 665 204.00	R 2 505 747.00
Abland Contribution:	50%	R 13 170 951.00	R 2 130 000.00	R 11 040 951.00

Case 2: Balwin, Abland and Peter Gillispie Contributing:

Balwin Contribution:	49.31%	R 12 987 951.00	R 10 665 204.00	R 2 322 747.00
Abland Contribution:	49.31%	R 12 987 951.00	R 2 130 000.00	R 10 857 951.00
Peter Gillispie Kyalami A/H 11 School on 155/407 -JR??	1.39%	R 366 000.00 Awaiting proposed zoning info	R 366 000.00	R 0.00

ANNEXURE D

BULK OUTFALL SEWER CONSTRUCTION ISSUE DRAWINGS & JW APROVAL LETTER DATED 06 MARCH 2015

City of Johannesburg
Johannesburg Water (SOC) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

a world class African city

Date: 6 March 2015
Your Ref.:

ADA CONSULTING ENGINEERS
P.O. BOX 130602
BRYANSTON
2047

ATTENTION: MR. J. VAN BANEVELD

Dear Sir

CONSTRUCTION DRAWING
KYALAMI RIDGE EXTENSION 3 (KYALAMI RETAIL PARK) BULK SEWER SERVICES

Your construction drawings dated 16 February 2015 for approval refer.

The following drawings are acceptable for construction purposes and one copy of each is returned herewith. Please note the
attached Annexure and Drawing checklists.

Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 1 OF 6
Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 2 OF 6
Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 3 OF 6
Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 4 OF 6
Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 5 OF 6
Dwg No. J3391 CS121 SEWER LAYOUT AND LONGITUDINAL SECTIONS SHEET 6 OF 6

Johannesburg Water's standard details will have to be used for all the work to be taken over by Johannesburg Water.

Please ensure that the contractor has officially approved drawings (with the required stamp and signature) on site at all times for construction purposes. Please will you liase with:
Mr. A. SHIBAMBU whose details are as follows:

JOHANNESBURG WATER (PTY) (LTD)
MIDRAND DEPOT
621 SIXTH ROAD
MIDRAND

Telephone: (011) 205-9500

Joburg
a world class African city

Johannesburg Water

City of Johannesburg
Johannesbug Water (SOC) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

For **MANAGER: DEVELOPMENT CONTROL**
011688-6506
hilda.matodzi@jwater.co.za

Joburg
a world class African city

Johannesburg Water

City of Johannesburg
Johannesbug Water (SOC) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

h) Where stormwater pipes are to be constructed in proximity to the new or existing water mains, the construction methods must be cleared with the inspector prior to commencing the works.

i) All water related steel fittings are to be copon coated internally and suitably wrapped, and galvanised fittings are to be suitably wrapped. The wrapping should be "Denso" tape (or similar approved).

j) The positions of across the road water house connections are to be indicated by means of a "W" cut into the kerbstone of the roadway.

k) All water valve and hydrant chambers are to be watertight.

l) The procedure for tie-in work to existing water pipes is to be confirmed with the **NEW CUSTOMER MANAGER**. All tie-in work requires a 2-week notice period so that arrangements can be made for the water to be shut off by the Company (note that the contractor may not shut valves themselves). Where the physical work is to be done by the applicant's contractor, the work may not commence without the strict supervision of the **NEW CUSTOMER MANAGER**. All tie-in work will only be done after the successful completion of the third inspection as set out below.

m) The Consulting Engineer must inform the **NEW CUSTOMER MANAGER** in writing when the works are complete.

n) The Company will not take over the works until all the completion procedures mentioned in the attached letter have been satisfactorily completed. This requirement affects the issuing of the relevant "Clearance Certificate".

2. Water Pipework Inspection Procedure

a) All water supply installations are to be inspected in the presence of the engineer, the contractor and the Company works inspector. Note that large townships may be inspected in acceptable stages, as decided on by the above mentioned parties.

b) **First Inspection**

- The First Inspection shall be held once the piping and fittings have been installed, and backfilled (and compacted) to 50% of the diameter of the pipe.
- The excavations for thrust blocks shall be left open for inspection. (Not applicable to high impact coupled pipe.)

c) **Second Inspection**

- The Second Inspection shall be held once the compacted backfilling has been completed to approximately 300mm above the top of the pipes.
- All joints and fittings are to remain exposed for this inspection.
- The concrete thrust blocks will be inspected at this stage and should be sufficiently cured. (Not applicable to high impact coupled pipe.)
- The pressure test will be done as part of the Second Inspection.

  NOTE: The pressure test used by the Company is stricter than the one recommended in SABS 1200, and provision must be made for this.
- The new water reticulation is to be tested to 1800 kPA.

d) **Third Inspection**

City of Johannesburg
Johannesbug Water (SOC) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

a world class African city

NOTES:

i) The words "As Built" may be replaced by "Record" if so desired by the responsible person.
ii) The endorsement block position on the drawing is preferred in the lower right hand corner of the drawing sheet.

c) The submission of the "As Built" drawings must be on transparent film and in electronic format, and shall become the property of the Company. The preferred electronic format is "AutoCAD", but where this is not available, a DXF file will be accepted. Further, the tables of data must be submitted for the GIS database: the preferred format is "Microsoft Excel".

d) The acceptance of the "As Built" record drawings by the Company in no way relieves the engineer responsible for the drawings from his/her professional accountability.

City of Johannesburg
Johannesburg Water (Pty) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

a world class African city

Date: 14 July 2015

Our Ref.: Kyalami Ridge Ext.3 Retail Center
Your Ref.:

A.D.A CONSULTING CIVIL ENGINEES
P.O BOX 130602
BRYANSTON
2447

ATTENTION: Mr. J MALAN

Dear Sir

CONSTRUCTION DRAWING
KYALAMI RETAIL CENTER (OUTFALL SEWER LINE)
KYALAMI RIDGE EXTENSION 3

Your construction drawings submitted on 25 June 2015 for approval refer.

The following drawings are acceptable for construction purposes and one copy of each is returned herewith. Please note the attached Annexure and Drawing checklists. ***Please note that JW standards and specification must be adhered to at all times.***

Dwg No. J3391 CS121(1/6)	***Outfall Sewer Plan & Long section Sheet 1 - 6***
Dwg No. J3391 CS121(2/6)	***Outfall Sewer Plan & Long section Sheet 2 - 6***
Dwg No. J3391 CS121(3/6)	***Outfall Sewer Plan & Long section Sheet 3 - 6***
Dwg No. J3391 CS121(4/6)	***Outfall Sewer Plan & Long section Sheet 4 – 6***
Dwg No. J3391 CS121(5/6)	***Outfall Sewer Plan & Long section Sheet 5 - 6***
Dwg No. J3391 CS121(6/6)	***Outfall Sewer Plan & Long section Sheet 6 - 6***

Note:

The above said Drawings are approved subject to:

- Annexure C *(Plan of servitude on the property)* for AH 19, 22, Re/27 and 25.
- Consent to go over Re/8/407 – JR (See attached)
- The EIA permission exempting you from crossing the river between MH 14 and MH 13.

City of Johannesburg
Johannesbug Water (Pty) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

Note that the engineers as built drawing will not be accepted and forwarded to development control until the as built drawings comply with the Company's requirements. To this end please find attached for you information the as built check lists used by the **NEW CUSTOMER MANAGERS** to check as built drawings for compliance with Company requirements.

The developer will not be released of his obligations in respect of providing these services until the above requirements have been fulfilled.

Yours faithfully,

(J. Kau)
For **MANAGER: DEVELOPMENT CONTROL**
0116884624
joel.kau@jwater.co.za

City of Johannesburg
Johannesbug Water (Pty) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

i) All water related steel fittings are to be copon coated internally and suitably wrapped, and galvanised fittings are to be suitably wrapped. The wrapping should be "Denso" tape (or similar approved).

j) The positions of across the road water house connections are to be indicated by means of a "W" cut into the kerbstone of the roadway.

k) All water valve and hydrant chambers are to be watertight.

l) The procedure for tie-in work to existing water pipes is to be confirmed with the **NEW CUSTOMER MANAGER**. All tie-in work requires a 2-week notice period so that arrangements can be made for the water to be shut off by the Company (note that the contractor may not shut valves themselves). Where the physical work is to be done by the applicant's contractor, the work may not commence without the strict supervision of the **NEW CUSTOMER MANAGER**. All tie-in work will only be done after the successful completion of the third inspection as set out below.

m) The Consulting Engineer must inform the **NEW CUSTOMER MANAGER** in writing when the works are complete.

n) The Company will not take over the works until all the completion procedures mentioned in the attached letter have been satisfactorily completed. This requirement affects the issuing of the relevant "Clearance Certificate".

2. Water Pipework Inspection Procedure

a) All water supply installations are to be inspected in the presence of the engineer, the contractor and the Company works inspector. Note that large townships may be inspected in acceptable stages, as decided on by the above mentioned parties.

b) **First Inspection**

- The First Inspection shall be held once the piping and fittings have been installed, and backfilled (and compacted) to 50% of the diameter of the pipe.
- The excavations for thrust blocks shall be left open for inspection. (Not applicable to high impact coupled pipe.)

c) **Second Inspection**

- The Second Inspection shall be held once the compacted backfilling has been completed to approximately 300mm above the top of the pipes.
- All joints and fittings are to remain exposed for this inspection.
- The concrete thrust blocks will be inspected at this stage and should be sufficiently cured. (Not applicable to high impact coupled pipe.)
- The pressure test will be done as part of the Second Inspection.
  NOTE: The pressure test used by the Company is stricter than the one recommended in SABS 1200, and provision must be made for this.
- The new water reticulation is to be tested to 1800 kPA.

d) **Third Inspection**

- The Third Inspection will be at the "commissioning" of the works and handing over to the Company for operation at the start of the 12-month defects liabilities period.

City of Johannesburg
Johannesbug Water (Pty) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

i) The words "As Built" may be replaced by "Record" if so desired by the responsible person.
ii) The endorsement block position on the drawing is preferred in the lower right hand corner of the drawing sheet.

c) The submission of the "As Built" drawings must be on transparent film and in electronic format, and shall become the property of the Company. The preferred electronic format is "AutoCAD", but where this is not available, a DXF file will be accepted. Further, the tables of data must be submitted for the GIS database; the preferred format is "Microsoft Excel".

d) The acceptance of the "As Built" record drawings by the Company in no way relieves the engineer responsible for the drawings from his/her professional accountability.

City of Johannesburg
Johannesbug Water (Pty) Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

JOHANNESBURG WATER (Pty) Ltd

Last updated 23 July, 2002

DRAWING CHECK LISTS

Consultant	
Contact	
Telephone	

TOWNSHIP :	

Checked by	
Date Checked	

	Endorsements	Prof. Reg. No.				
		Signature & Date				
4.	Electronic disc with drawing and database info					

ANNEXURE E

TIA APPROVAL LETTERS JRA & GAUTRANS

- **GAUTRANS APPROVAL LETTER DATED 2016-09-14**
- **JRA APPROVAL LETTER DATED 2016-07-14**

GAUTENG
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF ROADS AND TRANSPORT

DEPARTEMENT VAN PAAIE EN VERVOER

LEFAPHA LA DITSELA LE DIPALANGWAI

UMNYANGO WEEZEMIGWAQO NE ZOKUTHUTHA

Enquiry / Navrae : Ms S Buthelezi

Ref / Verw : 1/1/3/1/3-22160

WSP SA Civil and Structural
Engineers
Postnet Suite 287
Private Bag X025
LYNNWOOD RIDGE
00040

TRAFFIC IMPACT ASSESSMENT: PROPOSED RESIDENTIAL TOWNSHIP: CROWTHORNE EXT 20, CITY OF JOHANNESBURG

This Department have studied the contents of the above Traffic Impact Study dated April 2015and a letter dated June 2016.

The proposed development:

- Residential 1300 units

The proposed development is to be located at the south eastern quadrant of Macgregor Road K56 and Pitts Avenue (K71) intersection. Furthermore, the site is bounded by Ethel Avenue to the east and Whisken Avenue to the south within the city of Johannesburg.

The proposed development is expected to generate approximately 975new vehicular trips during the Weekday AM and PM peak hour periods.

This traffic impact assessment only evaluates the traffic operations and does not evaluate neither the access positions nor geometric designs. The approval for access points and the geometric designs of the roads and intersections must be discussed separately with the relevant sub-directorates of the Department.

This Department agrees with and supports the traffic impact analysis done yourselves.

Sage Life Building, 41 Simmonds Street, Private Bag X83, MARSHALLTOWN, 2107
Tel No : (011) 355 7307 Fax No : (011) 355 7310

The support is done with the following conditions:

- The local municipality must be satisfied that all known latent demand has been provided for.
- The local municipality must be in agreement to the trip generation rates applied.
- The developer must satisfy local municipality upgrade requirements and road contribution conditions.
- The developer must carry the costs of all the proposed road and intersection improvements as stated in the report **–(SKC001 and SKC004)**
- The local municipality must be satisfied that all upgrades apportioned to latent developments are implemented.
- The developer must construct bus/taxi laybyes as proposed in the report.
- The developer must construct paved pedestrian sidewalks in and around the road boundaries of the development.

An application for permission to undertaken any work within the road reserve of a road under the control of this Department must be submitted to Directorate Planning: Infrastructure Protection at Construction and Maintenance, their address is:-

Chief Engineer: Infrastructure Protection
Department of Public Transport Roads and Works
Gauteng Province
Private Bag X1
TOTIUSDAL
0134

These conditions are laid down in terms of delegated authority in terms of the provisions of the Gauteng Transport Infrastructure Act, Act No. 8 of 2001 and do not exempt the applicant/ owner/ successor-in-title from the provisions of any other law.

Yours faithfully

Directorate Engineer (Traffic Engineering)
Ms Sliadile Buthelezi

City of Johannesburg
Johannesburg Roads Agency

66 Pixley Ka Isaka Seme Street
Cnr. Rahima Moosa Street
Johannesburg
2001

P/Bag X70
Braamfontein
South Africa
2017

Tel +27(0) 11 298 5000
Fax +27(0) 11 298 5178
www.jra.org.za
www.joburg.org.za

a world class African city

Tel: (011) 298-5042
Fax: (011) 298-5066

Ref: 17/8/C53-20
T De Jager

WSP Group Africa (Pty) Ltd
Postnet Suite 287
Private Bag x025
Lynnwood Ridge
0040

Date: 14 July 2016

Email: Christopher.Nair@wspgroup.co.za

Attention: Mr. Christopher Nair

Sir,

TRAFFIC IMPACT ASSESSEMENT: CROWTHORNE EXTENSION 20

Your letter and Traffic Impact Study dated June 2016 refers.

The report was studied by our Traffic Engineer and Analysis Section and The Johannesburg Road Agency comment as follows:

This TIA is in support of a residential development for 1300 multi level townhouse at an expected trip generation of 975 trips during the AM and PM peak hours. The applicant further propose the closure of Whisken Avenue to the west of Ethel Avenue. This will be incorporate the portion of Whisken Avenue falling adjacent to the site into the development for site access and landscaping purposes. This department has not objection against the proposed closure but a formal application must be submitted to the Johannesburg Property Company.

The R55 is a provincial road and it should be noted that the comments that follow were done in the absence of having received comments from the Gauteng Department of Roads and Public Works on this traffic study. We therefore reserve the right to reconsider our input once the comments from Province has been made available. Comments on provincial roads are subject to the approval of Province.

The study further noted that the proposed upgrading of the K71 (R55) is scheduled for construction in the 2016/2017 financial year. JRA will not support the Section 82 certificated should this upgrade i.e. contractor on site be in place at the time of request.

The traffic impact study assumed the following road network upgrades to be in place and undertaken by either the Province or other developers

1. Intersection 1: R55/Arthur/ Papenfus (as per SCK010)
    a. Blue Hills Ext 78
        i. Exclusive SB left turn lane on the R55 with downstream additional through lane
        ii. Exclusive EB left turn lane on Arthur Road
    b. Century Blue Hills
        i. Exclusive right turn lane NB on the RFF
        ii. Downstream through lane on the EB approach of Arthur Rd
    c. Kyalami Ridge Ext 3
        i. Shared through and left turn lane on the WB approach of Arthur Rd
2. *(it is not stated who will be responsible for the revised traffic signal design but it is assumed that all these upgrad* Intersection 2: R55/Pitts Avenue/ Macgregor Rd/ Ethel Avenue (as per SKC004)
    a. Holdings II Kyalami AH
        i. Exclusive right turn lane on the EB approach of Macgregor Rd
        ii. Additional through lane on the SB R55 through the intersection
    b. Crowthorne Ext 20
        i. An exclusive slip lane on the SB R55 approach
        ii. An additional through lane on the SB R55 approach
        iii. A dedicated through lane on Macgregor Rd EB approach with two receiving through lanes on the opposite side of the intersection
        iv. An exclusive right turn lane, two dedicated through lanes and a slip lane on the WB K56 approach
        v. A dedicated right turn lane on the NB R55 approach
        vi. Revised traffic signal layout which should be approved prior to approval of geometric design

3. Intersection 3: Kyalami Blvd/ Kenilworth Rd/ Pitss Avenue (as per SKC010)
    a. Kyalami Ridge Ext 3
        i. Additional dedicated through lane on the R55 NB approach
        ii. *(it is not stated who will be responsible for the revised traffic signal design but it is assumed that all these upgrades will take place in conjunction with the upgrading of the R55)*

4. Intersection 6: Neptune Avenue/ Walton Road/ Whisken Avenue
    a. Crowthorne Ext 20
        i. Signalise the intersection
        ii. A dedicated short right turn lane on Neptune Avenue (30m)
        iii. The existing lane on Neptune Avenue to be converted to a shared through and left turn lane
        iv. A dedicated short right turn lane on Walton Road (30m)
        v. The existing lane on Walton Road to be converted to a shared through and left turn lane.
        vi. A dedicated short right turn lane on Whisken Avenue WB (30m)
        vii. The existing lane on Whisken Avenue WB to be converted to a through lane with a proposed slip lane onto Walton Road
        viii. A short receiving lane on Walton Road to accommodate the above slip lane
        ix. A dedicated short right lane on Whisken Avenue EB (30m)
        x. The existing lane on Whisken Avenue EB to be converted to a shared through and left turn lane.

5. Crowthorne Ext 20: Construct the Link Road between intersections 2 and 5 to accommodate the land use rights
6. Proposed public transport and NMT facilities

    a. Public transport lay-byes to be constructed adjacent to Main Road Road (R55/K56) intersection by Kyalami Ridge Ext 3.
    b. An additional lay-by is to be provided along the new link road in close proximity to the development access.
    c. Paved sidewalks along the western side of Ethel Avenue adjacent to the proposed development.

Should the upgrades/ new road links impact on any existing access arrangement, the property owner must be consulted and consent in writing must be obtained prior to the application for wayleave.

The proposed development be served by a single access off Whisken Avenue with 2 ingress and 2 egress lane.

All road upgrades to be undertaken by the developer or his representatives, the cost thereof, will not be refunded back to the developer by the Johannesburg Roads Agency (JRA) or the City of Johannesburg (CoJ) unless these upgrades were discussed and agreed upon in writing by both parties upfront, before any construction commences. The mere fact that the detail design drawings or Traffic Impact Studies have been approved, does not bind the JRA or the CoJ to any agreement.

It should also be noted that if any upgrades are undertaken by the developer to any roads or storm-water on behalf of CoJ or the JRA, the developer will be entitled to an off-set against their external engineering services contributions as per section 49(4) of SPLUMA, provided these services are required to be upgraded to resolve background capacity problems, and not as a result of his/her impact of the development. These upgrades are to be discussed with the officials of the JRA and agreement in writing is to be obtained from the JRA to the off-set of such contributions, before any construction commences on site.
If the amount for the upgrade/construction exceeds the contributions payable, the balance thereof will not be refunded to the developer and the construction is then carried out at the developers own cost.

The development can be supported from a traffic engineering perspective, provided that the abovementioned requirements / recommendations are implemented.

These comments only pertain to traffic engineering aspects. The issues of Land Use, the Site Layout and the SDP must be confirmed by CoJ LUM and Development Planning and Control.

These comments are based on the rights mentioned in the report and should these rights not be in line with the rights applied for then these comments will be considered void.

These comments are only valid for 5 years as per COTO TMH 16 Vol 1.

pp Manager-Development Control
bn/tdj
E-mail:tdjager@jra.org.za

ANNEXURE F

ROAD UPGRADES
6752-FIG 20-A

ANNEXURE G

CROWTHORNE EXT 20 WATER CONNECTION – JW APPROVAL LETTER AND DRAWING

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

a world class African city

Date: 04 July 2016

Our Ref.: Crowthorne-20
Your Ref.: 6752A-A3

KANTEY & TEMPLER (PTY) LTD
P.O. BOX 412541
CRAIGHALL
2024

Attention: Mr. F Bain

Dear Sir

CONSTRUCTION DRAWING
CROWTHORNE EXTENSTION 20

Your construction drawings submitted on 03 March 2016 for approval refers.

The following drawings are acceptable for construction purposes and one copy of each is returned herewith. Please note the attached Annexure and Drawing checklists.

Dwg No. 6752-350 Water Reticulation, Connection and Details

Please ensure that the contractor has officially approved drawings (with the required stamp and signature) on site at all times for construction purposes. Please will you liaise with;

Mr. A. Shibambu (011) 205 9500 from our Midrand depot

for the inspection of the works at various stages of construction, including final inspection of the works.

When part of the works is to be constructed over land not owned by the applicant as part of the specific development, the engineer (on behalf of the applicant) must liaise with the following;

- the Johannesburg Roads Agency for official wayleave to undertake construction in the road reserve – in this respect the approved drawing with the Agency's stamp should be taken as this Agency's acknowledgement of the works to be undertaken
- the City Parks for official permission to undertake construction within property managed by them

Joburg
a world class African city

Johannesburg Water

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

- any other "third party" property owner over whose property construction is to be undertaken, including all negotiations and legal matters relating to the acquisition of a servitude if required
- City Power when the works impact on any electrical power line whether overhead or underground
- Any other service provider (e.g. Rand Water) whose installations may be affected by the works

Please also note that all connections to the existing water supply and sewerage reticulations shall be carried out by this Company; unless the **NEW CUSTOMER MANAGER** may allow otherwise.

Upon completion of the works and before final approval by the **NEW CUSTOMER MANAGER** (or his/her delegated representative) for handing over to this Company for operation at the start of the 12-month defects liabilities period

- Submit to the **NEW CUSTOMER MANAGER** the "As Built" record drawings in accordance with the requirements of this Company
- Certify that the works have been built in accordance with the specifications
- Certify the value of the constructed works (including all Preliminary and General items and VAT) for asset register and other legal purposes
- **Prior to the clearance being issued, where any of the services under the care of this Company are constructed in servitudes, submit acceptable documentation to show that servitude/s have been, or will be, registered in perpetuity against the title deeds of the properties affected (such documentation may take the form of a written undertaking from an attorney).**

Note that the engineers as built drawing will not be accepted and forwarded to development control until the as built drawings comply with the Company's requirements. To this end please find attached for you information the as built check lists used by the **NEW CUSTOMER MANAGERS** to check as built drawings for compliance with Company requirements.

The developer will not be released of his obligations in respect of providing these services until the above requirements have been fulfilled.

Joburg
a world class African city

Johannesburg Water

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

Yours faithfully,

(C. Bello)
For **MANAGER: DEVELOPMENT CONTROL**
0116881621
claudio.bello@jwater.co.za

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

JOHANNESBURG WATER (Pty) Ltd

PROCEDURE FOR THE SUBMISSION OF DRAWINGS FOR THE CONSTRUCTION OF WATER AND SEWER SERVICES

(Revised: July 2002)

1. Note the following requirements which are often a source of problems

a) The **NEW CUSTOMER MANAGER** must be informed as soon as the contractor is on site. Note that the Johannesburg Water (the Company **NEW CUSTOMER MANAGER** (or his/her delegated representative) shall be allowed access to the site at all times

b) Ensure that the contractor has only approved drawings (with the Company stamp) on site. The **NEW CUSTOMER MANAGER** shall be kept informed of all construction related changes to the drawing details and/or variation orders. In principle, the written approval of the Company must be obtained for all deviations from the approved drawings. Most matters can be handled at the site level with the relevant regional manager, but major re-location, re-designs, etc must also be cleared in writing by Development Control (Head Office) with new approved drawing/s as appropriate.

c) All materials to be used in the construction of water reticulations must comply (as a minimum) with the requirements of the Company and with the standards given in the "Guidelines and Standards for the Design and Maintenance of Water and Sanitation Services". Approval and/or acceptance of the engineer's design and related drawings shall not in any way relieve the engineer of his professional responsibility/liability for the satisfactory design of the reticulation infrastructure such that the pipe network shall remain functional under all operating conditions including malfunction of the PRV. Sufficient anchor blocks must be provided at all valves, hydrants, tees, bends, and joints to ensure the functional integrity of the pipe network. (Note that saddle connectors for erf connections are excluded from this requirement.) The engineer must include in his design the effects of hammer due to a sudden valve closure.

d) The requirements regarding cover to water and sewer pipes are to be strictly adhered to.

e) The position and depth of all existing services must be confirmed on site prior to any construction proceeding.

f) The engineer is responsible (on behalf of the developer) for confirming the location of all existing water and sewer services. Information given by the Company in this regard is always under the legal disclaimer with respect to exact position horizontally and depth from existing

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

ground level. Where the development involves road works, or any other construction works, in the vicinity of the existing services, these services may require deviation, or alteration, or other protection to the satisfaction of The Company, and shall be at the developer's cost. Where appropriate, specific design details and drawings may be required (refer to (b) above). The engineer is advised to allow for all these costs in his tender documentation. The engineer's attention to these matters is drawn particularly in the older suburbs and those areas that have been incorporated into the metropolitan area of the City of Johannesburg.

g) Water mains are not to be located in common trenches with other services. Note that where water and/or sewer pipes are to be laid parallel with other services a minimum of 1m between the water/sewer pipe and the other service is required.

h) Where stormwater pipes are to be constructed in proximity to the new or existing water mains, the construction methods must be cleared with the inspector prior to commencing the works.

i) All water related steel fittings are to be copon coated internally and suitably wrapped, and galvanised fittings are to be suitably wrapped. The wrapping should be "Denso" tape (or similar approved).

j) The positions of across the road water house connections are to be indicated by means of a "W" cut into the kerbstone of the roadway.

k) All water valve and hydrant chambers are to be watertight.

l) The procedure for tie-in work to existing water pipes is to be confirmed with the **NEW CUSTOMER MANAGER**. All tie-in work requires a 2-week notice period so that arrangements can be made for the water to be shut off by the Company (note that the contractor may not shut valves themselves). Where the physical work is to be done by the applicant's contractor, the work may not commence without the strict supervision of the **NEW CUSTOMER MANAGER**. All tie-in work will only be done after the successful completion of the third inspection as set out below.

m) The Consulting Engineer must inform the **NEW CUSTOMER MANAGER** in writing when the works are complete.

n) The Company will not take over the works until all the completion procedures mentioned in the attached letter have been satisfactorily completed. This requirement affects the issuing of the relevant "Clearance Certificate".

Joburg
a world class African city

Johannesburg Water

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

www.johannesburgwater.co.za

2. Water Pipe work Inspection Procedure

a) All water supply installations are to be inspected in the presence of the engineer, the contractor and the Company works inspector. Note that large townships may be inspected in acceptable stages, as decided on by the above mentioned parties.

b) **First Inspection**

- The First Inspection shall be held once the piping and fittings have been installed, and backfilled (and compacted) to 50% of the diameter of the pipe.
- The excavations for thrust blocks shall be left open for inspection. (Not applicable to high impact coupled pipe.)

c) **Second Inspection**

- The Second Inspection shall be held once the compacted backfilling has been completed to approximately 300mm above the top of the pipes.
- All joints and fittings are to remain exposed for this inspection.
- The concrete thrust blocks will be inspected at this stage and should be sufficiently cured. (Not applicable to high impact coupled pipe.)
- The pressure test will be done as part of the Second Inspection.
  NOTE: The pressure test used by the Company is stricter than the one recommended in SABS 1200, and provision must be made for this.
- The new water reticulation is to be tested to 1800 kPA.

d) **Third Inspection**

- The Third Inspection will be at the "commissioning" of the works and handing over to the Company for operation at the start of the 12-month defects liabilities period.
  NOTE: Water reticulation systems will not be accepted and taken over by The Company if there are any outstanding snags or if any of the following has not be submitted.
- Prior to the Third Inspection the following must be submitted

i. "As Built" record drawings (1x transparency, 2 paper prints, & electronic disc)
ii. Surveyor General diagram
iii. Completion certificate from the engineer
iv. Confirmation by the engineer that there are no outstanding snags.

e) **NOTE** that a charge of R500, 00 will be levied by the Company for each fruitless visit by its officials.

3. Value of the Constructed Works

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

The following amounts must identified in the submission for each of the sewer and water works

a) The value of supply and construct (including site clearing, excavation, pipework, manholes and/or chambers, backfill, and any other related works).

b) The value of the Preliminary and General items proportional to the value of (a) above.

c) The value of the VAT proportional to the value of (a) and (b) above.

Note that in some cases the Item for "Site Clearing" is included in the P & G items; in this case it should not also be included in the "Supply and Construct" amounts.

4. Endorsement and Submission of "As Built" Drawings

a) The developer shall appoint a suitable competent person in compliance with the National Building Regulations to supervise the design and construction of the water and sewer works, and conducts the liaison with the Company. This person shall be the "responsible person".

b) The developer shall arrange for the responsible person to submit a complete set of the relevant drawings duly amended to show the engineering details of the works after construction and certified by the responsible person as being correct within the accepted tolerances by endorsement as follows;

AS BUILT DRAWING **And final inspection by**	
.....	.....
(print name)	(signature)
.....	.....
(print Prof. Reg. No.)	(date)

NOTES:

i) The words "As Built" may be replaced by "Record" if so desired by the responsible person.

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

ii) The endorsement block position on the drawing is preferred in the lower right hand corner of the drawing sheet.

c) The submission of the "As Built" drawings must be on "Sepia" and shall become the property of the Company.

d) The acceptance of the "As Built" record drawings by the Company in no way relieves the engineer responsible for the drawings from his/her professional accountability.

JOHANNESBURG WATER (Pty) Ltd

Last updated 23 July, 2002

DRAWING CHECK LISTS

Consultant	
Contact	
Telephone	

TOWNSHIP :	

Checked by	
Date Checked	

Checked by Regional Depot	Print Name		Signature	
Date Checked				

AS BUILT SEWER DRAWINGS			**Plan Dwg No.** **Section Dwg No.**			
			Approved	Rejected	N/A	Comments
1.	Original drawings with lists					
2.	Check for :	Levels				
		Co-ordinates				
		Other services				

City of Johannesburg
Johannesburg Water SOC Ltd

17 Harrison Street
Johannesburg

Johannesburg Water
PO Box 61542
Marshalltown
2107

Tel +27(0) 11 688 1400
Fax +27(0) 11 688 1528

a world class African city

www.johannesburgwater.co.za

JOHANNESBURG WATER (Pty) Ltd

Last updated 23 July, 2002

DRAWING CHECK LISTS

Consultant	
Contact	
Telephone	

TOWNSHIP :	

Checked by	
Date Checked	

		Sewer Connection, Position & Depth				
		Servitudes				
3.	As Built Endorsements	Name printed				
		Prof. Reg. No.				
		Signature & Date				
4.	Electronic disc with drawings & database info					

AS BUILT WATER DRAWING		**Drawing No.**				
			Approved	Rejected	N/A	Comments
1.	Original drawing with list					
2.	Check for :	House connections				
		Other services				
		Water Connection, Position & Depth				
		Servitudes				
3.	As Built Endorsements	Name printed				
		Prof. Reg. No.				
		Signature & Date				
4.	Electronic disc with drawing and database info					

ANNEXURE H

OUTFALL SEWER CONNECTION DRAWINGS