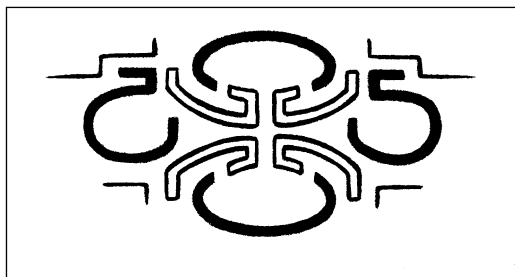


**Cultural Heritage Impact Assessment:
Phase 1 Investigation for the Proposed Rehabilitation of the Boksburg Lake,
Ekurhuleni Metropolitan Municipality, Gauteng**



For

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Executive Summary

This report contains a comprehensive heritage impact assessment investigation in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (Act No. 25 of 1999) and focuses on the survey results from a cultural heritage survey as requested by SRK Consulting (Pty) Ltd. The survey forms part of a Basic Assessment Report (BAR) and a Water Use Licence (WUL) as stipulated by the National Environmental Management Act (NEMA) (Act No. 107 of 1998) and NEMA Regulations. The proposed developments seek to address and restore the water quality of the Boksburg Lake by managing the Suspended Solids (SS). It is proposed to install aerators, construct a low crest weir and establish a filtration plant to address these issues.

Please note that although the Boksburg Lake and surrounds in itself can be regarded as historical (older than 60 years as per Section 34 of the NHRA (Act No. 25 of 1999) as the area is a living, dynamic and changing entity which has been constantly reshaped during the last 100 years. Within this context no (isolated) historical or archaeological structures, features, assemblages or artefacts were recorded during the survey. However, also note that several pagoda-style picnic structures (age unknown) have recently been repainted and restored by contractors.

The proposed dynamic restoration initiatives to reestablish water quality at the Boksburg Lake may proceed as there is no objection from a heritage perspective.

Also, please note:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

Definitions and abbreviations

Midden:	Refuse that accumulates in a concentrated heap.
Stone Age:	An archaeological term used to define a period of stone tool use and manufacture
Iron Age:	An archaeological term used to define a period associated with domesticated livestock and grains, metal working and ceramic manufacture
LIA:	Late Iron Age sites are usually demarcated by stone-walled enclosures
NHRA:	National Heritage Resources Act (Act No. 25 of 1999)
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System
PHRA-G:	Provincial Heritage Resources Authority - Gauteng
GDARD:	Gauteng Department of Agriculture and Rural Development
HIA:	Heritage Impact Assessment
DMR:	Department of Mineral Resources
DENC:	Department of Environment and Nature Conservation: Northern Cape
I&APs:	Interested and Affected Parties
RAL:	Road Agency Limpopo

I, Francois Coetzee, hereby confirm my independence as a cultural heritage specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of the listed environmental processes, other than fair remuneration for work performed on this project.



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1. Introduction and Terms of Reference

SRK Consulting (Pty) Ltd has been appointed by the Ekurhuleni Metropolitan Municipality to conduct a Basic Assessment process and apply for a Water Use Licence (WUL) for the proposed rehabilitation of Boksburg Lake which aims to address and restore the water quality of the Boksburg Lake by managing the Suspended Solids (SS). It is proposed to install aerators, construct a low crest weir and establish a filtration plant to address these issues.

The Boksburg Lake is situated in Boksburg within the Ekurhuleni Metropolitan Municipality, Gauteng and is situated on the farm Vogelfontein84 IR. The Basic Assessment process for Environmental Authorisation for the proposed upgrade is conducted in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). A Cultural Heritage Impact Assessment (HIA) was requested by SRK Consulting on behalf of the client to evaluate the potential impact of the proposed rehabilitation of the Boksburg Lake.

2. Objectives

The general objective of the cultural heritage survey is to record and document cultural heritage remains consisting of both tangible and intangible archaeological and historical artefacts, structures (including graves), settlements and oral traditions of cultural significance.

As such the terms of reference of this survey are as follows:

- Identify and provide a detailed description of all artefacts, assemblages, settlements and structures of an archaeological or historical nature (cultural heritage sites) located on the study area,
- Estimate the level of significance/importance of these remains in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value,
- Assess any impact on the archaeological and historical remains within the area emanating from the development activities, and
- Propose recommendations to mitigate heritage resources where complete or partial conservation may not be possible and thereby limit or prevent any further impact.

3. Description of Physical Environment of Study Area

The heritage survey focussed on the footprint of the proposed rehabilitation project which seeks to address and restore the water quality of the Boksburg Lake. The site is situated in Boksburg.

Farm Name(s) and Portions	The following farm: <ul style="list-style-type: none"> • Vogelfontein 84 IR <ul style="list-style-type: none"> ○ Boksburg Lake, Erf 1599
Size of Survey Area	30 Ha
Magisterial District	Ekurhuleni Metropolitan Municipality
1:50 000 Map Sheet	2628AA 2628AB
1:250 000 Map Sheet	2628
Central Coordinates of the Development	28.247627°E 26.220287°S

Table 1: Physical Environment

The survey area falls within the Grassland Biome, particularly the Mesic Highbush Grassland Bioregion and specifically the Soweto Highbush Grassland (Gm8) (Mucina & Rutherford

2006). Mpumalanga and Gauteng (and to a very small extent also in neighbouring Free State and North-West) Provinces: In a broad band roughly delimited by the N17 road between Ermelo and Johannesburg in the north, Perdekop in the southeast and the Vaal River (border with the Free State) in the south. It extends further westwards along the southern edge of the Johannesburg Dome (including part of Soweto) as far as the vicinity of Randfontein. In southern Gauteng it includes the surrounds of Vanderbijlpark and Vereeniging as well as Sasolburg in the northern Free State (Mucina & Rutherford 2006).

The survey footprint falls mostly within the existing recreational area within a suburb with various residential and commercial buildings. Infrastructure also includes roads bridges, recreational playground for children, fences, paved parking area and an amphitheatre.

Boksburg normally receives about 588 mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall (0 mm) in July and the highest (110 mm) in January. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Boksburg range from 16.6°C in June to 26.2°C in January. The region is the coldest during July when the mercury drops to 0.2°C on average during the night (SAExplorer 2018).

Current Zoning	Recreational park/dam
Economic activities	Recreational/tourism
Soil and basic geology	
Prior activities	Residential/recreational
Socio Economic Environment	
Evaluation of Impact	An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits NHRA (Act No. 25 of 1999, Section 38(3d)): Positive

Table 2: Socio-economic environment

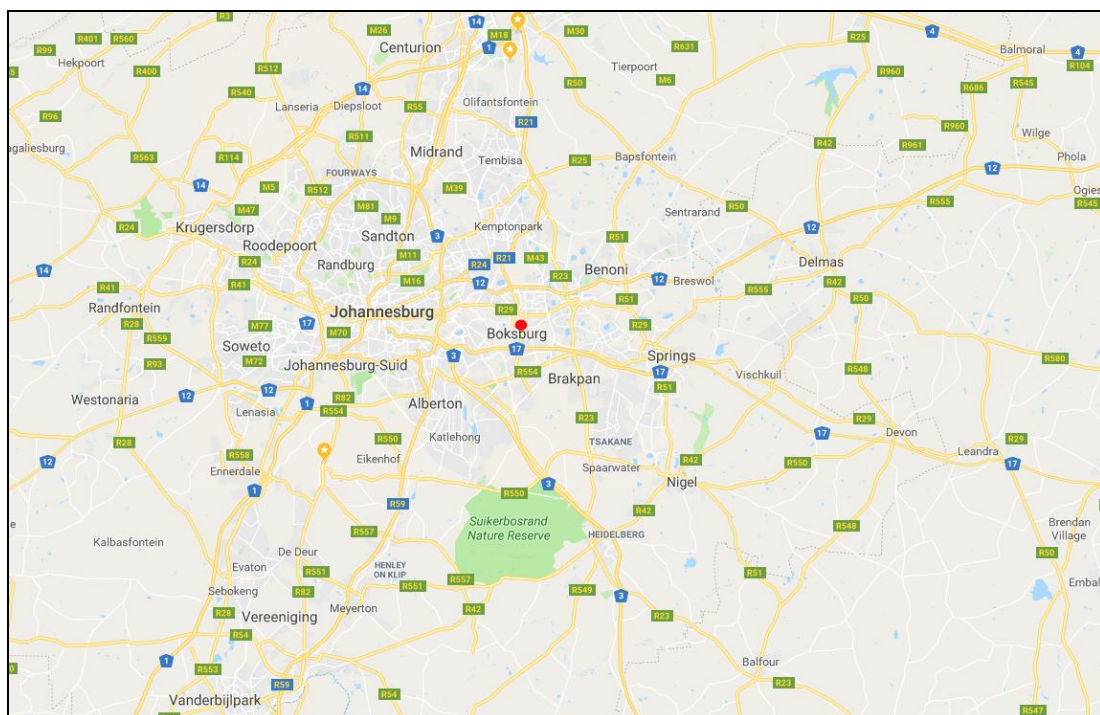


Figure 1: Regional context of the survey footprint located east of Johannesburg CBD (indicated by the red area)

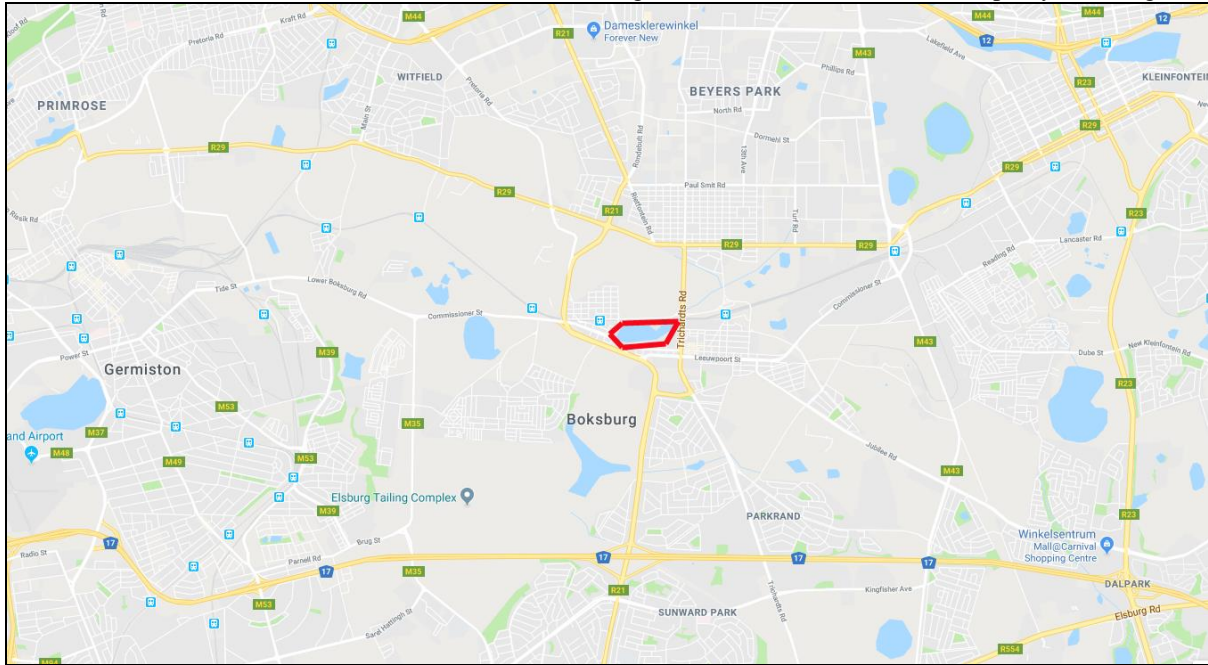


Figure 2: Local context of the survey footprint located in Boksburg (indicated by the red area)

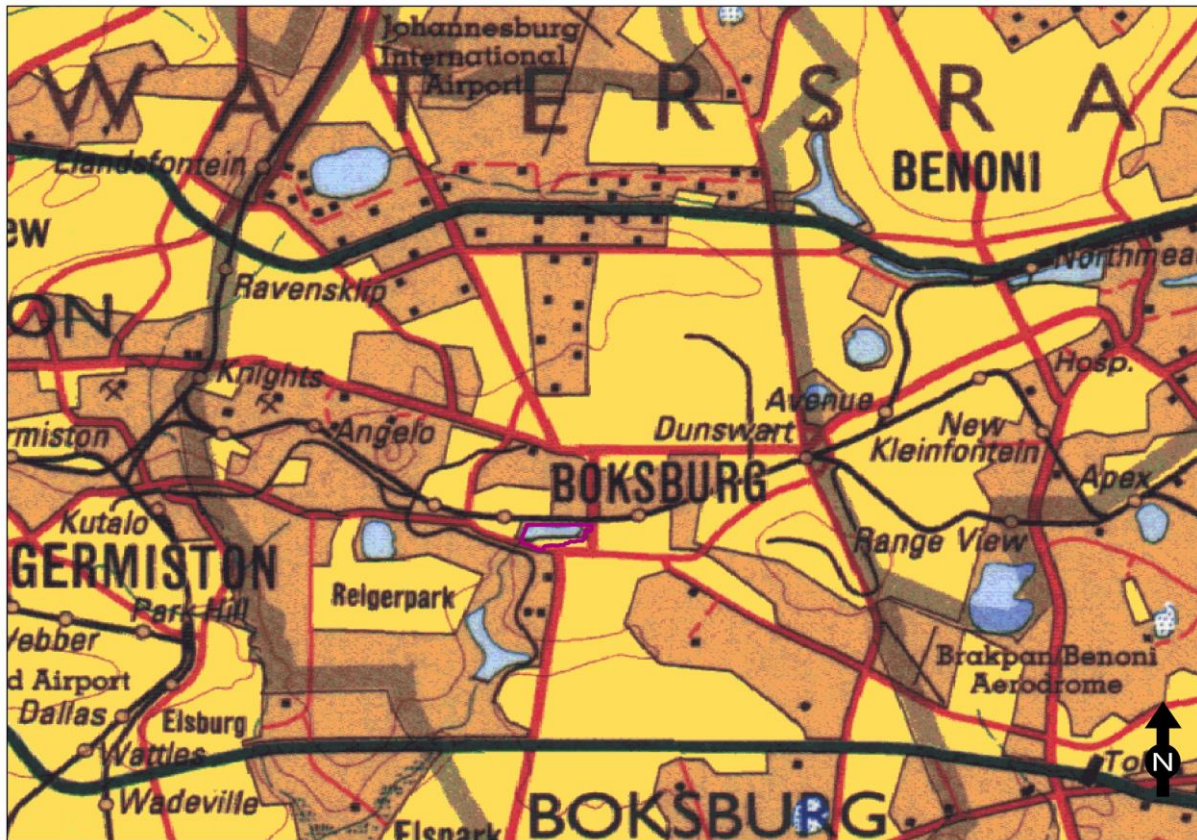


Figure 3: Local context of the survey footprint (1:250 000 Topographical Map 2628)

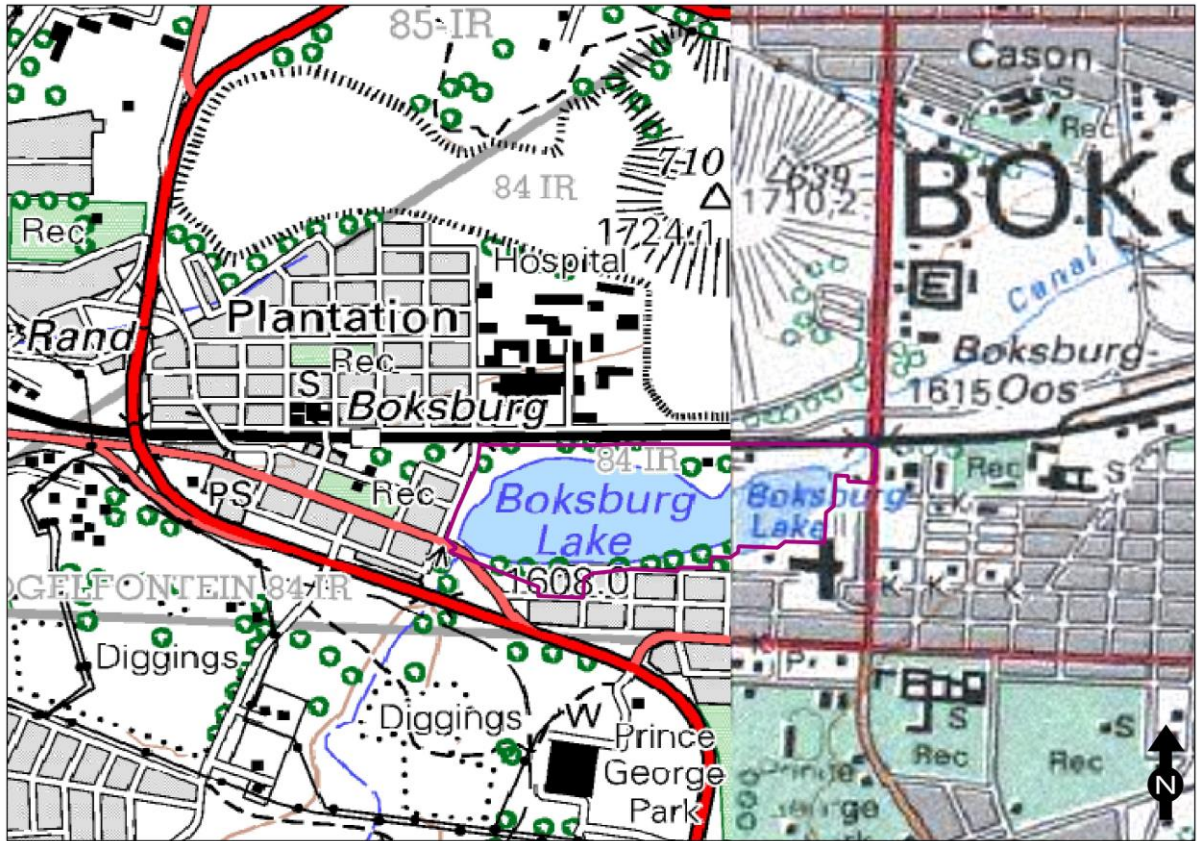


Figure 4: The survey area as indicated on the 1:50 000 topographic maps 2628AA & 2628AB



Figure 5: Survey area within general context (Google Earth Pro 2018)



Figure 6: General view of the eastern section with a bridge

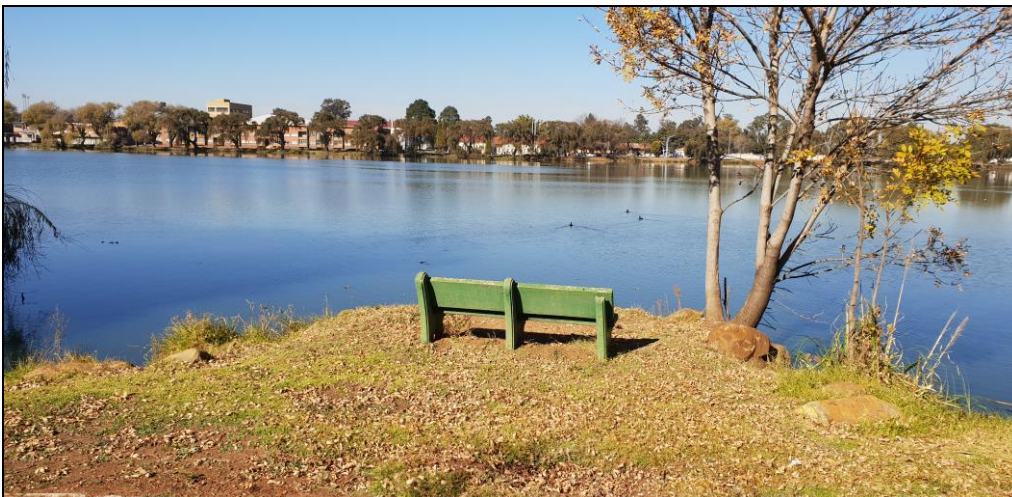


Figure 7: General view of existing infrastructure at the northern section



Figure 8: General view of an existing pagoda being restored



Figure 9: General view of existing paved parking areas



Figure 10: General view of the amphitheatre



Figure 11: Existing square brick structure with corrugated iron roof

4. Proposed Project Description

Low Crest Weir, Wastewater Treatment Package Plant and Aeration

The preferred solution to address the immediate need to restore the water quality of the Boksburg Lake so that it can be used by the public is to facilitate the natural processes bodies

of water should treat themselves. The critical problem with the Boksburg Lake is the constant inflow of Suspended Solids (SS) and nutrients from the sewerage leaking into the municipal storm water system that drain into the lake.

Specific strategies to address a lake's nutrient enrichment problems must focus on activities in the watershed and in-lake restoration techniques.

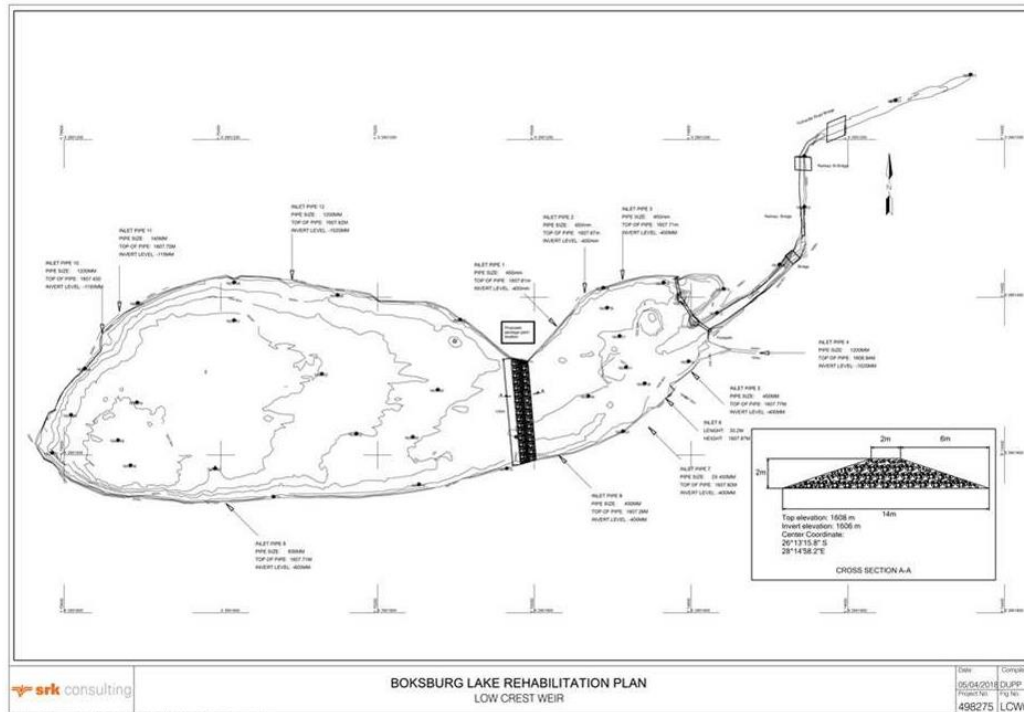
Strategies to address the nutrients emanating from the watershed is a medium to long term process before results will be seen and do not address the immediate EMM Lakes and Dams Flagship programme requirements so in lake interventions are required.

Lakes and bodies of water have a certain amount of pollution they can handle without human intervention, however if the pollution inflows into the lake exceed the amount that the natural processes of the lake can handle then then leads to cultural eutrophication and the anaerobic conditions that now prevail in the lake.

Due to the dynamic interaction of lake chemistry, plants, microbes and how they will respond to this intervention it is recommended a staggered approach be taken. Once the Dissolved Oxygen (DO) levels are raised and the aerobic conditions are restored and maintained that the natural process will be able to cope with the high SS levels negating any further interventions.

The transfer of oxygen from the atmosphere to the top layer of the lake ensures a surface layer of varying depth which keeps nature in equilibrium. Urbanisation drastically increases pollutants into the lakes thus exceeding the capacity the water body can handle on its own and turning the oxidative layer into anaerobic conditions. Aerators have proven that they increase the ability of lakes to survive pollution, increased nutrient levels and eutrophication. By providing sub surface aeration with directional mixing, the water moves in a circular pattern around the entire lake, breaks up stratification and increases in DO levels, the aerators assist nature in returning a healthy state of aerobic equilibrium. The first step in the restoration will be to install three 45 kW aerators into the lake and then to monitor the results. With the aeration of the water and improved DO content aerobic conditions will return which in turn the digestion of the SS. It is possible that only this intervention could restore the lake, however if the SS levels and nutrient loadings are not resolved with aerators the next step would be to filter out the SS.

The removal of the SS would require the construction of low crest weir and the establishment of a filtration plant as shown in Figure 1.



The purpose of the low crest weir is to contain the sewage laden inflows from the main storm water pipes into a holding area separate from the main body of the lake. The low crest weir is not to create an impoundment that would cause water during a storm event to back up and exacerbate the flooding that is experienced under the railway bridge on Trichardts Street.

The Design of the low crest weir is to span the “narrows” between Lat -26.220416° ; Long 28.249346° and Lat -26.221608° ; Long 28.249553° . The weir is to be constructed from hand stone sized crushed rock of a sound stable lithology. The Depth of the lake at this point is up to 2m deep.

The side slope of the rockfill is to be at an angle of 1v:3h and the crest is to be 2m wide. The rock is to be nominally compacted so that the crest is on the mean average water level of the lake of elevation 1608m.

From this holding area water laden with SS will be processed through a filter plant that will remove the SS and filtered water will run into the main body of the lake. The SS solids that are filtered out will then be removed to a waste disposal facility. The most suitable filtration plant identified is the Dynadisc plant. This plant has a small footprint and minimal establishment requirements.

5. Legal Framework

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE APPLIED
The Constitution of the Republic of South Africa (Act No. 108 of 1996)	
The National Environmental Management Act (Act No. 107 of 1998)	Section 24 Section 28
The National Water Act (Act No. 36 of 1998)	Section 21 (c) and (i)
Regulation 2, Appendix 2 of Governmental Notice Regulation	GNR 372, GN 324
Air Quality Act (Act No. 39 of 2004)	
National Forests Act, Act of 84 of 1998	
The National Heritage Resources Act (Act No. 25 of 1999)	Section 38, 34, 35, 36

Conservation of Agricultural Resources Act (Act No. 85 of 1983)	
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)	
The National Water Act (Act No. 36 of 1998);	
Mine Health and Safety Act (Act No. 29 of 1996) (MHSA)	
Biodiversity Act (Act 10 of 2004)	
Lephalale Municipality Process Plan 2018/9	
Waterberg District Municipality IDP 2018/9	

Table 3: Legal framework

NR 983, December 2014 Activity 12	The development of (xii) infrastructure or structures with a physical footprint of 100 square metres or more, where such development occurs (a) within a watercourse. The total foot footprint of the low crest weir will be more than 100 m ² .
GNR 983, December 2014: Activity 19 a	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse. The construction activities will require that material be deposited into the lake for the weir. It is expected that the material required will be more than 10 m ³ .
GNR 983, December 2014: Activity 25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres. It is expected that the package plant may be required to treat more than 2 000 m ³ of wastewater.
GNR 985, December 2014: Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance plan (c) Gauteng (ii) Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans. The area to be cleared for the proposed package plant will be more than 300 m ² .
GNR 985, December 2014: Activity 14	The development of (v)weirs, (xii) infrastructure or structures, all exceeding 10 square metres or more in size (a) within a watercourse or (c) within 32 metres of a watercourse measured from the edge of a watercourse (b) in Gauteng Province(x) sites zoned for conservation or public open spaces or equivalent zoning. The Boksburg Lake is located within an area classified as an Ecological Support Area (ESA) and the weir and package plant will have a footprint of more than 10m ² .

Table 4: Listed activities

- Section 38 of the NHRA (Act No. 25 of 1999) stipulates that the following activities trigger a heritage survey:

Development criteria in terms of Section 38(1a-e) of the NHRA (Act No. 25 of 1999)	Yes/No
Construction of road, wall, powerline, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 m ² in extent	No
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 m ²	No
Any other development category, public open space, squares, parks, recreation grounds	Yes

Table 5: Activities that trigger Section 38 of the NHRA

- Field rating system as recommended by SAHRA:

Field Rating	Grade	Significance	Recommended Mitigation
National Significance	Grade I	High significance	Conservation by SAHRA, national site nomination, mention any relevant international ranking. No alteration whatsoever without permit from SAHRA
Provincial Significance	Grade II	High significance	Conservation by provincial heritage authority, provincial site nomination. No alteration whatsoever without permit from provincial heritage authority.
Local Significance	Grade III-A	High significance	Conservation by local authority, no alteration whatsoever without permit from provincial heritage authority. Mitigation as part of development process not advised.
Local Significance	Grade III-B	High significance	Conservation by local authority, no external alteration without permit from provincial heritage authority. Could be mitigated and (part) retained as heritage register site.
Generally Protected A	Grade IV-A	High/medium significance	Conservation by local authority. Site should be mitigated before destruction. Destruction permit required from provincial heritage authority.
Generally Protected B	Grade IV-B	Medium significance	Conservation by local authority. Site should be recorded before destruction. Destruction permit required from provincial heritage authority.
Generally Protected C	Grade IV-C	Low significance	Conservation by local authority. Site has been sufficiently recorded in the Phase 1 HIA. It requires no further recording before destruction. Destruction permit required from provincial heritage authority.

Table 6: Field rating system to determine site significance

- Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and they are valuable, finite, non-renewable and irreplaceable.
- All archaeological remains, features, structures and artefacts older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the **National Heritage Resources Act (NHRA) (Act No. 25 of 1999, Section 34 & 35)**. The Act makes an archaeological impact assessment as part of an EIA and EMPR mandatory (see **Section 38**). No archaeological artefact, assemblage or settlement (site) may be moved or destroyed without the necessary approval from the **South African Heritage Resources Agency (SAHRA)**. Full cognisance is taken of this Act in making recommendations in this report.
- Cognisance will also be taken of the Mineral and Petroleum Resources Development Act (Act No 28 of 2002) and the National Environmental Management Act (Act No 107 of 1998) when making any recommendations.

- Human remains older than 60 years are protected by the NHRA, with reference to Section 36. Human remains that are less than 60 years old are protected by the Regulations Relating to the Management of Human Remains (GNR 363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003 as well as local Ordinances and regulations.
- With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise.
- The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3, and the Australian ICOMOS (International Council on Monuments and Sites) Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.
- A copy of this report will be submitted on SAHRIS as stipulated by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), Section 38 (especially subsection 4) and the relevant Provincial Heritage Resources Authority (PHRA).
- Note that the final decision for the approval of permits, or the removal or destruction of sites, structures and artefacts identified in this report, rests with the SAHRA (or relevant PHRA).

6. Study Approach/Methodology

Geographical information (KML shapefiles) on the proposed central pivots was supplied by SRK Consulting. The most up-to-date Google Earth images and topographic maps were used to indicate the survey area. Topographic maps were sources from the Surveyor General. Please note that all maps are orientated with north facing upwards (unless stated otherwise).

The strategy during this survey was to survey most of the footprint that forms part of the application. However, the whole survey footprint was surveyed by detailed pedestrian (foot) survey.

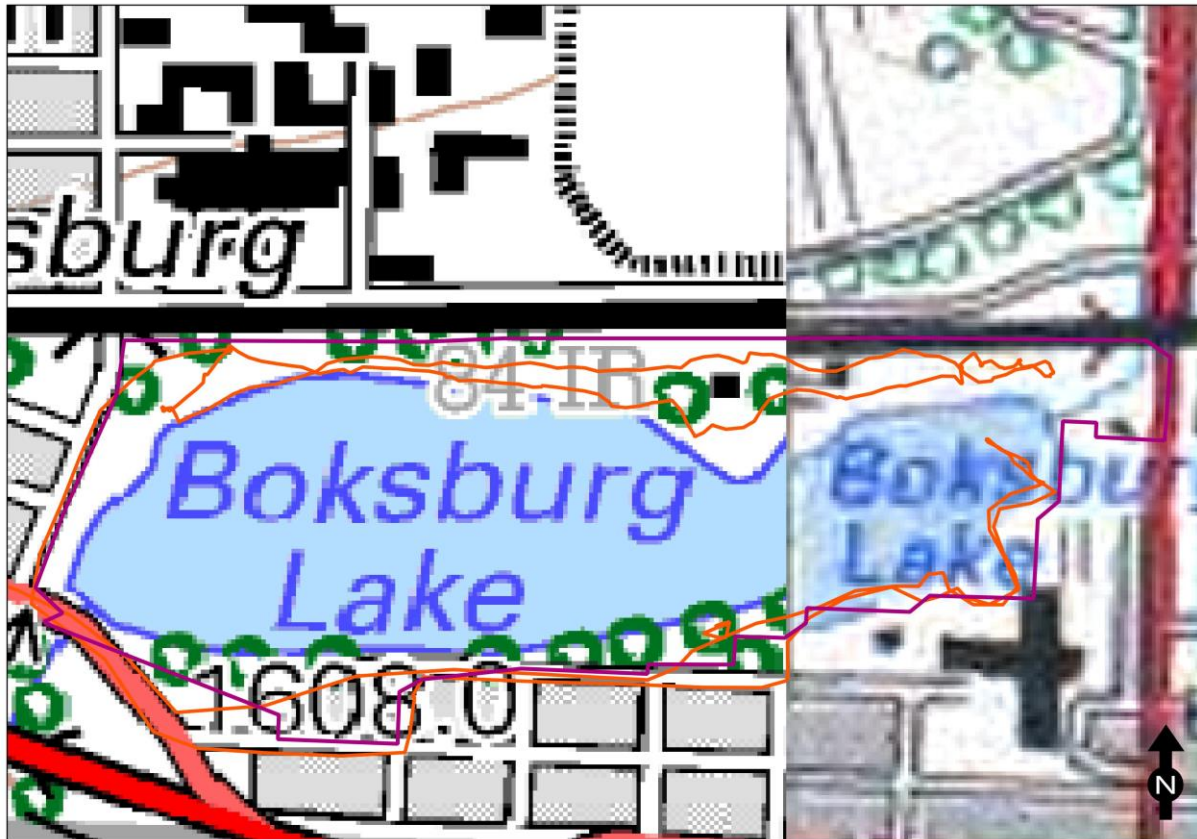


Figure 12: Recorded survey tracks for the project

6.1 Review of existing information/data

Additional information on the cultural heritage of the area was sourced from the following records:

- National Mapping Project by SAHRA (which lists heritage impact assessment reports submitted for South Africa);
- Environmental Potential Atlas (ENPAT);
- Online SAHRIS database;
- National Automated Archival Information retrieval System (NAAIRS);
- Maps and information documents supplied by the client; and
- Several heritage surveys have been conducted in the vicinity of the survey area (published and unpublished material on the area)

The survey area is located on the farm Vogelfontein 84 IR which was first surveyed in 1887 and it seems that the Boksburg Lake was first established and opened to the public in January 1905. There roughly 12 000 people at the opening (also see Addendum 1 for more detail).



Figure 13: General view of the lake in 1905

6.2 Palaeontological sensitivity

The simplified geology of the Waterberg District can be classified into five distinct geology types, namely the Transvaal Super Group, Karoo Super Group, Waterberg Group, Bushveld Igneous Complex, and the Archaean Granite/Gneiss and Swazian Complex.

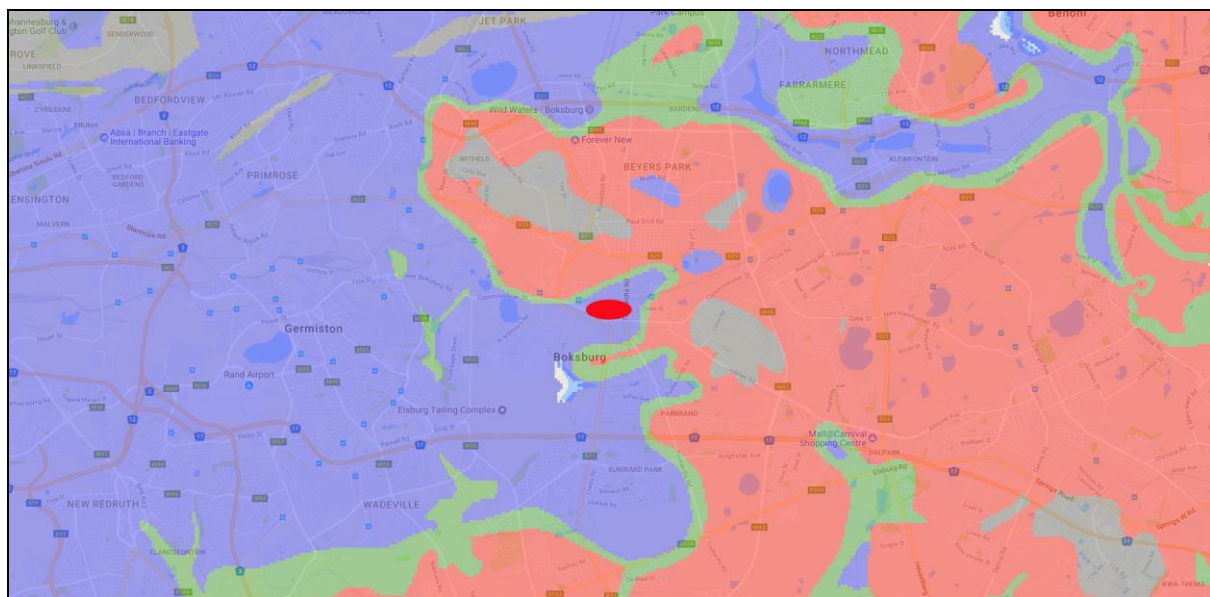


Figure 14: Palaeontological sensitivity zones as indicated for the survey footprint (SAHRIS 2018)

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required

GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	Will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The palaeontological sensitivity map was extracted from the SAHRIS database and clearly shows Blue (Low) sensitivity. As a result a desktop palaeontological study will not be required for the survey footprint.

6.3 Site visits

The field survey was conducted on 9 June 2018.

6.4 Social interaction and current inhabitants

None

6.5 Public Consultation and Stakeholder Engagement

Measures have been taken to include all potential I&APs as required.

6.6 Assumptions, restrictions, gaps and limitations

No severe physical restrictions were encountered as the survey area was accessible.

6.7 Methodology for 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 - of a medium-term (5–15 years);
 - 4 - of a 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:

$S = (E+D+M) \times P$; where:

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

Points	Significance Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 point	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.

7. The Cultural Heritage Sites

7.1. Isolated occurrences

Isolated occurrences are artefacts or small features recorded on the surface with no contextual information. No other associated material culture (in the form of structures or deposits) was noted that might provide any further context. This can be the result of various impacts and environmental factors such as erosion and modern developments. By contrast archaeological sites are often complex sites with evidence of archaeological deposit and various interrelated features such as complex deposits, stone walls and middens. However, these isolated occurrences are seen as remains of erstwhile complex or larger sites and they therefore provide a broad indication of possible types of sites or structures that might be expected to occur or have occurred in the survey footprint.

Throughout the survey footprint no isolated finds were recorded.

7.2 Heritage sites

None

8. Locations and Evaluation of Sites

None

9. 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.

9.1 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 NHRA (Act No. 25 of 1999), Section 51. (1).

9.2 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.

10. Recommendations and Conclusions

Please note that although the Boksburg Lake and surrounds in itself can be regarded as historical (older than 60 years as per Section 34 of the NHRA (Act No. 25 of 1999) as the area is a living, dynamic and changing entity which has been constantly reshaped during the last 100 years. Within this context no (isolated) historical or archaeological structures, features, assemblages or artefacts were recorded during the survey. However, also note that several pagoda-style picnic structures (age unknown) have recently been repainted and restored by contractors.

The proposed dynamic restoration initiatives to reestablish water quality at the Boksburg Lake may proceed as there is no objection from a heritage perspective.

Also, please note:

Archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during development activities, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

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Addendum 1: Archaeological and Historical Sequence

The table provides a general overview of the chronological sequence of the archaeological periods in South Africa.

PERIOD	APPROXIMATE DATES
Earlier Stone Age	more than 2 million years ago to >200 000 years ago
Middle Stone Age	<300 000 years ago to >20 000 years ago
Later Stone Age (Includes hunter-gatherer rock art)	<40 000 years ago up to historical times in certain areas
Early Iron Age	c. AD 200 - c. AD 900
Middle Iron Age	c. AD 900 – c. AD 1300
Late Iron Age (Stonewalled sites)	c. AD 1300 - c. AD 1840 (c. AD 1640 - c. AD 1840)

< = less than; > = greater than

Archaeological Context

Stone Age sequence

Concentrations of Early Stone Age (ESA) sites are usually present on the flood-plains of perennial rivers and may date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as handaxes and cleavers. The earliest hominins who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore kill sites.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the Later Stone Age (LSA) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

History of Boksburg

Prior to 1860, the present municipal area of Boksburg and its immediate environs comprised mainly the highveld farms called Leeuwpoort, Klippoortje, Klipfontein and Driefontein. Carl Ziervogel bought the farm Leeuwpoort in 1875 and for 300 morgen of barren, rocky veld he paid £75. In September 1886 Pieter Killian, a young Afrikaans prospector, discovered quartz

reefs on Leeuwpoort. He also discovered quartz reefs on the farm Vogelfontein, named after Adolf Vogel.

Samples of the quartz were sent to Pretoria for assaying, which confirmed the presence of gold. Killian advised Dr W.E. Bok, Secretary of State for the Transvaal Republic, of the results of the assay. The result was the proclamation, on 10 March 1887, of the two farms as public diggings. Carl Ziervogel, who had been trying to sell Leeuwpoort, now opened the first gold mine on the East Rand, the Ziervogel Gold Mining Company.

Cornish miners were brought out to work the diggings. Unfortunately, it soon transpired that heavy expenditure was necessary for development, and as the Directors were unable to finance this, the mine closed down.

Mr Abe Bailey of the Barnato Group, which owned the Johannesburg Consolidated Investment Company (JCI), bought the farm Leeuwpoort in 1894 for £100,000. The mynpacht was controlled by JCI, who established E.R.P.M. Ltd, which is still carrying on mining operations after 120 years. JCI also developed many residential suburbs over the years.

Gold was also found at Elsburg, 8 km to the southwest. Elsburg was a recognized stopping point for coaches and wagon traffic. The first Government offices were at Elsburg and what was to become Boksburg was but a suburb of Elsburg. With the real centre of mining being centred on Boksburg, however, soon President Paul Kruger ordered that a new town be laid out to accommodate the miners. Land for the new town was released by having the boundaries of the farms Leeuwpoort, Driefontein and Klipfontein moved back from where they met. The newly created farm was called Vogelfontein, on which 1000 stands of 50x50 feet each were created. The new town of Boksburg was named after Dr Bok. In 1887 the first auction sale of stands took place, at which prices of £5 to £25 were realized.

Also in 1887 the Republican Government built the Post Office and the Mining Commissioner's office. Business and residential properties began to be built in the fledgling town in its first year of existence.

In 1888 coal deposits were discovered right on the boundary of the new town, and here coal was first mined in the Transvaal. This started an era of company promotion and syndicate formation, with ground fetching high prices. Enterprises of all kinds were set up and Boksburg began to emerge from a mining camp atmosphere to a fully-fledged town. Coal ensured that the gold mining industry would grow to a formidable size.

Originally, Boksburg was laid out in 1887 to serve the surrounding gold mines, and named after the State Secretary of the [South African Republic](#), [Eduard Bok](#). The Main Reef Road linked Boksburg to all the other major mining towns on the [Witwatersrand](#) and the Angelo Hotel was used as a production post. A railway was built by the [Netherlands-South African Railway Company](#) (NZASM) to link Boksburg to [Johannesburg](#) in 1890.

The first coal mine was called Gauf's Mine after the Manager Mr J.L. Gauf. Others were the Good Hope, Ferndale and many more. There now arose a pressing need for a more sophisticated coal distribution system than using teams of ox wagons. The mine owners strongly advocated a railway line between Johannesburg and Boksburg, but this was opposed by the waggoneers. President Kruger managed to persuade the Volksraad to approve the building of a "tram" line, ostensibly to transport passengers only! The Rand Tram (so named as to appease the transport riders) opened in 1890, between Johannesburg's Park station and Boksburg station. The line was subsequently extended to Brakpan and Springs, where large deposits of superior quality coal had been discovered. Also, deposits of high grade fireclay

were discovered in Boksburg, which gave impetus to development of a fireclay manufacturing industry. All this helped the importance of the gold mining industry.

Coal mining came to an end in 1895 after underground fires broke out, rendering the entire mining area unsafe. Immediately to the north of Boksburg Township was a large muddy vlei fed by a small stream from the North-East. This vlei was the only watering place for stock between Middelburg and Johannesburg and the government received strong representations from transport riders and others for improved watering facilities near the public outspan west of the town. It was accordingly decided to build a small dam at the outlet of the vlei. Work on the dam was not proceeding satisfactorily, so Montague White, appointed Mining Commissioner of the Boksburg Goldfields in 1888, was asked by President Kruger to look into the matter. White said soon after arriving in Boksburg that the place was one of the "most uninviting spots" he had ever seen. Two things dear to him were needed: a stream or well-ordered sheet of water and trees, instead of the barren area of muddy pools which he found.

White was able to persuade a reluctant President to build a larger dam than was originally envisaged, because he visualised the ugly vlei being transformed into a beautiful lake fringed with trees. However, after completion, the new lake stood empty for nearly two years and became known as "White's folly". In 1891 the rains came, there was a cloudburst north of the dam one night and the next morning the citizens awoke to find a large lake filled and running over. Ever since then, it has been a popular and attractive feature of Boksburg and an integral part of its central area.

After the discovery of gold in the late 1800s, people of all races flocked to Boksburg—some hoped to get rich, others just wanted employment. Most workers initially resided in the Boksburg North area but another area was later established for all mine workers dubbed, Julewe, the Zuluword for Place of Work.

The Government of the time declared that all coloured, Asian and black people should live in Julewe, which was situated between two wetlands and close to the mines (Cinderella and Hercules Mine Shafts). Julewe was divided in two by the main road, Church Road, running through it, with black mine workers on the one side, and coloureds, who moved to the Transvaal from the Eastern Cape, on the other. Close to the entrance of the township, was the Asian trading market known as Kalamazoo.

The Hercules Mine Shaft, (the headgear and structures were demolished three years ago - [from 2007]) was the deepest shaft in the world.

The Julewe community soon started schools and churches, and the Boksburg Coloured School, now known as Goedehoop Primary, is the oldest school in Boksburg, as it opened in 1905, with Mr G W Van Rooyen as the principal.

By 1911, the township was renamed Stirtonville, after the superintendent of the area.

As a precaution, and to monitor the number of residents in the area, residents of Stirtonville each received a residential permit, while people who wanted to visit family or friends residing in the township, had to obtain a temporary day-pass, in order to enter the township.

But even the strict control of the "Black Jack" officers who patrolled the township, failed to detect a few people creeping in and hiding away in the dense township.

One of the people who did this, is one of the most iconic people in the world, the Nobel prize-winner and former President [Nelson Mandela](#).

It is rumoured that Mandela hid in Stirtonville, with authorities hot on his heels. Years later, Mandela returned to this area, where he was given the Freedom of the City.

During the 1960s, all the black residents were moved to a new township on the border of Boksburg and Germiston, called Vosloorus and the Asian residents to Actonville, and Stirtonville became the sole residential area of the coloured community. The community decided to rename their suburb to Reiger Park, in 1962.

Two years later, town council agreed to change the street names, which were mainly African words. The Reiger Park Stadium was built upon a cemetery, mainly used for Chinese mine workers—the remains were never removed. Reiger Park has developed a fearful reputation, mainly due to gang violence.

Today it is a community focussed on change and remaining positive to build a bright future. The township has over 100 formal and informal churches, four primary school, two high schools, and some community facilities, including a public library and swimming pool.

The oldest mosque in the Gauteng area was also to be found in this suburb, but a fire in 2003 destroyed it completely. In 2003 a new shiny mosque, Masjid Al-Noor, was erected (Wikipedia 2018).



Figure 15: Postcards of the Boksburg Lake during the early 1900s

Addendum 2: Description of the Recorded Sites

A system for grading the significance of heritage sites was established by the NHRA (Act No. 25 of 1999) and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

An example of data form:

A. GENERAL SITE DESCRIPTION				
B. SITE EVALUATION				
B1. HERITAGE VALUE			Yes	No
Historic Value				
It has importance to the community or pattern of South Africa's history or precolonial history.				
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.				
It has significance relating to the history of slavery in South Africa.				
Aesthetic Value				
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.				
Scientific Value				
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.				
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.				
It has importance to the wider understanding of the temporal change of cultural landscapes, settlement patterns and human occupation.				
Social Value				
It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).				
Tourism Value				
It has significance through its contribution towards the promotion of a local sociocultural identity and can be developed as tourist destination.				
Rarity Value				
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.				
Representative Value				
It is importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.				
B2. REGIONAL CONTEXT				
Other similar sites in the regional landscape.				
B3. CONDITION OF SITE				
Integrity of deposits/structures.				
C. SPHERE OF SIGNIFICANCE		High	Medium	Low
International				
National				
Provincial				
Local				
Specific community				
D. FIELD REGISTER RATING				
National/Grade 1 [should be registered, retained]				
Provincial/Grade 2 [should be registered, retained]				
Local/Grade 3A [should be registered, mitigation not advised]				
Local/Grade 3B [High significance; mitigation, partly retained]				
Generally Protected A [High/Medium significance, mitigation]				
Generally protected B [Medium significance, to be recorded]				
Generally Protected C [Low significance, no further action]				

E. GENERAL STATEMENT OF SITE SIGNIFICANCE	
Low	
Medium	
High	
F. RATING OF POTENTIAL IMPACT OF DEVELOPMENT	
None	
Peripheral	
Destruction	
Uncertain	
G. RECOMMENDED MITIGATION	
•	
H. APPLICABLE LEGISLATION AND LEGAL REQUIREMENTS	
•	
I. PHOTOGRAPHS	

Addendum 3: Surveyor General Farm Diagram

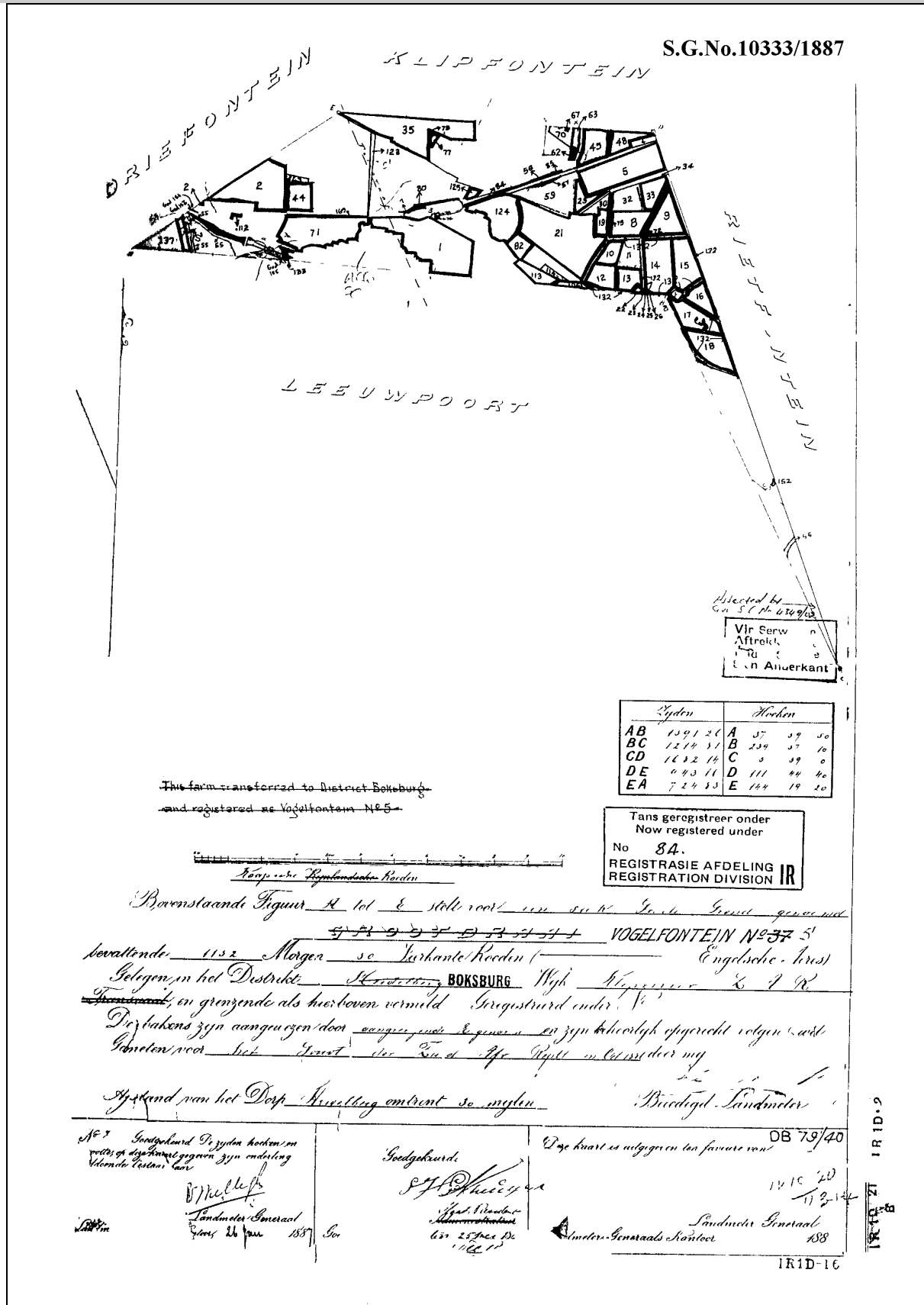


Figure 16: Surveyor General’s sketch of Farm Welgelegen 647 LR which was first surveyed in 1887

Addendum 4: Relocation of Graves

Marked graves younger than 60 years do not fall under the protection of the NHRA (Act No. 25 of 1999) with the result that exhumation, relocation and reburial can be conducted by an undertaker. This will include logistical aspects such as social consultation, purchasing of plots in cemeteries, procurement of coffins, etc. Other legislative measures which may be pertinent include the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), Regulations Relating to the Management of Human Remains (GNR 363 of 22 May 2013) made in terms of the National Health Act No. 61 of 2003, Ordinance on Exhumations (Ordinance No. 12 of 1980) as well as any local and regional provisions, laws and by-laws that may be in place.

Marked graves older than 60 years are protected by the NHRA (Act No. 25 of 1999) as a result an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. Note that unmarked graves are by default regarded as older than 60 years and therefore also falls under the NHRA (Act No. 25 of 1999, Section 36).

The relocation of graves entails the following procedure:

- Notices of intent to relocate the graves must be put up at the burial site for a period of 60 days. This should contain contact information where communities and family members can register as interested and affected parties. All information pertaining to the identification of the graves must be documented for the application of a SAHRA permit. All notices must be in at least 3 languages, of which English is one. This is a requirement by law.
- These notices of intention must also be placed in at least two local newspapers and have the same information as above.
- Local radio stations can also be used to try contact family members. This is not required by law, but can be helpful.
- During this time (60 days) a suitable cemetery must be identified near to the development 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.
- Once the 60 days have 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 issued, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any remains and any additional objects found in the grave.

Information needed for the SAHRA permit application

- The permit application must 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.
- A letter of permission from the landowner granting permission to the developer to exhume and relocate the graves.
- A letter (or proof of purchase of the plots) 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.

Graves are generally be classified into four categories. These are:

- Graves younger than 60 years;
- Graves older than 60 years, but younger than 100 years;
- Graves older than 100 years; and
- Graves of victims of conflict or of individuals of royal descent.