

APPENDIX D4: Heritage Assessment

25 March 2014



Att: Mr Andrew Salomon

Archaeological Heritage Impact Assessor

South African Heritage Resources Agency

PO Box 4637

Cape Town

8000

By email: asalomon@sahra.org.za

Dear Mr Salomon,

REQUEST FOR EXEMPTION FROM AN ARCHAEOLOGICAL IMPACT STUDY: PREVENTION OF WATER INGRESS INTO MINED OUT AREAS OF THE WITWATERSRAND MINING BASIN, GAUTENG PROVINCE

1. Introduction

This letter constitutes a notification of intention to construct three canals as part of the project to prevent water ingress into mined out areas of the Witwatersrand Mining Basin. The Department of Mineral Resources (DMR), through the Council for Geoscience (CGS) has embarked on a project to prevent water ingress into mined out areas of the Witwatersrand goldfields. This project is part of a large project approved by Cabinet to deal with Acid Mine Drainage (AMD) within the Witwatersrand goldfields. Acid mine drainage (AMD) is the flow, or seepage, of polluted water from mainly extinct mining areas. Depending on the area, the water may contain toxic heavy metals and radioactive particles. These are dangerous for the health of humans, fauna and flora. Acid mine drainage on the Witwatersrand has reached a crisis point.

Various measures are currently being planned and implemented to prevent AMD from further polluting water resources. One such preventative measure is being undertaken by the Department of Mineral Resources (through the CGS) to prevent water from entering mined out areas in the Witwatersrand goldfields. Ingress of surface water into underground mines, and the subsequent decant of the impacted water, is a major concern in the Witwatersrand mining basin. The objective of this project is to alleviate the ingress of surface water into underground mines in identified areas. Three canals have been identified for construction along and across streams traversing shallow undermined areas in the Witwatersrand

goldfields.

The proposed canals are the:

- Durban Roodepoort Deep (DRD) - DEA Ref: 14/12/16/3/3/3/72
- New Canada Dam (NCD) - DEA Ref: 14/12/16/3/
- Elsburgspruit (Elsburg) DEA Ref: 14/12/16/3/3/3/73

Stream	Portion	Farm name	Farm Number	Registration Division
DRD	37	Roodepoort	237	IQ
	1	Vlakfontein	238	IQ
Elsburgspruit	206	Driefontein	87	IR
	230	Driefontein	87	IR
	231	Driefontein	87	IR
NCD	1	Paardekraal	226	IQ
	129	Paardekraal	226	IQ

A Basic Assessment (BA) and Water Use Licence Application (WULA) must first be lodged for each of the three proposed canals before construction can start. This is done to identify and evaluate potential impacts, to recommend measures to avoid or reduce negative impacts and to enhance positive impacts. Zitholele Consulting has been tasked with doing the BA's and WULA's for these proposed canals that are situated in Johannesburg as per the location map below.

PGS Heritage has been contacted to evaluate the possible heritage impacts by the proposed projects and determine if a heritage impact assessment will be required.

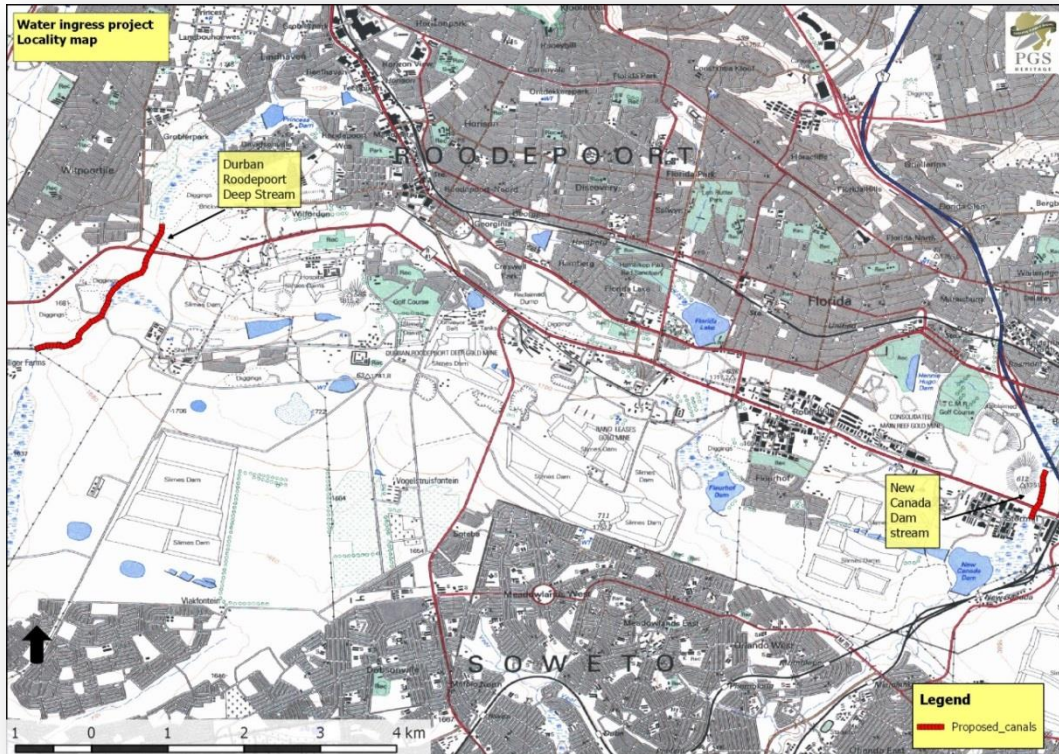


Figure 1 – Locality map for the Durban Roodepoort Deep stream and the New Canada Dam Stream canals

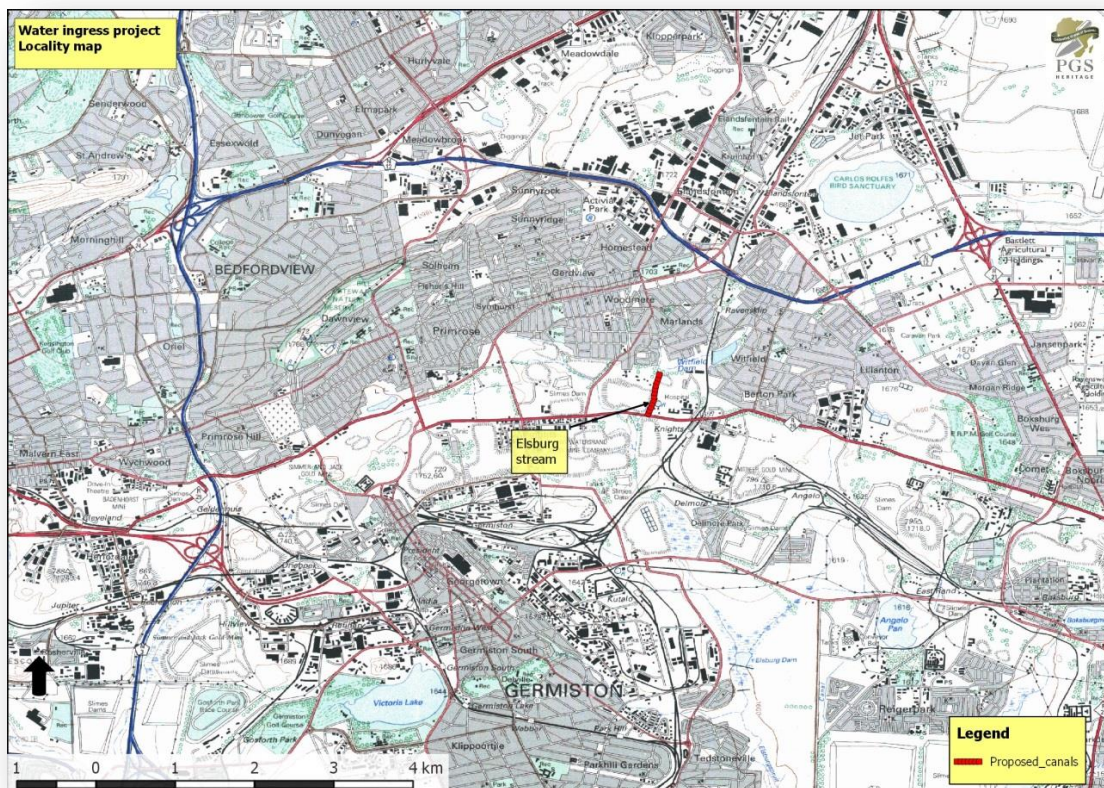


Figure 2 - Locality map for the Elsburg stream canal

2. Project description

Construction of each of the three proposed canals will involve the following activities:

- 1.) Delineation of the river segment in which intervention measures will be undertaken;
- 2.) Diversion of the river away from the construction area. The diversion will be about 10 m to 20 m away from the river. Water Use Licence (WUL) issues are being addressed with Department of Water Affairs;
- 3.) Removal of the river bed sediment and clearing adjacent river banks of all litter and pollution, including slimes that may have been washed into the river bed and settled out in the riverine area. The servitude to be cleared will be 30 m wide around the existing river. All slimes found in the area under consideration will be disposed of at an appropriate and registered landfill site;
- 4.) Earthworks within the 30 m servitude, including the excavation along the affected river (proposed river canal), profiling of the river and adjacent river banks. Should any hard rocks be encountered along the proposed canal route, they will accordingly be excavated or blasted. All relevant permits to be obtained prior to undertaking activities that require such permits;
- 5.) Import and fill a 500mm thick layer of dump rock to obtain a hard working surface;
- 6.) Construct a subsoil drainage system which consists of a 150mm thick layer of 19mm stone wrapped in a geotextile (A4 Bidim or similar);
- 7.) Installation and welding of watertight 1.5mm thick HDPE geomembrane;
- 8.) Installation of a heavy geotextile on top of the HDPE geomembrane to protect it from damage (A8 Bidim or similar);
- 9.) Construction of a 170mm thick Reno mattress on top and 1m deep Gabions on each side of the channel. Alternatively a concrete layer will be constructed instead of the Reno mattress and gabions;
- 10.) Diversion of the river back to the canalised river segment;
- 11.) Compaction next to channel lining (to prevent erosion) filled with 150mm to 300mm topsoil on top of the compacted material, followed by rehabilitation below;
- 12.) Rehabilitation of the areas affected outside of the river canal during construction activities. Where signs of unsuccessful natural re-vegetation is evident, the following will be done to ensure rehabilitation success:
 - a. The disturbed areas will be covered with Geojute up to 5 m from the stream channel, anchored by pegging and burying the edges of the material on a 1 x 1 metre grid over its entire area. Only wooden pegs will be used.
 - b. Plugs of indigenous sedges and grass material from the adjacent banks will then be planted into holes punched into the Geojute at 10 x 10 cm per 50 x 50 cm area, adding fertiliser, appropriate to the soil composition, in the bottom of the hole prior to planting.

- c. To limit damage to the Geojute 10 cm diameter planting holes will be cut through the Geojute with a sharp knife and a 10 cm diameter soil augur will be used to remove the earth for planting.
- d. Planted plugs will be watered immediately after planting and will continue for every three days in the absence of more than 10 mm of rainfall until plants are established.

13.) Alien plants (e.g. Khakibos *Tagetes minuta*, Blackjack *Bidens pilosa*, *Sesbania*) will be weeded out by hand once a month during the first growing season.

14.) Where plants have not established successfully after 2 growing seasons new plant material will be planted.

15.) Protection of the river banks and wetlands: Constructions will preferably take place in winter i.e. during low flow period and will take approximately 6 to 8 months to complete. The identified wetlands and affected water courses will be protected through implementing the following:

- a. The river banks over the disturbed areas will be profiled to emulate the adjacent undisturbed slopes and all soils will be replaced.
- b. In addition turbidity and sedimentation downstream of the river crossing sites will be monitored until levels have returned to the preconstruction baseline.

3. Description of the receiving environment

3.1 DRD Stream

The DRD stream is one of the tributaries of the Kliprivier system starting in the Witpoortjie and Lindhaven area of the West Rand of Gauteng. The stream and surrounds are covered by thick vegetation growth (**Figure 3** and **Figure 4**) heavily impacted by previous mining activities (**Figure 6**), thick vegetation growth and currently small scale illegal mining activities (**Figure 7**).

The stream traverses the R29, where it is channeled through a culvert/bridge (**Figure 5**), and then continues on for a further 700 meters before it enters a large wetland area. This wetland area was created by historic prospecting activities and a second stream joining from the east.



Figure 3 – General view of the DRD stream and dense vegetation towards the south of the R29

The stream then joins the Kliprivier 1.2 kilometers further down from the wetland/confluence area. At this point the proposed canal will end.



Figure 4 – Conditions of vegetation and stream on southern side of DRD stream bridge



Figure 5 – View of DRD stream bridge on the R29



Figure 6 – View towards the north from DRD stream bridge on R29 (old rock dumps visible to the left in background)



Figure 7 – Illegal mining activities, indicated by yellowish water flow

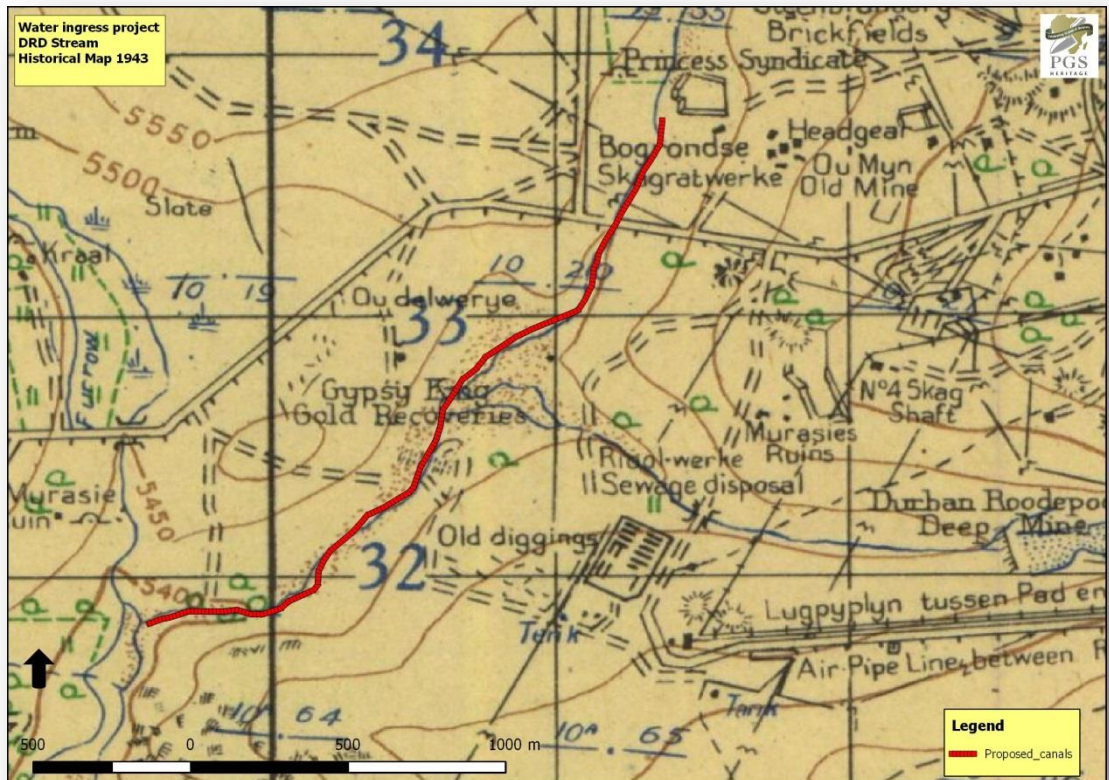


Figure 8 – 1943 topographical map indicating the proposed DRD canal

A cursory analysis of the 1943 First Edition 1:50 000 topographical map (Figure 8), shows the area as previously impacted by old prospecting workings (Ou delwerye). The R29 road is also indicated on the 1943 map, raising the possibility that the bridge (Figure 5) is possibly older than 60 years. This can however not be confirmed as a fact, as road upgrades after 1943 could have required the construction of a new bridge.

3.2 New Canada Stream

The New Canada Stream originates in the area of Westbury/Bosmont and runs south towards the New Canada Dam that is situated just south of the R29. The proposed canal is proposed to run between the N1 and R29, crossing underneath the R29 (Figure 9) towards the New Canada Dam. The stream area is totally covered by thick reed beds (Figure 10 and Figure 11).



Figure 9 – View towards the west and the large culvert channeling the New Canada Dam stream under the R29



Figure 10 – View of reed beds in New Canada Dam stream



Figure 11 – View towards the north from the R29 towards the N1 highway

A cursory analysis of the 1943 First Edition 1:50 000 topographical map (**Figure 12**), shows the no historical activity in the area of the proposed canal. No changes to the existing culvert on the R29 is proposed, this culvert/bridge is also not older than 60 years as the single carriage way was converted to double carriage way in the past 20 years..



Figure 12 – 1943 topographical map indicating the proposed NCD canal

3.3 Elsburg Stream

The Elsburg stream originates in the Ravensklip and Witfield areas on the East Rand. The stream runs under the R29 through a small pipe and culvert (**Figure 13** and **Figure 14**) and continues on towards the Elsburg dam some 4 kilometers downstream. This stream is also heavily degraded by current and historic mining activities in the area and over grown with reed beds and vegetation (**Figure 16**).



Figure 13 – Culvert and pipe channeling the Elsburg stream under the R29



Figure 14 – Close up of stone work on culvert



Figure 15 – View from the south of the R29 towards the Elsburg stream



Figure 16 – View of Elsburg stream with reed beds in northern section of the proposed canal

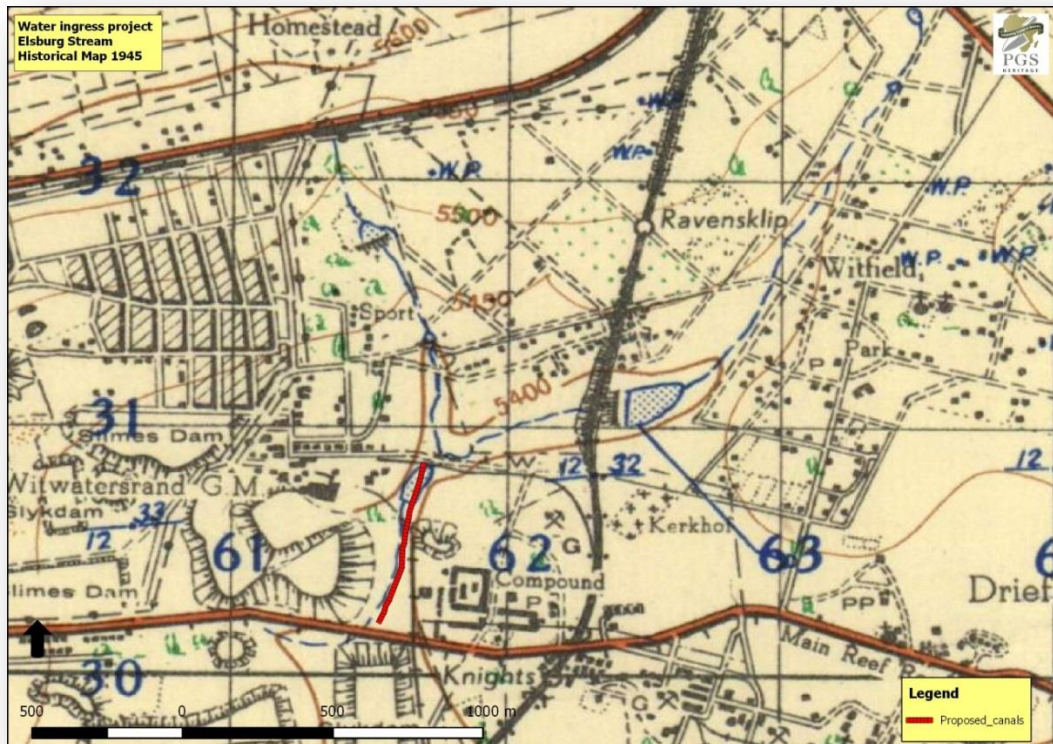


Figure 17 – 1945 topographical map indicating the proposed Elsburg stream canal

A cursory analysis of the 1945 First Edition 1:50 000 topographical map (Figure 17), shows no historic mining activities or buildings in the direct impact area of the proposed canal. The R29 road is also indicated on the 1945 map, raising the possibility that the culvert (Figure 14) is possibly older than 60 years. This can however not be confirmed as a fact, as road upgrades after 1943 could have required the construction of a new culvert.

4. Heritage potential

Geotechnical investigations have shown that the areas to be impacted by the proposed canals were all previously disturbed down to bedrock by mining activities. The activities involved diverting the natural water course that fell within the footprint area for mining. The overburden was removed. An opencast pit was excavated and the mineral sourced. On rehabilitation and closure, the pit was backfilled with the overburden material. There was no compaction. The river was then reinstated to its natural route. Over the years the backfilled material acted as a French drain and the water from the river percolated through into connected underground workings.

These prospecting and mining activities date from the gold rush era when most of the streams on the Witwatersrand were totally degraded by mining and prospecting activities (**Figure 18**).

The excavation and backfilling that occurred during the historic mining operations have disturbed the primary context of any heritage resources that would have been present.



Figure 18 – Prospecting and mining activities such as these, in and around streams on the Witwatersrand, would have removed all heritage resources in question. (<http://www.miningartifacts.org/South-African-Mines.html>)

It is thus highly unlikely that any heritage resources will be present in the alignment of the canals.

5. Conclusion

The proposed foot print areas of the three canals have been disturbed by mining activities in the past 130 years. These disturbances would have removed any remnants of heritage resources in the footprint areas.

It must however be noted that construction activities such as laydown areas, construction camps and

access roads to the proposed canal areas could impact on unidentified heritage resources, as these areas could be in close to unmarked graves, prospecting camps or other historic mining infrastructure.

6. Recommendations

With regard to the proposed development, the following recommendations are made:

1. No further heritage impact assessment of the study area is required.
2. No palaeontological assessment will be required, as bedrock has already been disturbed during earlier mining activities
3. No archaeological assessment will be required, as the stream beds have already been disturbed during earlier mining activities.
4. It is recommended that as soon as the laydown areas, access roads and construction camps foot prints have been identified, after the appointment of the contractor, a qualified archaeologist must screen these footprint areas and then make the relevant recommendations on any heritage resources found.
5. It is recommended that the age of the culvert and bridge at the DRD and Elsburg streams be determined and if found to be older than 60 years a destruction permit be applied for under Section 34 of the National Heritage Resources Act. This application must be lodged with the Gauteng Provincial Heritage Resources Agency.
6. In the unlikely event of any unmarked human burials, burial pits, potsherds or stone tools being uncovered during earthworks, these must be reported immediately to the South African Heritage Resources Agency (Mr Andrew Salomon (021 362 2535)).

Should you have any queries, please contact Wouter Fourie (email: wouter@gravesolutions.co.za; tel: (012) 332 5305).

Yours Sincerely



Wouter Fourie

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