APPENDIX H: AQUATIC BIODIVERSITY - WETLAND ASSESSMENT

WETLAND SENSITIVITY VERIFICATION AND COMPLIANCE STATEMENT FOR THE PROPOSED DEVELOPMENT OF A HYDROGEN PRODUCTION DEVELOPMENT PLATFORM AT MOGALAKWENA MINE, LIMPOPO

Mogalakwena

Prepared for: Anglo American Platinum (AAP) Limited - Rustenburg Platinum Mines

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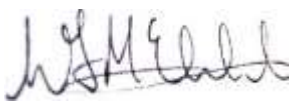

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EXECUTIVE SUMMARY

SLR Consulting (South Africa) (Pty) Ltd (SLR) were appointed by Anglo American Platinum Limited (AAP) - Rustenburg Platinum Mines (RPM) to prepare an aquatic compliance statement as per the Department of Forestry, Fisheries and Environment (DFFE) Screening tool as part of the Basic Assessment Authorisation process for the proposed Development of a Hydrogen Production Development Platform (PDP) at the Mogalakwena Platinum Mine.

No watercourses traverse the proposed development site. The area identified for the construction of the HPDP is flat and already transformed with existing infrastructure that will be removed to construct the proposed project.

A wetland is located within less than 100m of the PDP. This document serves to place the wetland in the appropriate ecological context for the purposes of obtaining relevant authorisation from the Department of Water and Sanitation (DWS) in terms of the requirements of the National Water Act 1998 (Act No. 36 of 1998).

Two large, artificial eroded channels are located adjacent to the western and north-western boundaries of the proposed development site. The eastern channel is within the stipulated distance of 32m (as per the National Environmental Management Act (NEMA). These are remnant results of historic attempts to drain two large wetland systems situated higher up in the landscape. The soils are highly erodible, resulting in the erosion of large gullies. The historic large wetland systems have now been covered by mine infrastructure. The remaining large drains support stormwater runoff away from the mine operational area.

There are also two artificial wetlands in the vicinity of the proposed development site. One is further than 120 m from the site. These wetlands have been introduced to the landscape as a consequence of mining activities, they are highly modified to the point of being completely artificial and man-made. They are included in this document to indicate that they have been considered, but they are separated from the proposed development site by the large, deep drain. They therefore have no influence on the proposed development, and vice versa.

The conclusions are as follows:

- No natural aquatic systems remain. The artificial ones present are characterised by secondary vegetation, which is resilient, ubiquitous in a highly disturbed landscape, and easy to replicate.
- The riparian channels are essentially well-vegetated drains.
- The aquatic habitats, because their high level of modification, are considered to have a Critically Modified Present Ecological State (PES), Category F.
- They provide marginal and limited ecological services, with the possible exception of the sediment trapping function performed by the dense vegetation in the drain beds.
- They are of Marginal or Low Ecological Importance and Sensitivity (EIS). The secondary nature of their vegetation, their relatively small size, and the severe disturbance regime of the immediate environment preclude the presence of faunal or floral species of conservation significance.
- The receiving environment adjacent to the proposed development site has been compromised ecologically by alterations to the landscape hydrology associated with independent and long-term

changes in land-use. The existing impacts from the Proof of Concept development have been superimposed on the disturbance footprint that has resulted from these greater catchment land-uses.

- This compliance statement is based on the key assumption that a formal Stormwater Management Plan has been developed for the PoC development, in accordance with the conventional environmental authorisation process. The proposed HPDP development provides an opportunity to review the existing stormwater management plan, and upgrade it where necessary to ensure that the stormwater generated by the proposed HPDP development is appropriately managed and that the development is fully compliant with the requirements of a Water Use Licence.

Compliance Statement

Based on the results of the desktop review and the site verification, the sensitivity of aquatic biodiversity associated with the watercourses in and around the proposed HPDP Project can be confirmed as **Low**. The proposed development will be superimposed on an existing development footprint and is unlikely to have additional or cumulative impacts on freshwater biodiversity.

CONTENTS

ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
AAP	Anglo American Platinum
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
EIS	Ecological Importance and Sensitivity
HPDP	Hydrogen Production Development Platform
NEMA	National Environmental Management Act (No.107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act (No.36 of 1998)
PDP	Production Development Platform
PES	Present Ecological State
PoC	Proof of Concept
RPM	Rustenburg Platinum Mines
SLR	SLR Consulting (South Africa) (Pty) Ltd
SWMP	Stormwater Management Plan

Wetland Sensitivity Verification and Compliance Statement for the Proposed Development of a Hydrogen Production Development Platform at Mogalakwena Mine, Limpopo

1. INTRODUCTION

SLR Consulting (South Africa) (Pty) Ltd (SLR) were appointed by Anglo American Platinum Limited (AAP) - Rustenburg Platinum Mines (RPM) to prepare an aquatic compliance statement as per the Department of Forestry, Fisheries and Environment (DFFE) Screening tool as part of the Basic Assessment Authorisation process for the proposed Development of a Hydrogen Production Development Platform (HPDP) at the Mogalakwena Platinum Mine, near Mokopane in Limpopo (Figure 1.1). This document forms part of the compliance statement and relates to the wetlands associated with the site.

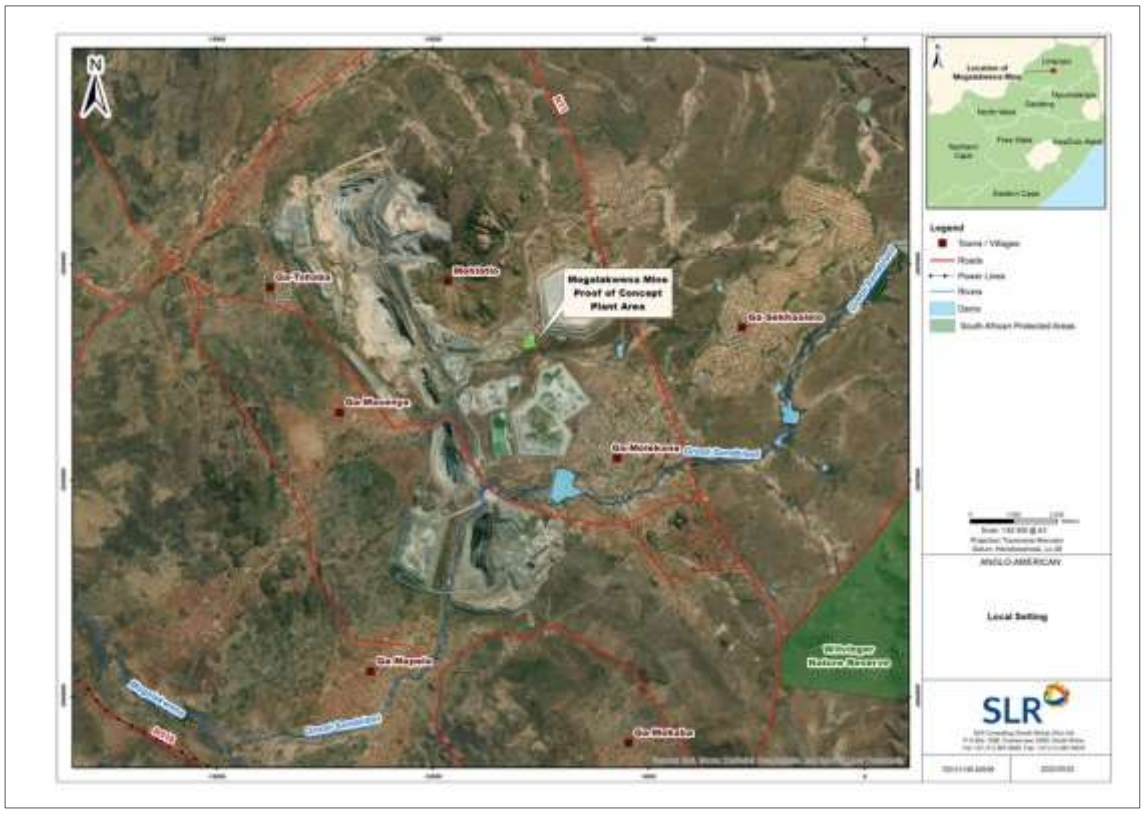

Figure 1.1: Locality of the Proposed Development

1.1 PROJECT BACKGROUND

AAP - RPM proposes to expand their existing Proof of Concept hydrogen production facility with the inclusion of a hydrogen Production Development Platform within the Mining Right area of the Mogalakwena Mine (the Project). The Mogalakwena Mine is an open pit platinum mine located approximately 20 km north-west of the town of Mokopane in the Mogalakwena Local Municipality within the Waterberg District Municipality of Limpopo Province (Figure 1.1).

The HPDP Project will be located inside the footprint of the already approved Proof of Concept hydrogen production facility on the Farm Zwartfontein 818 LR, covering an area of approximately 8 ha (

Figure 1.2). As part of the hydrogen PDP Project, the Proof-of-Concept Plant will have to be expanded with additional refuelling and distribution components to supply three additional mine haul trucks with hydrogen.

The HPDP Project will ultimately connect the hydrogen production and mine haul truck application through the establishment of an Export-Transport-Refuel System, using commercially available equipment. The aim of the Project is to rapidly refuel the mine haul trucks at high pressure (Export-Transport-Refuel System), and to ensure ample hydrogen storage availability on trucks (e.g., high-capacity tube trailers) for transportation to the mine pits. This will require the development of fixed high-pressure and mobile low-pressure hydrogen storage infrastructure/ facilities.

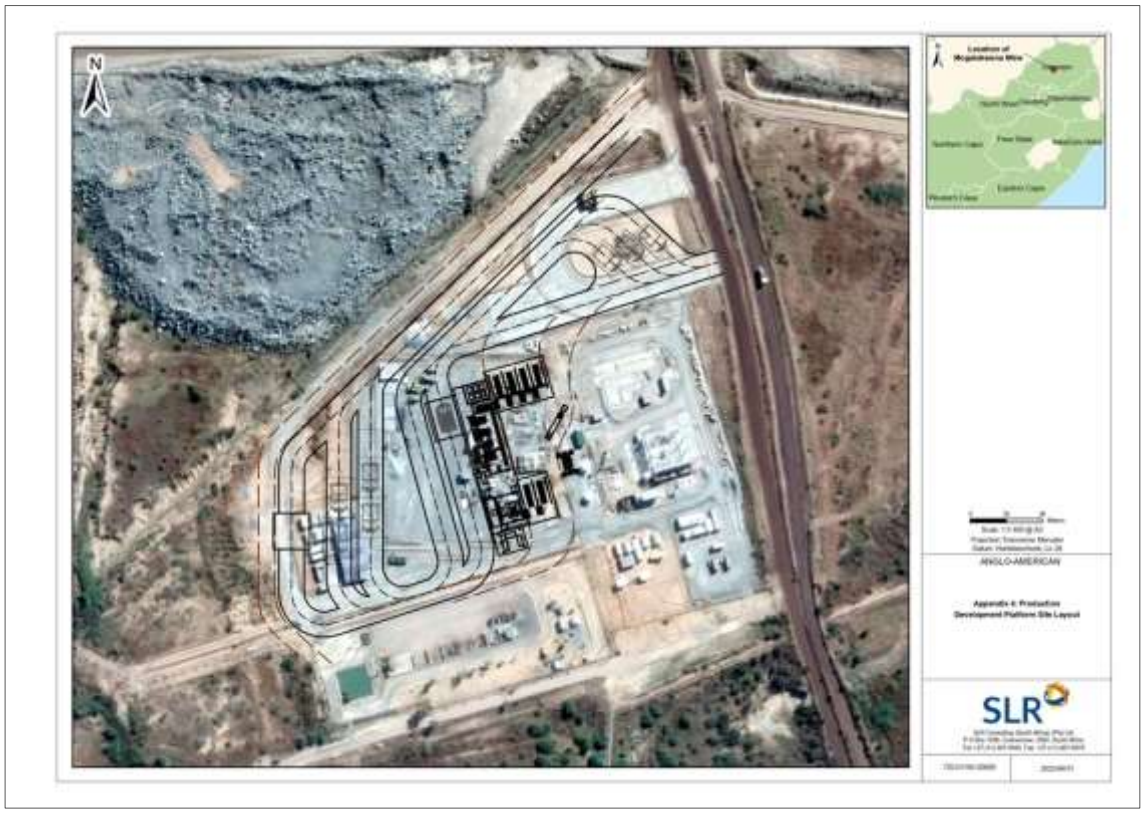

Figure 1.2: Layout of the Proposed Development

1.2 LEGISLATIVE REQUIREMENTS

The following legislative requirements were taken into consideration during the assessment.

1.2.1 National Environmental Management Act (Act No. 107 of 1998)

Any development within the extent of a watercourse or within 32 m from a watercourse may require Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). A watercourse is defined in the Act as:

(a) River or spring,
(b) A ***natural*** channel in which water flows regularly or intermittently,
(c) A wetland, pan, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act (NWA).

(d) A channel refers to a natural or constructed watercourse having a definite bed and sides, through which water flows.

No watercourses or aquatic habitats were encountered within the study area boundary. The proposed development site, constituting the PoC development, is entirely transformed and covered by compacted and hardened surfaces. The proposed development is located within 32m of an artificial watercourse in the form of an excavated drain that runs along the north-western boundary of the proposed HPDP site. There is also an artificial wetland associated with this drain. This will, however, not trigger Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act (1998) because it is assumed that the proximity of the watercourse to the site was addressed during the granting of environmental authorisation for the Proof of Concept (PoC) project that currently occupies the study site. The development of the HPDP facility overlaying the PoC development is not expected to result in a change to the current environmental relationship between the site and the receiving environment.

1.2.2 National Water Act (Act No. 36 of 1998)

The National Water Act (Act No. 36 of 1998) (NWA) allows for the protection of water resources and recognises that the entire ecosystem and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). The definition of a watercourse is consistent across the NEMA and NWA. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

2. SCOPE OF WORK

The requirement for this Aquatic Compliance Statement and the Scope of Work is prescribed in terms of NEMA. As such the study aims to comply with legislative requirements. In terms of NEMA wetlands, rivers and ephemeral drainage lines fall under the identified theme of Aquatic Biodiversity (refer to Loukes, 2022). Aquatic biodiversity is, however, a multi-disciplinary practice, with wetland and river ecosystems differing substantially in ecological processes, functions and geophysical form. Although complimentary, they are different fields of practice. This report addresses the wetland component of the Aquatic Compliance Statement. The river and invertebrate biodiversity components are addressed in a related report (Loukes, 2022).

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA, when applying for environmental authorisation the current use of the land and the environmental sensitivity of the site under consideration as identified by the national web-based environmental screening tool, must be confirmed by undertaking a site sensitivity verification. The site sensitivity verification must be undertaken by a specialist and must entail the following:

1. Desktop analysis, using relevant aerial and satellite imagery,
2. A preliminary on-site inspection, and
3. Any other available relevant information.

The outcome of this site sensitivity verification assessment presents the recorded site assessment results so as to:

1. Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool,
2. Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

2.1 OUTCOMES OF THE APPLICATION OF THE DFFE SCREENING TOOL

The site sensitivity for the study area as identified by the National Web-Based Environmental Screening Tool shows that the aquatic biodiversity theme is of **Low Sensitivity.** According to the guidelines, an applicant intending to undertake an activity on a site identified as being of "very high sensitivity" for an aquatic biodiversity theme must submit an Aquatic Biodiversity Impact Assessment. If the area is identified as being of "low sensitivity" then an Aquatic Biodiversity Compliance Statement is appropriate and must be compiled and submitted to the competent authority.

3. APPROACH AND METHODOLOGY

Available national and provincial databases were used in the desktop study in order to confirm the presence or absence of watercourses within the study area and to determine the level of conservation significance of the study area.

The following data sources and GIS spatial information was consulted to inform the assessment:

- Latest Google Earth™ imagery,
- NFEPA wetlands/rivers coverage (CSIR, 2011),
- Limpopo Conservation Plan (Limpopo - CPLAN, 2013),
- South African National Biodiversity Institute: Biodiversity Geographic Information System. (bgis.sanbi.org),
- CSIR Summary analysis for Anglo American's Smart Power (hydrogen) for Mogalakwena mine Report 2022, and
- The DWS Resource Quality Information Services (RQIS) PES/EIS database (2014).

A site verification visit was conducted on 6 February 2022 by a suitably competent wetland ecologist. The fieldwork took place during the summer season when regular rains occur and when waterflow within the rivers and streams is likely to be present. A detailed CV and specialist declaration are provided in Appendix A. A verification report has been prepared in accordance with the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (Government Notice 320, dated 20 March 2020), as well as in line with the NWA.

3.1 LIMITATIONS AND ASSUMPTIONS

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following assumptions and limitations apply to the aquatic assessment techniques and methods utilised to undertake this study:

- This report is based on a single site assessment. Usually this precludes the evaluation of temporal and seasonal trends in wetland vegetation and degree of saturation. While worth mentioning, this is not

considered to be an important shortcoming given the extent of transformation that has occurred within the proposed site and its immediate environs.

- The mapped features shown in Figures 5.1 and 5.4, showing the historic and current ecological scenarios, are illustrative and based on specialist experience in identifying wetland soil, topographic and vegetation signatures from aerial imagery. Accurate field delineation was not possible due to the extent of land transformation that has occurred since 2005.
- A key assumption of this report is that a formal Stormwater Management Plan has been developed for the PoC development, in accordance with the conventional environmental authorisation process.
- The project boundary was provided by the client.
- It is assumed that the proximity of a watercourse within 32m of the proposed development boundary was given appropriate consideration during the preceding PoC environmental authorisation process.
- The impacts for the site are specific to the proposed HPDP Project.

4. ENVIRONMENTAL ATTRIBUTES OF THE STUDY AREA

4.1 CLIMATE AND RAINFALL

The study area is located close to the town of Mokopane and has a hot semi-arid climate. The temperatures for the area average at 19°C with summer highs of 28°C in February and winter lows of 6.9°C in July. During the year there is little rainfall with an average annual rainfall of approximately 550 mm. Rainfall is strongly seasonal, occurring in the spring and summer months (October to March). According to Köppen and Geiger, this climate is classified as BSh (Hot semi-arid [Steppe] climate)[1].

4.2 ECOREGION

The study area falls within the Eastern Bankenveld (Ecoregion 9) that can be described as having closed hills and mountains with moderate and high relief (Kleynhans *et al*., 2005).

4.3 GEOLOGY AND SOILS

The underlying geology consists of granite and various types of Quaternary sediments (Geological Survey, 1984). The landscape associated with the site was characterised by soils of the Avalon form (Orthic A/ Yellow-Brown Apedal B/ Soft Plinthic B) in the high-lying landscape, and highly erosive soils of the Estcourt form (Orthic A/ Prismacutanic B) in the low-lying areas (Soil Classification Working Group, 1991).

4.4 VEGETATION TYPES

According to the National Biodiversity Assessment (SANBI, 2018), the study area is located within the Central Bushveld bioregion within the Savanna Biome. The vegetation type associated with the PDP site is Makhado Sweet Bushveld and is classified as vulnerable (Musina and Rutherford 2006). It should be noted that the vegetation unit identified within the study area is for reference purposes. In reality the study area is completely transformed and contains existing infrastructure.

[1] https://en.climate-data.org/africa/south-africa/limpopo/mokopane-953/. Accessed 26/05/2022

4.5 WATER RESOURCES AND DRAINAGE

The study area extends across quaternary catchment A61G of the Limpopo Water Management Area (WMA). The *Mohlosane* River is located south of the proposed PDP development site and an ephemeral tributary of this river is situated to the west of this (**Figure 4.1**). The *Mohlosane* River, an ephemeral system, has been assigned a Moderately to Largely Modified (Class C/D) Present Ecological State (PES)[2] reflecting the impact of surrounding mining activities.

Figure 4-1: Local Drainage Context of the Study Area

4.6 CONSERVATION CONTEXT OF AQUATIC ECOSYSTEMS

4.6.1 Biodiversity Conservation Priorities

According to the Limpopo Conservation Plan, the proposed development site is located within areas classified as No Natural Remaining and Other Natural Areas (ONA). ONA's are natural and intact areas but are not required to meet targets, nor have they been identified as Critical Biodiversity Areas (CBA) or Ecological Support Areas (ESA). No management objectives, land management recommendations or land-use guidelines are prescribed.

It must be noted that even though the Limpopo Conservation plan indicated that the site is partially located within an area designated as ONA, the study site is not located within natural habitat and the footprint is occupied by existing infrastructure such as photovoltaic panels, workshops and paved roads.

[2] https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx accessed on 20 January 2022.

4.6.2 National Freshwater Ecosystem Priority Areas (NFEPA)

According to the Atlas of Freshwater Ecosystem Priority Areas (FEPA) in South Africa (Nel *et al*, 2011), the study site falls within an Upstream Management Catchment. These areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas. According to the NFEPA Database there are no wetland features associated with the study area. This is, however, based on coarse landscape-scale data. A fine-scale desktop survey indicated the presence of a substantial artificial and modified riparian watercourse approximately 100m east of the proposed HPDP project, and an artificial riparian watercourse (or drain) within 32m of the existing PoC site boundary.

4.6.3 Strategic Water Source Areas (SWSAs)

Strategic Water Source Areas (SWSAs) are areas of land that either: (a) supply a disproportionate quantity of mean annual surface water runoff in relation to their size and are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b) (Le Maitre *et al,* 2018). The study area does not fall within a SWSA.

5. SITE SURVEY RESULTS

No watercourses or aquatic habitats occur within the proposed development site. The area identified for the construction of the HPDP is flat and already transformed by the existing infrastructure associated with the PoC project. The proposed HPDP development will be superimposed on the footprint of the existing PoC development. A large, artificial, eroded drainage channel and an artificial wetland are located adjacent to the north-western boundary of the site, within the 32m distance stipulated by NEMA.

5.1 HISTORICAL CONTEXT

In evaluating these systems it is necessary to examine them in a historical context (**Figure 5.1**). The objective of the following section is to explain the origin of the large, eroded, artificial drains that occur in close proximity to the proposed development site. They are a product of substantial ecological manipulation associated with historic land-use and the properties of the soil type occupying the valley footslopes. According to Google Earth™ satellite imagery, in 2004, prior to any mining development, the site consisted of old, ploughed lands. The soils were highly erodible, and their agricultural productivity low. Farming activities were not sustained, and the land had reverted to secondary grassland. Much of the ploughed land was seasonally wet, and a concerted effort had been made to drain the western wetland.

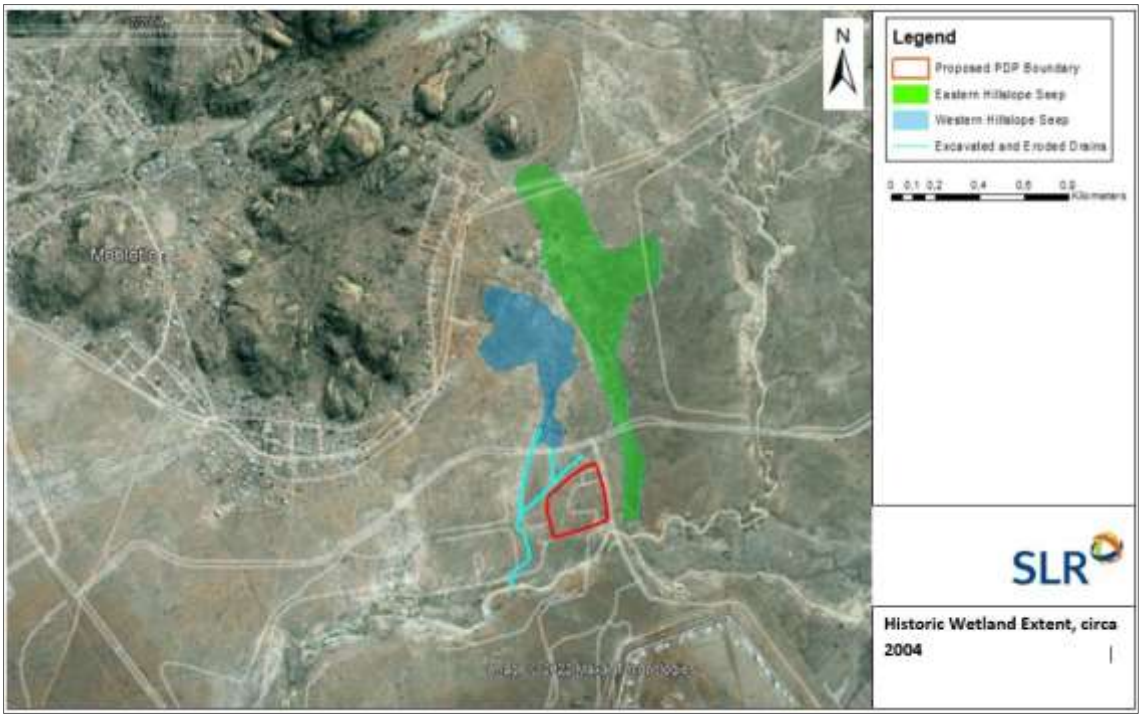

Figure 5.1: Estimated historic (circa 2004) distribution of wetland habitat associated with the landscape surrounding the development site, based on soil hydromorphic signatures (image from Google Earth ™).

Two large hillslope seepage wetlands flowed from the granite outcrops to the north of the site, and historically would have bracketed the site to the east and west. The hydrological mechanism for this is subsurface interflow along a clay aquitard (**Figure 5.2**). The soils at the base of the outcrops are luvic sandy loams overlying dense clay and soft plinthite. Rainfall infiltration from the granite hills percolates perpendicularly through the sandy topsoil before coming into contact with the dense clay layer. The infiltration rate slows to the point where lateral subsurface flow occurs at depth along the interface between the sandy horizon and the dense clay. At the base of the slope the water is expressed to the surface to form a wetland.

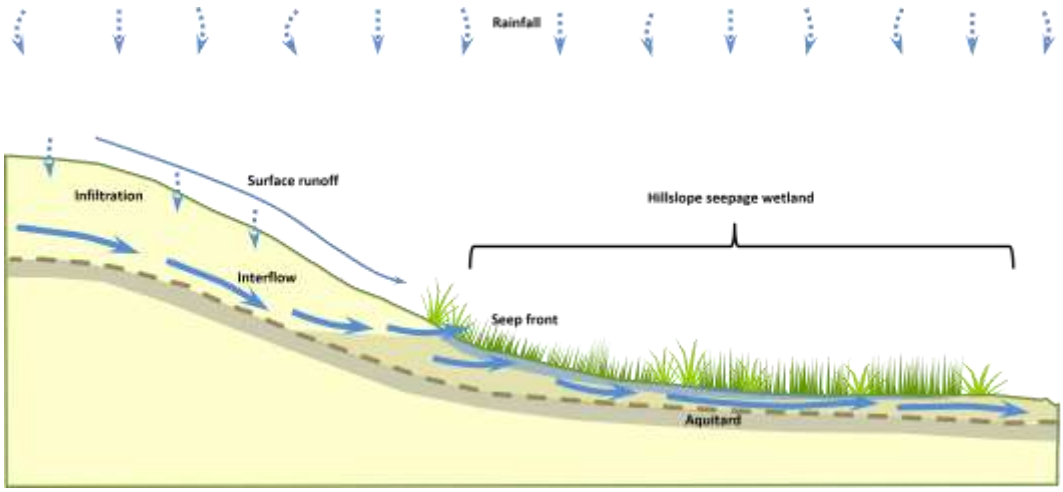

Figure 5.2: Conceptual diagram of the hydrological drivers of hillslope seep wetlands.

The distribution of the two wetland systems would have been determined by topography. The lower reaches of the western wetland was drained through the excavation of several large, straight channels.

The soils in this area were characterised by highly erodible Prismacutanic subsoils (**Figure 5.3**). When dry the subsoil forms a hard, dense impenetrable layer that prevents the infiltration of rainfall, resulting in periodically wet surface conditions. The soil is stable if the surface remains intact, with water either moving across the interface between topsoil and subsoil or removed via evapotranspiration. If the surface is disturbed, and confined surface water flow introduced, the soils prove highly unstable and erodible. They slake when exposed to water, resulting in distinctive soil slumping and subsequent removal. Prismacutanic subsoils also tend to be dispersive, the bonds between the clay micro-peds dissociating in water. A simple attempt to drain a large wetland area to enable crop cultivation has therefore resulted in the formation of a series of deep, broad eroded gullies, a consequent drop in water table and the desiccation of previously wetland habitat (**Figure 5.3**). The western wetland drained into the head of two large drains, ultimately forming a modified seasonally-flowing Riparian B-channel that runs approximately 120m west of the proposed development site and discharges into the *Mohlosane* River.

Figure 5.3: Main picture: straight excavated drains that have eroded and incised to become deep, broad, highly eroded gullies (Image from Google Earth™, 2004). Inset: Estcourt soil form, showing distinctive difference between the shallow sandy topsoil and the hardened, erodible subsoil of Prismacutanic clay.

5.2 THE CURRENT SCENARIO

The current landscape surrounding the proposed development site is provided in **Figure 5.4.** The upper reaches of both wetland systems have been separated from the drainage system downstream, and most of the wetland habitat has been removed from the landscape. The water moving through these remnant systems is now intercepted by deep, excavated cut-off drains that direct water through the mine operational area, into the older excavated and subsequently eroded drains adjacent to the proposed development site (features A and B, **Figure 5.5**), and into the river. The eastern wetland no longer flows to the east of the site, and this area is now dry, disturbed secondary terrestrial habitat.

An artificial catchment has been established for the drains bypassing the west of the site, which is characterised by the steep slopes and coarse, porous stone medium of the tailings dam. A large area immediately north of the site consists of rock piles that further trap rainfall and encourage infiltration. The rainfall seeping out of these features feeds a series of drains that flow into the large, prominent excavated drains that now form the focus of this study.

Figure 5.4: Extent of mining development surrounding the development site. The hillslope seeps are historic, the image illustrates the extent to which the mining operational area has encroached into them.

There are two isolated wetland areas situated west of the site (features C and D), feeding into the drains (**Figure 5.5**). These are artificial and have formed in response to the transformation of the landscape. There is no wetland signature in these areas on imagery dated prior to the mine development. The wetland area nearest to the site (C) is a seepage wetland that has most likely formed in response to elevated infiltration from the depressions in the rock dump site to the north. It consists of secondary vegetation and is present only in response to continual seepage from the rock dump.

The wetland furthest from the site (D) is also artificial. It is likely to have formed due to the combined effects of:

- Subsurface seepage from the rock dump site,
- Impoundment against the road berms to the east,
- Impoundment against the development platform to the west,
- A dense underlying clay subsoil, and
- Rainfall that is unable to drain away.

Figure 5.5: Artificial wetland areas in proximity to the site.

Both artificial wetlands are seasonal, with the degree of saturation varying with rainfall. Their habitat is secondary and human-induced, the vegetation community is typical of wherever disturbed soils remain saturated enough to support widespread hydrophilic species such as *Typha capensis* and *Imperata cylindrica*. There is a low likelihood of plant species of conservation importance occurring within these wetlands. High levels of disturbance associated with current mining activities in the immediate area have resulted in a low likelihood of any wetland faunal species of conservation concern being present. It should be emphasised that these wetlands are separated from the development site by the large drains (A and B in Figure 5.5). It is necessary to take note of them, since they are present in the landscape, but they are not influenced by, and nor do they influence, the proposed development site in any way.

The ecological services provided by the aquatic features within the ambit of the proposed development site are marginal, and summarised as follows:

- Streamflow augmentation is considered to be the most important ecological service provided by the artificial wetlands; however, this is provided at a low level because of the small scale of their catchments relative to the wider catchment.

- The drains are densely vegetated (**Figure 5.6**), effectively trapping sediment and providing a stable conduit for water flow from the mine. This service is undermined by continuing lateral soil erosion and sediment deposition from the channel sides. Conversely, however, it is of heightened importance due to the sediment mobilised from mining activities upstream.
- Control of erosion due to the maintenance of dense vegetation is a beneficial, although limited ecoservice.
- Maintenance of water quality, which is considered to be a negligible contribution.

Figure 5.6: Channel conditions of the large, eroded channel to the west of the site, showing dense vegetation and trapping of sediments (photo Karin Loukes).

The aquatic habitats, because of their high level of modification, are considered to have a **Critically Modified** PES, Category F. They provide marginal and limited ecological services, with the possible exception of the sediment trapping function performed by the dense vegetation in the drain beds. The aquatic habitats are also of **Marginal or Low** Ecological Importance and Sensitivity (EIS). The secondary nature of their vegetation, their relatively small size, and the severe disturbance regime of the immediate environment preclude the presence of faunal or floral species of conservation significance.

6. MANAGEMENT OF EXISTING IMPACTS

Although artificial, the watercourses remain part of the upper catchment of the Nyl River, a regionally important water resource. It should be recognised that the 32m distance stipulated by NEMA is more applicable to diffuse surface flow, meaning that this distance is sufficient to ameliorate many impacts resulting from diffuse flow leaving a development prior to contact with the watercourse. However, the impacts of urban and industrial developments mostly relate to confined surface discharge into the receiving environment. Drainage systems are linear, and these impacts may manifest themselves on a watercourse

several hundred metres away from a development. It is assumed that the occurrence of a watercourse within 32m of the proposed development site would have been addressed appropriately during the authorisation process for the PoC development that currently occupies the development site.

The types of impacts usually associated with industrial developments are mostly linked to the increase in compacted and hardened surfaces. The main impacts are:

- An increase in the velocity of rainfall runoff entering the receiving environment. Prior to development surface runoff would have been reduced by the surface roughness provided by the vegetation and micro-topography. Hardened surfaces of developments have no surface roughness or vegetation to slow runoff down prior to discharge into the watercourse. The uncontrolled point-source discharge of surface runoff may result in lateral erosion at the point of entry, or channel incision and scouring further downstream.
- An increase in the volume of rainfall runoff leaving a development. Under natural conditions a certain proportion of the rainfall infiltrates the soil and subsequently drains down through the soil profile to enter the landscape at a much later date. A certain proportion is also removed via evapotranspiration. The compacted and hardened surfaces associated with development capture all of the rainfall, directing it into the stormwater network and discharging it almost immediately into the receiving environment. The quantity of water entering the drainage network is therefore higher. The time between rainfall and discharge into the receiving environment is also far shorter than it would be under natural conditions, further resulting in a higher volume of water inputs. Since erosion threat is a function of water volume and velocity, this usually translates into increased channel incision and scouring in riparian systems downstream.
- The conversion of diffuse surface runoff from diffuse to confined point-source discharge, which is associated with a higher level of soil erosion risk within watercourses.
- An increase in the quantity of pollutants (hydrocarbons, dust, cleaning materials, industrial pollutants) being washed into the receiving environment from the hardened surfaces of a development.

The Proof of Concept (PoC) facility that currently occupies the development site consists almost entirely of hardened surfaces that are assumed as being serviced by a formal Stormwater Management Plan (SWMP). The proposed development of the HPDP is unlikely to alter the area of the site under hardened surfaces. The current status quo is hence unlikely to change, and it is not envisioned that the proposed development will have additional or cumulative effects on the receiving environment.

The PoC and HPDP developments occur within a landscape characterised by severe disturbance. It should be recognised that the watercourses that constitute the receiving environment for the study site have been severely impacted by a range of land-uses in the preceding decades. The drains (A and B of Figure 5.5) are remnant features of a previous endeavour to drain large wetland systems. These drains were deeply incised and laterally eroded prior to the advent of mining and industrial activities. The *Mohlosane* River has been severely impacted by urban and infrastructure development activities in the upstream catchment outside the area encompassed by mining rights. Key impacts are (i) a decline in water quality; (ii) longitudinal channel incision; (iii) lateral channel scouring, and (iv) lateral sheet erosion (**Figure 6.1**).

Within this context any impacts on the receiving environment directly attributable to the PoC development are difficult to reliably discern. It is likely that they have been superimposed on a receiving environment that had already been substantially morphologically modified by a range of independent influences

operating at larger scales. The conversion of the PoC development into the HPDP facility is not anticipated to alter the scale or nature of the existing impact regime on the receiving environment. Rivers do, however, traverse large distances, and catchment impacts on water resources are cumulative. It is an important principle of responsible water resource management that the potential impacts of any development are effectively mitigated or managed to an acceptable level. A key mechanism for this for urban and industrial developments is the integration of the engineering and environmental objectives of the Storm Water Management Plan (SWMP). This is an important proviso for the granting of environmental authorisation. This being the case, it can be assumed that the current SWMP for the PoC development meets these requirements and will be equally appropriate for the proposed HPDP development.

Figure 6.1: Channel incision, lateral scouring and sediment deposition in the *Mohlosane* River upstream of the study site (left); and lateral erosion and sediment deposition further downstream adjacent to the study site (right) (Photos- D. McCulloch).

It must be emphasised that there are **no visible indications** of environmental degradation within the receiving environment due specifically to impacts from the PoC development. The subsequent development of the HPDP facility poses a **minor risk** to the adjacent receiving environments assuming the adoption of appropriate mitigation measures. The planning of the proposed HPDP development does, however, offer an opportunity to review the current SWMP as part of the new SWMP design process and upgrade it if necessary. There is an opportunity to incorporate additional mitigation management measures (if required). Examples of stormwater management features that may be reviewed are:

- The appropriate attenuation of runoff prior to discharge into the receiving environment, the goal being to reduce the velocity of discharge. These include attenuation ponds and bio-attenuation ponds. Surface runoff is temporarily captured in ponds with a designed outlet that allows the water to exit at a slower rate. These are a central component of all SWMPs, and changes to the dimensions and positions of these features should be compatible with the existing SWMP budget.
- The provision of adequate rainfall storage to compensate for the loss in soil storativity (the amount of rainfall that infiltrates, and remains in, the soil during and following a rainfall event) caused by the hardened surfaces. This volume is calculated using mean annual rainfall and soil porosity. Examples of this would be storage ponds, underground concrete tanks or JoJo^{TM} tanks. The water could then be used within the facility as, for example, irrigation water for gardens or for suppressing dust. These measures would not be expected to be onerous within the context of the existing SWMP budget.

- The introduction of stormwater leaving the attenuation structures into the receiving environment via well-vegetated, stable swales (broad, grass-covered earthen drains), with multiple small discharge points. These should be reinforced where necessary by reno-mattresses, the objective being (i) to stabilise the discharge areas, (ii) to prevent soil erosion and mobilisation, and subsequent deposition into the receiving environment, and (iii) overall localised ecological instability. These are also not costly structures within the context of the SWMP.
- The use of various commercially available pollution and toxicant traps and methods to clean runoff prior to its discharge into the receiving environment.

7. SUMMARY

To summarise:

- The watercourses associated with the site are highly modified to the point of being completely artificial and man-made. No natural aquatic systems remain. The wetlands are artificially fed by infiltrated rainfall and runoff from the mine operational area.
- The wetlands are characterised by secondary vegetation, which is resilient, ubiquitous in a highly disturbed landscape and easy to replicate.
- The riparian channels (features A and B) are well-vegetated drains.
- The wetlands (C and D) have been introduced to the landscape as a consequence of mining operational activities. They will not be affected by the proposed HPDP development.
- The aquatic habitats, because of their high level of modification, are considered to have a **Critically Modified** PES, Category F.
- The aquatic habitats provide marginal and limited ecological services, with the possible exception of the sediment trapping function performed by the dense vegetation in the drain beds.
- The aquatic habitats are of **Marginal or Low** Ecological Importance and Sensitivity (EIS). The secondary nature of their vegetation, their relatively small size, and the severe disturbance regime of the immediate environment preclude the presence of faunal or floral species of conservation significance.
- The proposed HPDP development is being constructed within an existing hardened development footprint. It is unlikely to change the existing impact scenario sustained by the receiving environment.
- It is assumed that there is a formal SWMP for the PoC development.
- The proposed HPDP development offers an opportunity to review the current SWMP and, where necessary, incorporate further stormwater management features into an upgraded SWMP design.

8. AQUATIC (WETLAND HABITAT) COMPLIANCE STATEMENT

Based on the results of the desktop review and the site verification, the sensitivity of aquatic biodiversity associated with the watercourses in and around the proposed HPDP Project can be confirmed as **Low**. The proposed development will be superimposed on an existing development footprint and is unlikely to have additional or cumulative impacts on freshwater biodiversity.

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APPENDIX A: SPECIALIST INFORMATION AND CV

SPECIALIST ASSESSMENT REPORT DETAILS AND DECLARATION OF INDEPENDENCE

This is to certify that the following report has been prepared as per the requirements of Appendix 6 (1) of the National Environmental Management Act, 1998 (Act No. 107 OF 1998) Environmental Impact Assessment Regulations 2014 as per Government Notice No. 38282 GOVERNMENT GAZETTE, 04 DECEMBER 2014.

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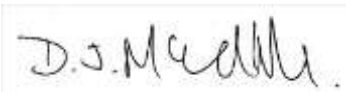
Registration / Associations	Pr. Sci. Nat. 400060/09 (Ecological Science)

I Doug McCulloch, declare that:

- I act as an independent specialist,
- Results will be interpreted in an objective manner, even if the viewpoints are not favourable to the applicant,
- I have the relevant expertise to conduct a report of this nature, including knowledge of the National Environmental Management Act (Act No. 107 of 1998) and the National Water Act (Act No. 36 of 1998),
- I will comply with the act(s) and other relevant legislation,
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member,
- Based on the information provided to me by the project proponent and in addition to information obtained during the course of this study, I have presented the results and conclusion within the associated document to the best of my professional ability,
- I reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field,
- I understand that any false information published in this document is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.



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RECORD OF REPORT DISTRIBUTION

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