KAMALUNDO PROPERTY INVESTMENTS (PTY) LTD

ERF 1051, ROCKDALE, MIDDELBURG, MPUMALANGA

Wetland Delineation Report

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SPECIALIST REPORT DETAILS

This report has been prepared as per the requirements of Section 32 of Government Notice No. R. 983 dated December 2014 (Environmental Impact Assessment Regulations) under sections 24(5), 24M and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998).

I, declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department Economic Development, Tourism and Environmental Affairs (EDTEA).

Signed:  Date: November 2018

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Confidentiality Statement

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WETLAND DELINEATION REPORT

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WETLAND DELINEATION REPORT

1 INTRODUCTION

SiVEST Environmental Division have been appointed by **Kamalundo Property Investments (Pty) Ltd,** to undertake a Wetland Delineation for Erf 1051, Rockdale, Middelburg, Mpumalanga. **Kamalundo Property Investments (Pty) Ltd** proposes to develop a retail development on the property, and the municipality that owns the property has indicated that the site may contain wetland.

2 TERMS OF REFERENCE

The terms of reference of this assessment are to:

- Desktop assessment of the site, incorporating all available provincial and national databases; and
- Delineation of the freshwater resources within the study area shall be verified according to "DWAF, 2008: A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Aspects such as soil morphological characteristics, vegetation types and wetness shall be used to verify the delineation of the wetland temporary zone according to the guidelines.

Further to the Terms of Reference above, the following protocol was extracted from the National Environmental Management Act, Act 108 of 1998. The relevant Section is **Section 32** and is included below for your ease of reference.

Specialist reports and reports on specialised processes

32.

(1) An applicant or the EAP managing an application may appoint a person who is independent to carry out a specialist study or specialised process.

(2) /the Person referred to in sub-regulation (1) must comply with the requirements of Regulation 17.

(3) A specialist report or a report on a specialised process prepared in terms of these Regulations must contain –

(a) details of –

(i) the person who prepared the report; and

(ii) the expertise of that person to carry out the specialist study or specialised process;

(b) a declaration that the person is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;

(d) a description of the methodology adopted in preparing the report or carrying out the specialised process;

(e) a description of any assumptions made and any uncertainties or gaps in knowledge;

(f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;

(g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;

(h) a description of any consultation process that was undertaken during the course of carrying out the study;

(i) a summary and copies of any comments that were received during any consultation process; and

(j) any other information requested by the competent authority.

3 PROJECT OVERVIEW AND LOCAL SETTING

Kamalundo Property Investments (Pty) Ltd proposes to develop a retail development on Erf 1051, Rockdale. The property sits adjacent to the N11 just south of the town of Middelburg, and is surrounding by low-cost residential housing. The N11 adjacent to the study site is currently being upgraded with additional lanes, and a site camp is currently using the western portion of the site closest to the N11. The study site has historically been used for the dumping of builders' rubble, and a portion of the site is currently being used for the storage of stone for the N11 road upgrades.

An assessment of the site via historical 2008 aerial imagery (**Figure 1**) shows an area in the centre of the site that is potentially wetland, and would probably be a depression wetland being fed by stormwater from the N11.

Figure 1: 2008 Aerial Imagery Desktop Assessment Map

4 CONCEPTUAL FRAMEWORK

4.1 Wetland Delineation

Wetlands are defined as those areas that have water on the surface or within the root zone for long enough periods throughout the year to allow for the development of anaerobic soil conditions that favour the growth and regeneration of hydrophytic vegetation (plants adapted to saturated and anaerobic soil conditions).

In terms of **Section 1** of the National Water Act (Act No. 36 of 1998), wetlands are legally defined as:

(1)…land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Soils characterised by prolonged anaerobic soil conditions are referred to as hydric or hydromorphic soils. Hydric soils develop and occur under anaerobic conditions and are characterised by the chemical reduction of common soil minerals (e.g. iron and manganese) under saturated conditions that results in the gleying (loss of mineral colours) of the soil matrix and under temporarily and seasonally saturated conditions, the formation of mottles, which are mineral oxide precipitates of formerly reduced minerals that precipitate out of solution during the drying of the soil in the dry season. These soil wetness features are referred to as redoximorphic features. Wetland delineations are based primarily on the presence of soil wetness indicators/redoximorphic features. These features must occur within 50 cm of the surface soil profile for an area to be considered a wetland (**Collins, 2005**).

Typical redoximorphic features are (**Collins, 2005**):

- A reduced matrix - occurs when the iron and manganese in soils are reduced and the soils appears grey/pale (colour appears washed out).
- Redox depletions - the “grey” (low chroma) bodies within the soil where Fe-Mn oxides have been stripped out, or where both Fe-Mn oxides and clay have been stripped. Iron depletions and clay depletions can occur. These can occur as:
    - Iron depletions - low chroma bodies with clay contents similar to that of the adjacent matrix. Iron depletions are often referred to as grey mottles.
    - Clay depletions - low chroma bodies containing less iron, manganese and clay than the adjacent soil matrix.
- Redox concentrations - Accumulation of iron and manganese oxides. These can occur as:
    - Nodules - firm, irregular shaped bodies that are uniform when broken.
    - Concretions - harder, regular shaped bodies;
    - Mottles - soft bodies of varying size, mostly within the matrix, with variable shape appearing as blotches or spots of high chroma colours;
    - Pore linings - zones of accumulation that may be either coatings on a pore surface, or impregnations of the matrix adjacent to the pore. They are recognized as high chroma

colours that follow the route of plant roots, and are also referred to as oxidised rhizospheres.

It is important to note that there are normally three wetness or saturation zones to every wetland; namely, the permanent zone, the seasonal zone and the temporary zone. Each zone is based on the degree and duration of inundation and saturation of the soils.
The permanent zone usually reflects soils that indicate inundation and/or saturation cycles that last more or less throughout the year, whilst the seasonal zone may only reflect soils that indicate inundation and/or saturation cycles for a significant period during the rainy season.

The temporary zone reflects soils that indicate the shortest period(s) of inundation/saturation that are long enough, under normal circumstances, for the formation of hydromorphic soils and the growth of wetland vegetation (**DWAF, 2005**). The diagnostic criteria for the identification of the three wetness zones are summarised in **Table 1** below.

Table 1: Relationship between degree of wetness (wetland zone), soil-physio-chemistry and vegetation (***after*** **Kotze *et al*, 1994**)

	Degree of wetness		
	Temporary	**Seasonal**	**Permanent / Semi-permanent**
Soil Depth (0cm –10cm)	Matrix chroma: 1-3 Few / no mottles Low / intermediate OM Non-sulphuric	Matrix chroma: 0-2 Many mottles Intermediate OM Seldom sulphuric	Matrix chroma: 0-1 Few / no mottles High OM Often sulphuric
Soil Depth (40cm – 50cm)	Few / many mottles Matrix chroma: 0-2	Many mottles Matrix chroma: 0-2	No / few mottles Matrix chroma: 0-1
Vegetation	Predominantly grass species	Predominantly sedges and grasses	Predominantly reeds and sedges

Vegetation distribution within wetlands is very closely linked to the flooding regime. Terrestrial plants are not tolerant of flooding and saturation within the root zone for periods long enough to cause anaerobic conditions, and are thus found on higher ground. The distribution of wetland plants is related to their tolerance of different flooding conditions, and their distribution within a system can be used as an indication of the wetness of an area.

Wetland plants are divided into 5 categories based on their expected frequency of occurrence in wetlands. These groups are:

- **Obligate Wetland Plants** - occur almost always in wetlands under natural conditions (>99% of occurrences);
- **Facultative Wetland Plants** - usually occur in wetlands but can occasionally be found on dry land (67-99% of occurrences);
- **Facultative Plants** - equally likely to grow in wetlands and non-wetlands (34-66% of occurrences);
- **Facultative Upland/Dry-land Plants** - usually occur outside of wetlands but occasionally found in wetlands (1-34% of occurrences); and
- **Obligate Upland/Dry-land Plants** - occur almost always outside of wetlands under natural conditions (<1% of occurrences).

Typically, indicators of soil wetness based on soil morphology correspond closely with vegetation distribution, since hydrology affects soils and vegetation in systematic and predictable ways. However, in systems where the hydrological regime has been modified due to human activities, vegetation distribution will not vary systematically with soil morphology. The response of vegetation to alteration of hydrological conditions is rapid (months/years), whereas the response of soil morphology to such alteration is slow (centuries). Therefore, the lowering of the water table or reduction of surface flows, may lead to rapid establishment of terrestrial vegetation, whereas the soil morphology will retain indicators of wetness for a lengthy period.

For this reason, soil morphology forms the basis of wetland delineation nationally, following international protocols, mainly because it provides a long-term indication of the "natural" hydrological regime. However, it is important to note that where soil wetness indicators cannot be used to identify the current hydrological conditions either through extensive disturbance or through certain soil types that do not retain clear redoximorphic features, the terrain and vegetation indicators will have to be used.

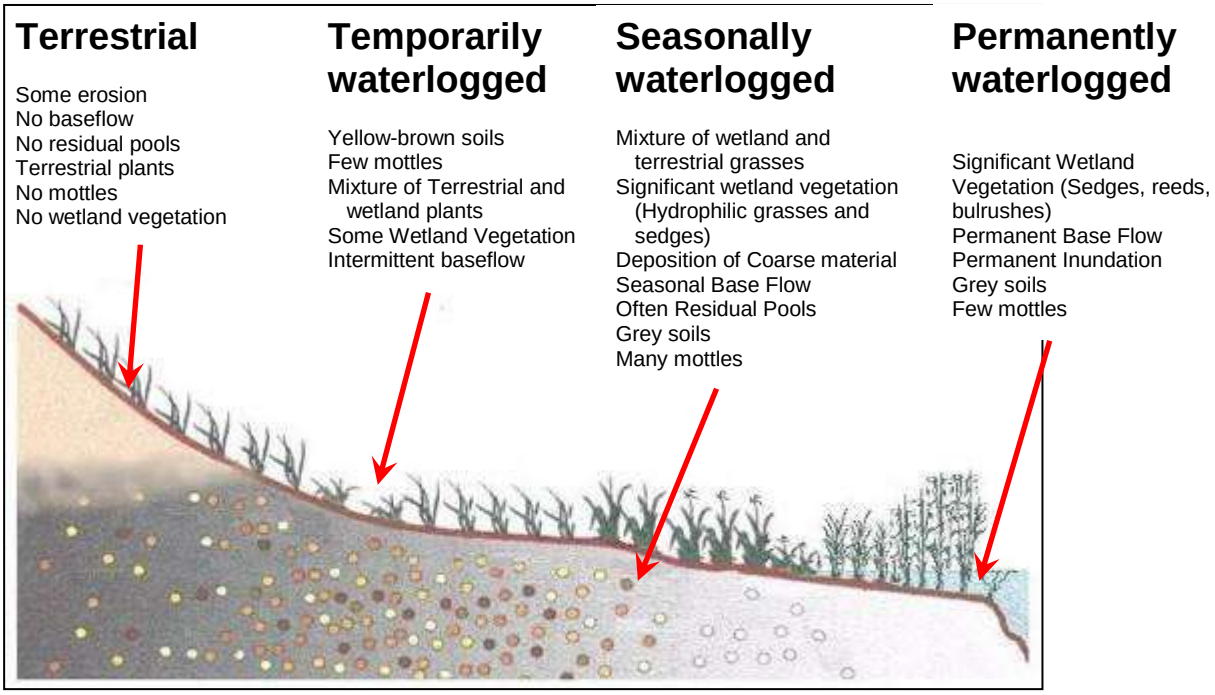

Figure 2: Cross section through a wetland, indicating how the soil wetness and vegetation indicators change along a gradient of decreasing wetness, from the middle to the edge of the wetland. (Reproduced from Kotze (1996), DWAF Guidelines)

4.2 Wetland Classification

Any features meeting the criteria above within the study area will be delineated and classified using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems hereafter referred to as the "Classification System" (Ollis et. al., 2013). A summary of Levels 1 to 4 of the classification system are discussed further below.

Inland wetland systems (non-coastal) are ecosystems that have no existing connection to the ocean which are inundated or saturated with water, either permanently or periodically (Ollis et. al., 2013). Inland wetland systems were divided into four levels by the Freshwater Consulting Group in 2009 and revised in 2013. Level 1 describes the connectivity of the system to the ocean, level 2 the regional setting (eco-region), level 3 the landscape setting, level 4A the hydro-geomorphic (HGM) type and level 4B the longitudinal zonation.

The level 3 classification has been divided into four landscape units. These are:

a) **Slope** – located on the side of a mountain, hill or valley that is steeper than lowland or upland floodplain zones.
b) **Valley Floor** – gently sloping lowest surface of a valley, excluding mountain headwater zones.
c) Plain – extensive area of low relief. Different from valley floors in that they do not lie between two side slopes, characteristic of lowland or upland floodplains**.**
d) **Bench** (hilltop/saddle/shelf) - an area of mostly level or nearly level high ground, including hilltops/crests, saddles and shelves/terraces/ledges.

Level 4 HGM types (which is commonly used to describe a specific wetland type) have been divided into 8 units. These are described as follows:

- **Channel** (river, including the banks) - an open conduit with clearly defined margins that (i) continuously or periodically contains flowing water. Dominant water sources include concentrated surface flow from upstream channels and tributaries, diffuse surface flow or interflow, and/or groundwater flow.
- **Channelled valley-bottom wetland** - a mostly flat valley-bottom wetland dissected by and typically elevated above a channel (see channel). Dominant water inputs to these areas are typically from the channel, either as surface flow resulting from overtopping of the channel bank/s or as interflow, or from adjacent valley-side slopes (as overland flow or interflow).
- **Unchannelled valley-bottom wetland** - a mostly flat valley-bottom wetland area without a major channel running through it, characterised by an absence of distinct channel banks and the prevalence of diffuse flows, even during and after high rainfall events.
- **Floodplain wetland** - the mostly flat or gently sloping wetland area adjacent to and formed by a Lowland or Upland Floodplain river, and subject to periodic inundation by overtopping of the channel bank.
- **Depression** - a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates. Dominant water sources are precipitation, ground water discharge, interflow and (diffuse or concentrated) overland flow.
- **Flat** - a near-level wetland area (i.e. with little or no relief) with little or no gradient, situated on a plain or a bench in terms of landscape setting. The primary source of water is precipitation.
- **Hillslope seep** - a wetland area located on (gentle to steep) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope.

- **Valley head seep** - a gently-sloping, typically concave wetland area located on a valley floor at the head of a drainage line, with water inputs mainly from subsurface flow.

Any of the above mentioned wetland forms may occur within the study area. The types of wetlands identified by the study are addressed later in the report.

5 METHODS

5.1 Wetland Delineation

The outer temporary boundaries of any wetlands onsite were delineated using the method contained within the DWAF guideline 'A practical field procedure for the identification and delineation of wetlands and riparian areas' (**DWAF, 2005**). This guideline document stipulates that consideration be given to four specific wetland indicators required to determine the outer edge of the temporary boundary of a wetland.

These indicators are:

- **Terrain Unit** - identify those parts of the landscape where wetlands are most likely to occur e.g. valley bottoms and low lying areas.
- **Soil Form** - identify the soil forms associated with prolonged and frequent saturation.
- **Soil Wetness** - identify the soil morphological "signatures" that develop in soils characterised by prolonged and frequent saturation.
- **Vegetation** - indentify the presence of 'hydrophylic and hydrophytic vegetation associated with frequently saturated soils.

In practice, the soil wetness indicator is the most important indicator for determining the outer boundary of wetlands and the other three indicators are better used in a confirmatory role. This is mainly due to the fact that soil wetness indicators remain in wetland soils, even if they are degraded or desiccated, thereby providing an indication of the natural extent of wetlands.

In this study the presence of soil wetness indicators within the top 50 cm of the soil profile were utilised to delineate the outer temporary wetland boundary. The vegetation indicator was used to supplement the findings.

Soil sampling was carried out along transects across the valley bottom and low-lying areas onsite. At each sample point, soil was sampled at 0-10 cm and 40-50 cm. The value and chroma were recorded for each sample according to the 7.5YR Munsell Soil Colour Chart, as well as the degree and colour of mottling. Vegetation sampling was carried out in a 5m radius surrounding each of the soil sample sites.

A conventional handheld Global Positioning System (GPS) was used to record the location of the soil sampling points along each transect. The GPS points were then imported into ArcGIS 10 and the outer temporary wetland boundary along each transect determined. The boundary points were then combined to form a single continuous boundary using contour information,

aerial photography and knowledge on the hydraulic conductivity of the soils. The GPS is expected to be accurate up to 3 metres.

5.2 Wetland Classification

Any features meeting this criteria within the study area were delineated and classified using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems hereafter referred to as the “Classification System” (Ollis et. al., 2013). This was achieved by observing the topographical and geomorphic setting, and the general hydrology of the wetland units.

6 RESULTS AND DISCUSSION: WETLAND DELINEATION

A wetland delineation assessment was undertaken for the proposed project area. As noted in **Figure 7** below, there is no evidence of wetland on the site. Intensive soil sampling of numerous points across the site, and to a depth of 500mm below surface level, yielded no wetland soils, and the vegetation of the site is alien invasive, and pioneer in composition.

Soils across the site, and to a depth of 500mm (**Figure 3**) indicate that the area has been extensively disturbed historically, and this is potentially occurred through the construction of the N11 adjacent to the site, as well as through the illegal dumping of building rubble and spoil material (soil) across the site (**Figure 4**).

Figure 3: Soil from a depth of 40-50 cm showing NO wetland indicators.

Figure 4: Illegal dumping on the site has been extensive.

The lack of wetland soils indicates that either there was never wetland on the site, or the illegal dumping has buried the wetland soils to a depth greater than 500m below the current surface. While either situation may be true, there is no evidence of any wetland soils or vegetation across the site.

The site is currently still covered partially in piles of rubble as pictured above (**Figure 4**), and a portion of the site is being used for a site camp for road construction (**Figure 5**). In addition, a portion of the site is currently being used for stone storage for the road construction (**Figure 6**).

Figure 5: Road construction site camp on the western portion of the site.

Figure 6: Stone stockpile for road construction.

Figure 7: Wetland for the study area

7 CONCLUSION AND RECOMMENDATIONS

SiVEST were appointed by Kamalundo Property Investments (Pty) Ltd to undertake a specialist wetland delineation for Erf 1051, Rockdale, Middelburg, Mpumalanga.

The desktop wetland assessment showed historically there may have been wetland on site, and that it appeared to be a depression fed by stormwater from the N11 adjacent to the site. However, the site has been used extensively for illegal dumping of spoil material and building rubble, and the onsite investigation showed that no wetland soils, or wetland vegetation was present on site during the site visit. It is possible that a wetland may have existed historically, but it cannot be verified, as no trace of wetland currently exists on site.

No wetland is currently present on site.

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