ESKOM HOLDINGS: GENERATION

Proposed Above Ground Bulk Storage Fuel Oil Tank: Grootvlei Power Station

Wetland Assessment Report

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Declaration

I, Kurt Barichievy, declare that I –

- act as an independent specialist consultant in the field of wetland hydrology for the **wetland assessment report for the proposed above ground bulk storage fuel oil tank at the Grootvlei Power Station, Mpumalanga Province**;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2010;
- have and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2010; and
- will provide the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not.

Mr. K. R. Barichievy *Pr.Sci.Nat*
Scientist
SiVEST Civil Engineering Division

ESKOM HOLDINGS: GENERATION

PROPOSED ABOVE GROUND BULK STORAGE FUEL OIL TANK – GROOTVLEI POWER STATION

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WETLANDS ASSESSMENT REPORT

1 INTRODUCTION

SiVEST were appointed by Eskom Holdings Generation to undertake a specialist wetland assessment for the area to be affected by the proposed above ground bulk storage fuel oil tank at the Grootvlei Power Station in Mpumalanga Province (**Figure 1**). The proposed development includes the installation of an additional $500m^3$ bulk storage fuel tank adjacent to existing above ground fuel storage facilities. Two positional alternatives, 30 metres apart, have been tabled for this environmental application.

The primary objective of this assessment is to provide specialist wetland input into the overarching Basic Assessment Report (BAR). In order to achieve this objective a detailed desktop wetland assessment and associated field verification was undertaken. This report serves to present the relevant results as well as outline potential impacts associated with the proposed development on nearby surface water resources.

A site visit was undertaken to the Proposed Development Area (PDA) in mid September 2011. The purpose of the site visit was to verify the results of the desktop assessment as well as to identify and delineate on-site wetlands. It is hoped that this assessment, along with the other specialist studies, will inform the final positioning of the fuel storage tank and minimise the predicted potential impacts on environmental resources.

1.1 Aims of the Study

The primary aims of the study are to:

1. Conduct a desktop study for the broad development area to identify nearby surface water features, including rivers and wetlands.
2. Undertake a site visit to ‘ground-truth’ the findings of the desktop assessment and delineate surface water resources where relevant.
3. Where wetlands occur on or near the two positional alternatives, delineation is to be performed (according to the DWAF proposed methodology for the delineation of wetlands) and as well as the classification of the wetlands into wetland hydro geomorphic types using the hydrogeomorphic method (as specified within Wet-Ecoservices).

4. Identify very sensitive surface water areas by undertaking an analysis of whether surface water bodies would contain endangered species, or would have high ecological or hydrological functionality.
5. Identify potential impacts associated with the proposed development on nearby surface water resources.

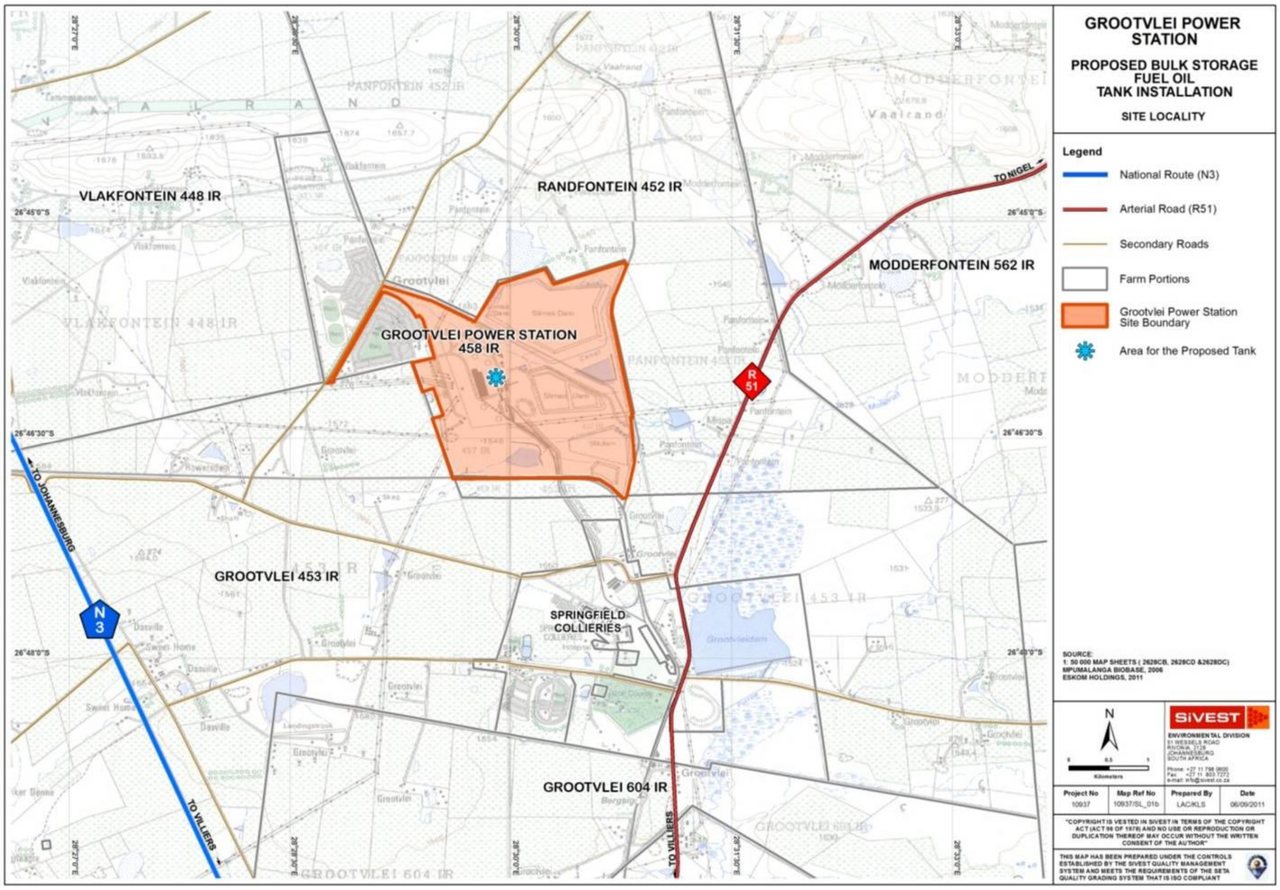

Figure 1: Locality Map

1.2 Technical Description of Proposed Activities

Grootvlei power station consists of 6 coal fired units rated at 200MW. These different drum boilers are fired with pulverised fuel (PF) via individual coal milling plants. The fuel oil is used to start up and shutdown of these boilers. The fuel oil plant supplies oil to the burners of all six boiler units via a common 4 inch supply duct. The used fuel oil returns to the fuel oil plant via a 5 inch circulation duct. Oil tankers deliver fuel oil on daily basis to the station. The fuel oil is predominantly supplied by Sasol from any of their two supply depots, namely Sasol refinery and Sasol depot.

The fuel oil in Grootvlei power station is stored in six storage tanks. Five tanks have a capacity of 97 m³ and one with capacity of 75 m³, so the total existing capacity at the Grootvlei Power Station is 560 m³. Each tank is fitted with an outflow heater, located inside the take-off of each tank. Each tank is fitted with a drain line that features an isolating valve for draining sediment that accumulates at the bottom of the tanks.

Grootvlei Power Station is proposing to install a 7th bulk fuel oil storage tank with a capacity of 500 m³. After the additional proposed tank has been installed the total capacity will be 1 060 m³. Two positioning alternatives, Alternative 1 and 2, has been proposed (**Figure 2**). There is also a possibility that two different capacity alternatives will most likely be considered (i.e. capacity alternative 1 – 1 x 500m³ above ground fuel oil tank; capacity alternative 2 – 2 x 250m³ above ground fuel oil tanks).

The 7th proposed tank will be installed on the open space adjacent to the existing 6 tanks, approximately 15 meters from the other nearest tank and a small building (**Figure 3**). The new proposed tank will be linked to the other six existing tanks and will therefore; similarly discharge to the same line as the other six existing tanks. As with all the existing tanks, the new proposed fuel storage tank will be bunded. The concrete bund will have a capacity to capture and store 110% of the tank's storage capacity.

Figure 2: Aerial photo illustrating the two tank position alternatives (Source: Google Earth, 2011; Imagery Date 22/08/2009)

Figure 3: Photo of an existing fuel storage tank at the Grootvlei power station.

1.3 Definition of Surface Water Resources as Assessed in this Study

Surface water resources can be classified according to a number of different forms. For the purposes of this study, surface water resources have been defined based on the definition for non-groundwater resources which appears in the National Water Act (36 of 1998), which defines a non-groundwater resource as a "watercourse, surface water or estuary," The Act defines a watercourse as (inter alia):

- a river or spring;
- a natural channel in which water flows regularly or intermittently;
- a wetland, lake or dam into which, or from which, water flows.

Thus for the purposes of this report, surface water resources have been defined as any natural stream, river, or inland wetland. Wetlands specifically have been defined as a piece of land on which the period of saturation of water is sufficient to allow for the development of hydric soils, which in normal circumstances would support hydrophytic vegetation[1].

Wetlands may either be palustrine (marsh-like) or lacustrine (lake-like) in nature. Palustrine and lacustrine wetlands can be divided up into different hydrogeomorphic forms, based on their position within the landscape, hydrological connectivity and water input. **Kotze et al. (2005)** have described a number of different wetland hydrogeomorphic forms:

[1] Hydrophytic is a term used to describe vegetation which has adapted to grow in saturated and anaerobic conditions

- Hillslope Seepage feeding a stream
- Hillslope Seepage not feeding a stream
- Channelled Valley Bottom
- Un-channelled Valley Bottom
- Pan / Depression
- Floodplain

1.4 Wetlands and Hydric Soils

Surface water features (including wetlands) are a very important component of the natural environment, as they are typically characterised by high levels of biodiversity and are critical for the sustaining of human livelihoods through the provision of water for drinking and other human uses. Wetlands are sensitive features of the natural environment, and pollution or degradation of a wetland can result in a loss of biodiversity, as well as an adverse impact on the human users which depend on the resource to sustain their livelihoods. As such surface water resources and wetlands are specifically protected under the National Water Act, 1998 (Act No. 36 of 1998) and generally under the National Environmental Management Act, 1998 (Act No. 107 of 1998).

Hydric (hydromorphic) soils are found within wetlands. The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) defines hydric soils as "soils that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part". These anaerobic conditions would typically support the growth of hydromorphic vegetation (vegetation adapted to grow in soils that are saturated and starved of oxygen) and are typified by the presence of redoximorphic features. The presence of hydric (wetland) soils on the site of a proposed development is significant, as the alteration or destruction of these areas, or development within a certain radius of these areas would require authorisation in terms of the National Water Act (36 of 1998) and in terms of the Environmental Impact Assessment Regulations promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998).

1.5 Assumptions and Limitations

The desktop portion of this report is used to identify major wetland systems and important freshwater resources. It should be clearly noted that, since the spatial information used in portions of this assessment is of a reconnaissance nature, only broad/large scale information is provided. This study has focused on the delineation of wetlands and wetland boundaries for the PDA and within the grounds of existing Grootvlei Power Station. A full delineation and mapping of all wetlands in the wider area has thus not been undertaken.

2 STUDY AREA DESCRIPTION AND DRAINAGE CONTEXT

The project area is located within the boundaries of the Grootvlei Power Station, which is situated approximately 15 kilometres north west of the town of Balfour in the Mpumalanga Province of South Africa (**Figure 1**). The first of Grootvlei's six units was commissioned in 1969. In 1989 three units were mothballed and in 1990 the other three followed. Due to the power crisis being experienced in South Africa, Eskom decided to return the station to service which has a total installed capacity of 1200MW (**Internet 1, 2011**).

The power station and associated infrastructure covers an area of approximately 5km^2. The broad development area has the following midpoint co-ordinates: 26^o 46' 05.05" S 28^o 29' 53.50" E. Two position alternatives, 30 metres apart, have been also been tabled for this environmental application (**Figure 2**). The site has been completely transformed by the power station, substation, ash dams and coal storage areas. Due to its topographic position, local soil characteristics and surrounding land use the presence of wetlands on the original site was unlikely. The Grootvlei falls within the C12k quaternary catchment (**Figure 4**). The runoff from the power station contributes to a small non-perennial stream which flows to the east of the site into the Grootvlei Dam. The Grootvlei Dam is located approximately 3.8km southeast of the proposed Alternatives. The outlet from Grootvlei Dam flows into the Molspruit which ultimately feeds the Vaal Dam.

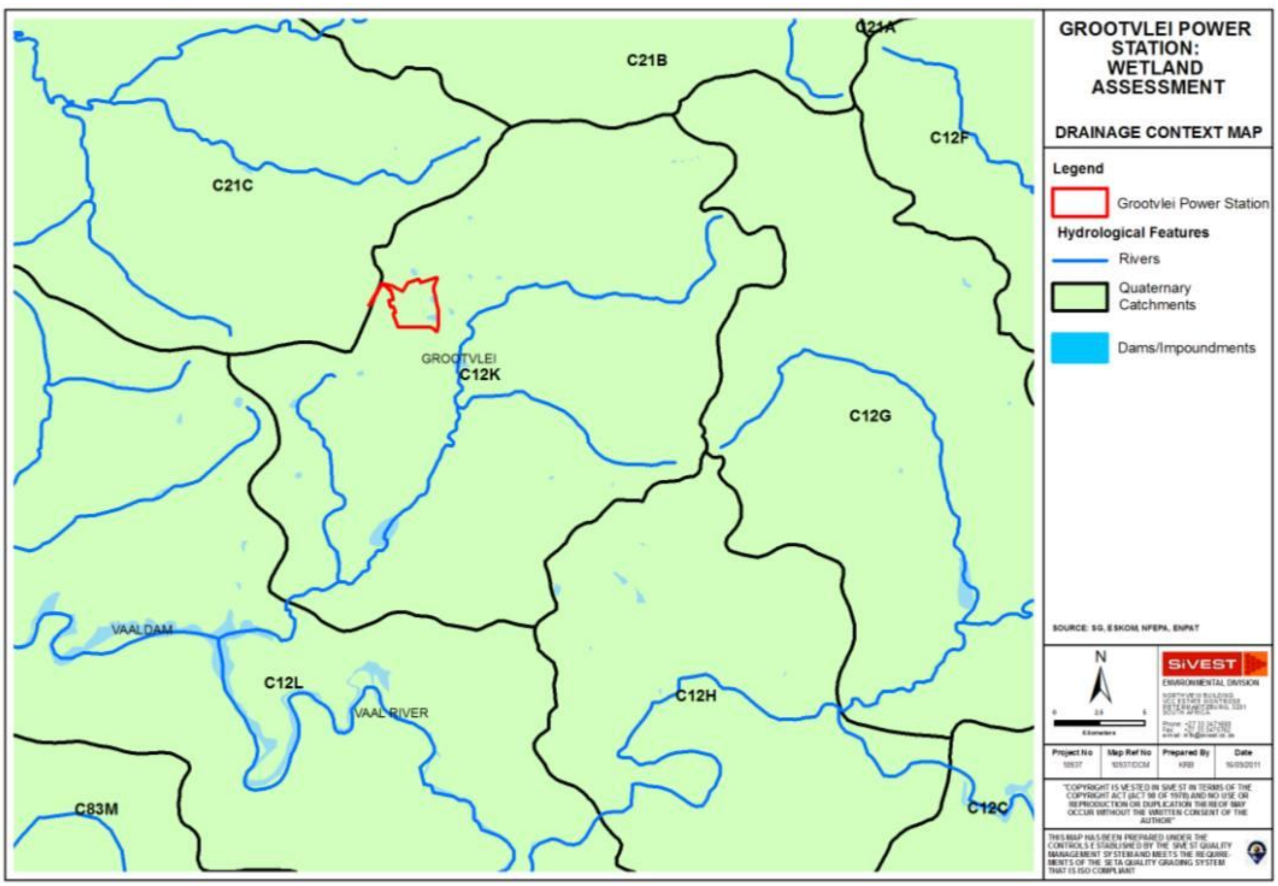

Figure 4: Drainage context map

3 WETLAND DESKTOP ASSESSMENT

A desktop wetland assessment was undertaken for the proposed development area. The objective of this study is to identify wetland features in the broad study area. In order to achieve this objective the National Freshwater Ecosystem Priority Areas database was used in combination with aerial photography to identify spatially prominent wetland features.

The National Freshwater Ecosystem Priority Areas (NFEPA) is a product of a multi-partner project, completed in 2011, between the CSIR, Water Research Commission, South African National Biodiversity Institute, Department of Water and Environmental Affairs, South African Institute of Aquatic Biodiversity and South African National Parks. By interrogating this database one is able to identify wetlands and other sensitive aquatic features. Identified surface water features from the database within close proximity to the PDA will provide the basis for the in-field detailed assessment.

3.1 Results of the Desktop Wetland Assessment

The results from the desktop assessment are shown in **Figure 5**, below. According to the NFEPA database there are 3 wetland systems near the broad development area.

Wetland 1: Is described as a flat artificial wetland.

Wetland 2: Is described as a natural valley head seep wetland.

Wetland 3: Is described as an artificial channeled valley bottom wetland.

When the NFEPA spatial database is overlaid onto the aerial photo it is clear that the NFEPA database has misclassified these wetland areas. For example the shadow caused by smoke emanating from one of the stacks has been classified as a natural wetland (Wetland 2). Owing to this misclassification, field verification was undertaken to refine and ground-truth the features displayed in the NFEPA database.

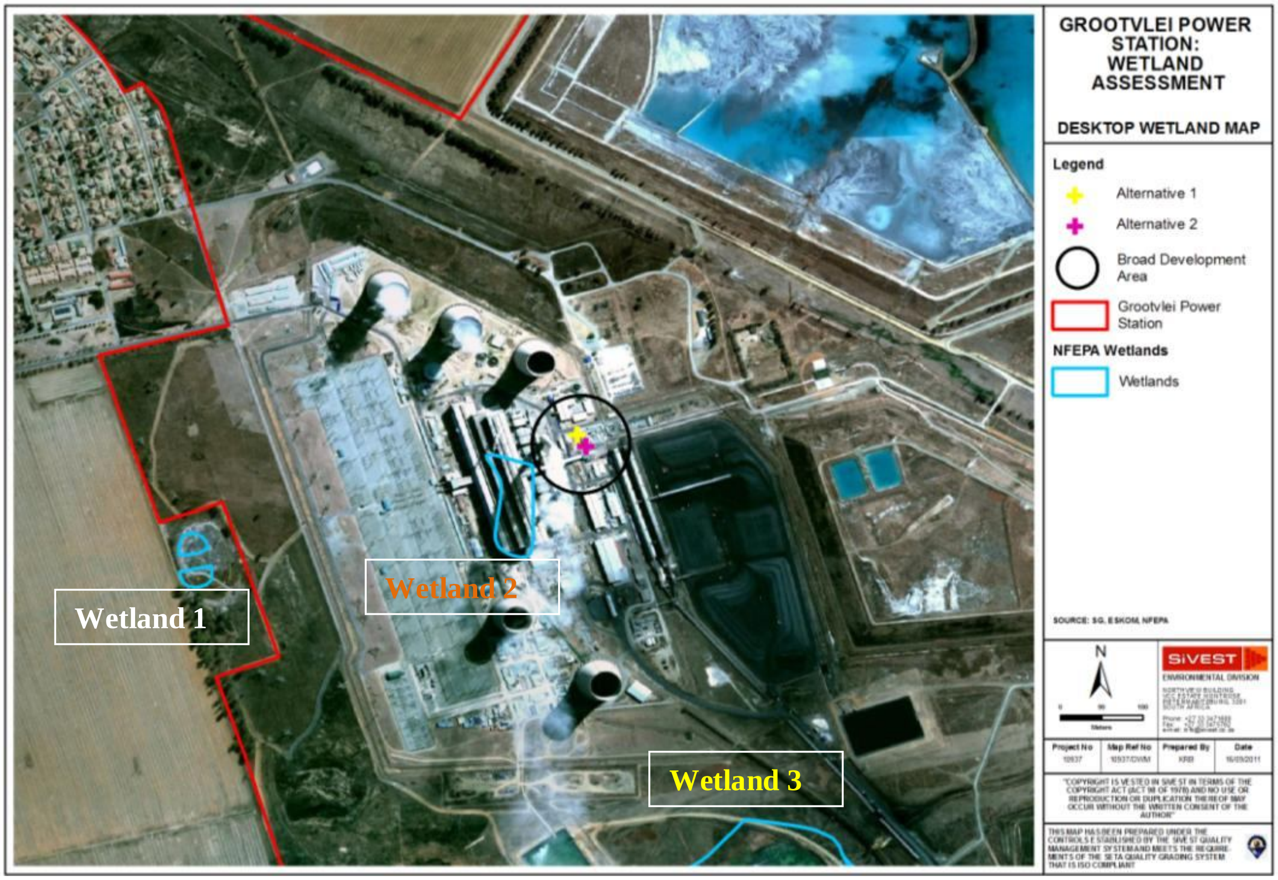

Figure 5: Desktop Wetland Map

4 FIELD VERIFICATION AND WETLAND DELINEATION

The potential occurrence / non-occurrence of wetlands and wetland (hydric) soils within the PDA and surrounds has been assessed according to the method contained within the DWAF guideline "A practical field procedure for the identification and delineation of wetlands and riparian areas" (**DWAF, 2005**). The guideline document stipulates that consideration be given to four specific wetland indicators to determine whether an area can be classified as a wetland:
These indicators are:

- terrain unit
- soil form
- soil wetness
- vegetation

For the purposes of the assessment, the presence of redoximorphic features within 50cm of the upper soil profile has been utilised as the basis on which to identify hydric soils in areas assessed on the site with the other indicators being used to confirm this assessment.

4.1 Soil Wetness Indicators

For an area to be considered a wetland, redoximorphic features must be present within the upper 500 mm of the soil profile (**Collins, 2005**). Redoximorphic features are the result of the reduction, translocation and oxidation (precipitation) of Fe (iron) and Mn (manganese) oxides that occur when soils are saturated for sufficiently long periods of time to become anaerobic. Only once soils within 50cm of the surface display these redoximorphic features can the soils be considered to be hydric soils. Redoximorphic features typically occur in three types (**Collins, 2005**):

- **A reduced matrix** – i.e. an *in situ* low chroma (soil colour), resulting from the absence of Fe3+ ions which are characterised by "grey" colours of the soil matrix.
- **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.
- **Redox concentrations** - Accumulation of iron and manganese oxides (also called mottles). These can occur as:
  - i. Concretions - harder, regular shaped bodies
  - ii. Mottles - soft bodies of varying size, mostly within the matrix, with variable shape appearing as blotches or spots of high chroma colours
  - iii. 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.

According to the DWAF guidelines for the delineation of wetlands (**DWAF, 2005**), soil wetness indicators (i.e. identification of redoximorphic features) are the most important indicator of wetland occurrence, due to the fact that soil wetness indicators remain in wetland soils, even if they are degraded or desiccated. It is important to note that the presence or absence of redoximorphic features within the upper 500mm of the soil profile alone is sufficient to identify the soil as being hydric or non-hydric (non-wetland soil) (**Collins, 2005**). This is important to note in the context of the other wetland indicators discussed below.

It is important to note however that under certain geological settings, for example where hydric soils derived from dolomite bedrock occur, the redoximorphic features may not always be present. Under these circumstances the delineation of wetlands must take other factors (indicators) into account.

4.2 Vegetation Indicators

Vegetation is a useful tool in determining wetland boundaries, although it does require that vegetation be in fairly good and identifiable condition. However, a cautionary approach must be taken when using vegetation as an indicator of wetlands. Vegetation also responds to changes in wetland hydrology, e.g. when a wetland is drained, the hydrophitic vegetation typically disappears and is replaced by vegetation more typical of upland (non-wetland) areas. In completely transformed wetlands however, no natural hydromorphic vegetation may exist within the wetland.

4.3 Soil Form Indicators

The soil form indicator examines soil forms, as defined by the Soil Classification Working Group. Typically soil forms associated with prolonged and frequent saturation by water, where present, are an indicator of wetland occurrence (**DWAF, 2005**). The Soil Classification Working Group has identified the soil types that typically occur within the different zones typically found within a wetland, i.e. permanent, seasonal and temporary.

4.4 Terrain Unit Indicators

Terrain unit refers to the terrain unit in which a wetland can be found. Wetlands can occur across all terrain units, from the crest to valley bottom. Many wetlands occur within valley bottoms, but wetlands are not exclusively found within depressions.

4.5 Field Sampling Technique

As the primary aim of the study was to identify whether wetlands (hydric soils) occurred within the broad development area, the field investigation and sampling focused within the site boundaries. Where necessary, the assessment also covered other parts of the wetland adjacent to the site in order to gain a more complete picture of the extent of wetland soils. Notes were made regarding the terrain, hydrology and state of the affected part of the wetland, as part of a broad-scale assessment of wetland state and functionality in order to assist in the assessment of the impact of the proposed development on the wetland.

4.6 Results of the field verification

The desktop wetland assessment indicated that there were three (3) wetland features near the broad development area. Field verification took place on 13th of September 2011. During the site visit **no functioning wetlands or natural aquatic systems were identified within or near the broad development area.** The site has been completely transformed by the Grootvlei Power Station. There are a number of large artificial ash tailings dams, but these are not performing any useful wetland functions nor do they provide any form of aquatic habitat. During the site visit it was noted that the broad development currently has sufficient storm water infrastructure to accommodate the proposed development.

The closest natural downstream surface water resource is located approximately 1600 m to the southeast of the two positional Alternatives. Located downstream, this extensive valley wetland is, in all probability, negatively affected by the activities associated with Grootvlei Power Station. These potential negative impacts include increase in pollution levels, sediment accretion and alteration of this system's natural hydrological regime. The development of Grootvlei Town, the creation of roads and the clearing of vegetation have also likely played a role in altering the natural flow regimes causing effects such as an increase in surface runoff, runoff velocities and erosion within the catchment.

The two positional Alternatives have already been completely transformed by anthropogenic activities. Both Alternatives have been raised, leveled and graveled (**Figures 6** and **7**). Surrounding developments include 6 existing bunded above ground fuel oil tanks, a coal storage area and a coal processing unit. The immediate area surrounding Alternatives 1 and 2 is characterised by low environmental significance and sensitivities. Due to their close proximity and similar characteristics, both Alternatives will be subjected to exactly the same impacts.

Figure 6: Current condition of positional Alternative 1

Figure 7: Current condition of positional Alternative 2

5 IMPACT ASSESSMENT

The installation and operation of an additional above ground bulk storage fuel oil tank will have a very limited impact on local freshwater resources. As outlined in previous sections, there are no wetlands or natural aquatic features in vicinity of the two positional alternatives. The proposed development will not cause any direct loss of surface water resources nor will it increase the runoff emanating from the site as both positional alternatives are partly sealed and completely covered by graveled. Thus this impact assessment will focus on the potential risk of contamination if the bulk storage fuel oil tank were to leak or fail completely. This potential impact is rated in the impact rating table below.

During the construction phase, no potential impacts are expected to occur as limited excavation will occur and sediment entering the storm water drains will be negligible and most likely not affect the nearby water course.

The determination of the effect of an environmental impact on an environmental parameter (in this instance, downstream aquatic systems) is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

5.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global) whereas Intensity is defined by the severity of the impact (e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence). Significance is calculated as per the example shown in **Table 2**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

5.2 Impact Rating System Methodology

Impact assessments must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental).

5.2.1 Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).

3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).

3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high

		costs of rehabilitation and remediation.

SIGNIFICANCE
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.** The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	**Impact Significance Rating**	**Description**
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

5.2.2 Impact Summary

Once rated, the impacts are summarised and a comparison made between pre- and post mitigation phases. The rating of environmental issues associated with different parameters prior to and post mitigation of a proposed activity will be averaged. A comparison is then made to determine the effectiveness of the proposed mitigation measures and identify critical issues related to the environmental parameters.

5.3 Rating of Predicted Impacts: Contamination of downstream surface water resources

From a surface water perspective the contamination of natural aquatic systems, as a result of the proposed activities, is the primary concern of this assessment. The desktop study and subsequent field verification has shown that there are no functioning wetlands or natural aquatic systems within or near the broad development area**.** As such the proposed installation and normal operation of an above ground bulk storage fuel oil tank will not impact on nearby natural surface water resources. However contamination of these features, without certain mitigation measures, could occur in the unlikely event of a major fuel leak or complete failure of storage tank (i.e. an emergency situation). If not mitigated fuel emanating from the site could reach important downstream systems, including the Vaal Dam.

Note: The pre-mitigation rating of the contamination of downstream surface water resource impact is taken as worst case scenario i.e. the fuel tank is not bunded or lined.

Table 1: Impact rating table for the Contamination of downstream surface water resources during the operational phases

IMPACT TABLE	
Environmental Parameter	*Wetland and Surface Water Resources*
Issue/Impact/Environmental Effect/Nature	*Contamination of downstream surface water resources by a major fuel leak or complete failure of the proposed above ground fuel storage tank.*
Extent	*District*
Probability	*Very Unlikely*
Reversibility	*Partly reversible*
Irreplaceable loss of resources	*Without mitigation measures the impact will result in significant loss of resources.*
Duration	*Medium Term*
Cumulative effect	*High cumulative impacts*
Intensity/magnitude	*High*

Significance Rating	*This issue, without suitable mitigation, has the potential to have a significant impact on surface water resources in the district. Pre-mitigation significance rating is medium negative. With appropriate mitigation measures, this impact significance rating becomes negligible.*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	1	1
Reversibility	2	1
Irreplaceable loss	3	1
Duration	2	1
Cumulative effect	4	1
Intensity/magnitude	3	1
Significance rating	-42 (**medium negative**)	-6 (**low negative**)
Mitigation measures	▪ Construct a complete sealed concrete bund around the proposed fuel tank. This bund must have a capacity of 110% of the bulk storage fuel oil tank. ▪ Undertake regular checks and maintenance on the bulk storage fuel oil tank and bund. ▪ Should contaminated water enter the bund, this would then need to be removed from the site, and would be recycled off-site as part of the remediation process.	

6 PREFERRED SITE LOCATION

If the above mitigation measures are correctly implemented then there is no reason why the proposed development cannot be accommodated on either of the identified site alternatives from surface water perspective. This is due to the current condition of the PDA, the close proximity of the two positional alternatives as well as their similarities in terms of the impacts on the receiving environment.

7 CONCLUSION AND RECOMMENDATIONS

SiVEST were appointed by Eskom Holdings Generation to undertake a specialist wetland assessment for the area affected by the proposed above ground fuel storage tank at the Grootvlei Power Station in Mpumalanga Province.

The desktop wetland assessment indicated that there were three (3) wetland features near the broad development area. Field verification took place on 13th of September 2011 and during the site visit **no functioning wetlands or natural aquatic systems were identified within or near the broad development area.** The site has been completely transformed by the Grootvlei Power Station. There are a number of large artificial ash tailings dams but these are not performing any useful wetland functions nor do they provide any form of aquatic habitat. During the site visit it was noted that the broad development area currently has sufficient storm water infrastructure to accommodate the proposed development.

A wetland impact assessment was undertaken for the proposed development. The focus centered on the possibility of downstream contamination of surface water features as a result of leakage or complete failure of the proposed above ground fuel storage tank. Recommended mitigation measures include the construction of a completely sealed concrete bund with the capacity to store 110% of the bulk storage fuel oil tank it encloses. **If the all the proposed mitigation measures are correctly implemented then there is no reason why the proposed development cannot be accommodated on either of the identified site alternatives from a surface water perspective.** This is due to the current condition of the PDA, the close proximity of the two positional alternatives as well as their similarities in terms of the impacts on the receiving environment.

8 REFERENCES

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