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Dear Bonginkosi

THE PROPOSED PLACEMENT OF A PORTION OF A SOLAR PHOTO-VOLTAICS FACILITY ON AN OLD REHABILITATED ASH DISPOSAL FACILITY AT GROOTVLEI POWER STATION

The discussions at the EDCC meeting (24 July 2013) and meeting with Zingisa Phohlo (standing in for yourself on the 13 August 2013), bear reference.

The objective of this note is to provide a background to the proposed placement of a portion of a Solar PV facility on the old rehabilitated Ash Disposal Facility at Grootvlei Power Station, Mpumalanga, and to request clarity on whether any waste-related licencing requirements are triggered through this project.

Eskom has long recognised renewable energy as one of the sustainable options for generating cleaner (low carbon) electricity. Solar photo-voltaic (PV) is one such renewable option. Eskom proposes to roll out 120 -150 MW of PV plants within the next few years in order to further diversify Eskom's energy mix to reduce Eskom's carbon footprint and to support the demand side management energy efficiency programme. Eskom Holdings SoC Limited (Eskom) proposes the construction and operation of a 5MW to 10 MW Solar Photo-Voltaic (PV) facility at the existing Eskom Grootvlei Power Station, in Mpumalanga. This additional capacity will be utilised by the auxiliary supply of the Power Station.

The site selection process for the project identified four (4) potential sites, but three (3) of those were found to have wetlands sensitivities in them. As a result, a site (Alternative Site 4), most of which constituted the old rehabilitated ash disposal facility (ADF), was recommended. This site is located on the south eastern part of the Grootvlei Power Station property – Figure 1. It was further recommended that utilisation of Alternative Site 4 includes the platform of the old rehabilitated ADF, adjacent to it, which would provide a 7Ha footprint. Therefore only 9Ha would be utilised of the adjacent land.

The utilisation of the particular old ADF for the placement of a portion of the proposed Solar PV plant resulted in questioning of whether this facility would require decommissioning in terms of the National Environmental Management Waste Act 59 of 2004 (NEMWA) and the National Environmental Management Act 107 of 1998 (NEMA).



Figure 1: The original sites identified for placement of the proposed PV facility around the power station – Alternative 4 is being considered further in the BA process

The **status of the old rehabilitated ash disposal facility (ADF)** is as follows:

- This old ADF was historically utilised by the power station when it first commissioned (in the late 1960's) until it ceased usage in the late 1970's.
- ADF was closed and rehabilitated by the early 1980's.
- Eskom was not required to obtain environmental authorisation to decommission and rehabilitate its ADF's under the applicable legislation then.
- The rehabilitation of this site consisted of the placement of topsoil, and planting of indigenous vegetation
- Natural drainage lines on the North Edge of the ADF platform have since formed since Grootvlei ceased usage, which dissipate any rainwater that falls onto the surface of the old ADF.
- The old ADF has not been used since rehabilitation.
- There is no intention to use the old ADF as an ADF in the future.

The following **legal advice** was provided from Eskom legal advisor with regards to this query:

- In terms of **NEMA** Listing Notice 1, GNR 544, decommissioning means *"to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be re-commissioned"*. (The first requirement is that the facility must be in active service.)
- The **NEMWA** defines decommissioning differently to NEMA and in relation to waste treatment, waste transfer or waste disposal facilities, means *"the planning for and management and remediation of the closure of a facility that is in operation or that no longer operates"*.

The definition of decommissioning under NEMA and NEMWA are not applicable as the site being considered is not covered by the factors of the definition. The old ADF is no longer in operation (since the 1970's) is already closed and rehabilitated (by the early 1980's). This is no different to a view that the facility was decommissioned in the early 1980's.

Further, the NEMWA provides that *"A person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct a basic assessment /an environmental impact assessment process"*. The facility has already been closed and rehabilitated and there is no intention to commence, undertake or conduct a listed activity.

Therefore it is deemed that a Waste Management Licence or authorisation for decommissioning of the old ash disposal facility is not required in terms of the NEMWA and NEMA.

Eskom would like to request advice and confirmation from the DEA Licencing section on whether any decommissioning related licencing activities would be triggered with regards to the utilisation of this old rehabilitated ADF for the placement of a portion of the proposed PV facility.

In a meeting with Zingisa Phohlo (standing in for Bonginkosi Dlamini) on the 13 August 2013, it was requested the DEA Licencing be provided with the technical scope for the proposed placement of the PV facility on the old rehabilitated ADF to further provide the assistance above. As such please find attached the following:

Appendix A: Technical scope of work for the portion of the proposed PV facility that will be placed on the platform of the ADF:

Appendix B: Photographs of and from the Alternative site 4.

Yours sincerely



Deidre Herbst

ESKOM ENVIRONMENTAL MANAGER

APPENDIX A:

Technical scope of work for the portion of the proposed PV facility that will be placed on the platform of the ADF

The PV Project structures:

PV operates by direct conversion of light into electricity at the atomic level. The following components comprise the portion of the proposed PV facility that will be placed on the ADF platform:

1. PV Cell - A basic photovoltaic device, which generates electricity when exposed to solar radiation. All photovoltaic cells produce DC electricity.
2. PV Panel - The smallest complete assembly of interconnected photovoltaic cells. In the case of crystalline silicon cells, the cells are connected and compressed between a transparent layer and a backing material. The panels are typically mounted in a lightweight aluminium frame. Panels will be spaced ~4m apart. (~Panel dimensions 1640mm / 992mm / 50mm, total area 1.63m²)
3. Photovoltaic Array - An interconnected system of PV panels that function as a single electricity-producing unit. The modules are attached to a steel/aluminium mounting structure that is either pilled to the ground or has concrete slabs supporting it (typical PV array represented in Figure 1). The PV array will occupy approximately 16 ha (approximately 7Ha of which will be on the platform of the old ADF).
4. String of panels – Number of PV panels connected in series. In this case, several strings will connect to a single inverter.
5. Connection to Array Enclosures - The electricity generated from the solar panels will be transferred via combiner boxes to the inverters. These combiner boxes combine the several cables that come from each string of panels into a unique pair of DC cables that is then connected to the inverter.
6. Wiring to Central Inverters/Transformers - Array enclosures are wired to central inverters, where DC is converted to AC. The central inverters function to convert DC electricity to AC electricity at grid frequency. The voltage is then stepped-up via transformers to be then distributed via the power station grid.



Figure 1 A typical PV array - The PV panels are attached to the mounting structures, that are then inserted into the ground (either rammed, screwed, etc).

The construction methodology:

The main construction activities for the proposed solar PV facility on the ADF include the following:

- Limited and controlled excavation on the ADF, specifically where piling and foundation strengthening is required.
- Trenches for the cables, which are approximately 20cm wide and around 50cm deep.
- Vegetation may need to be cleared or shortened (in cases where it is long)
- Construction of a storm water management system, to control the potential increased run-off coefficients on the ADF – as recommended by the EAP and Hydro specialist for the BA process.
- Eskom will outsource the construction and select the best bid. Due to this fact, Eskom would like to leave the foundation option of the PV panels open to selection. The different foundation options include concrete pad, piles or ballast foundations.

The **proposed rain water management system** is based on the following:

- It is believed the rain falling onto the PV arrays is pure water;
- If the rain water does come into contact with any particulates it will not differ to the way the system operated currently. Note the old ash facility has been rehabilitated by means of the placement of an approximate 30cm layer of top soil, followed by the planting of indigenous vegetation.

It is proposed to channel the rain water that falls on the arrays through lined drains (Figure 2 and Figure 3), to the already existing natural drainage system that has been in existence over the past 40 years around this old ADF platform on the North edge. The old ADF platform appears to drain from South to North with a 2m cross fall of approximate grade 1: 100. This is based on Google earth measurements. This grade is deemed suitable for effective drainage and will be the basis for the drain sizing of the proposed primary drains. Sizing of the drains will therefore be reliant on slope, rainfall intensity and channel lining. These factors will be considered when using Sanral’s Drainage Manual and other relevant codes designing the stormwater channels.

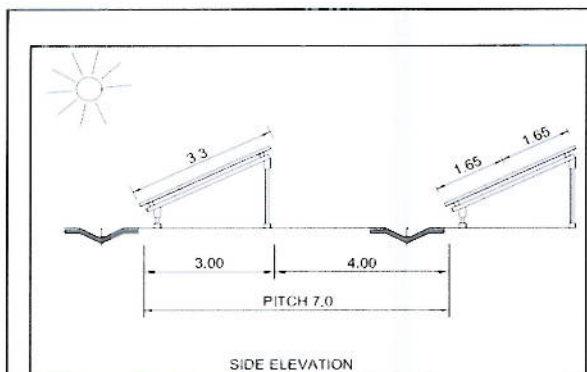


Figure 2: Drawing of the proposed drains

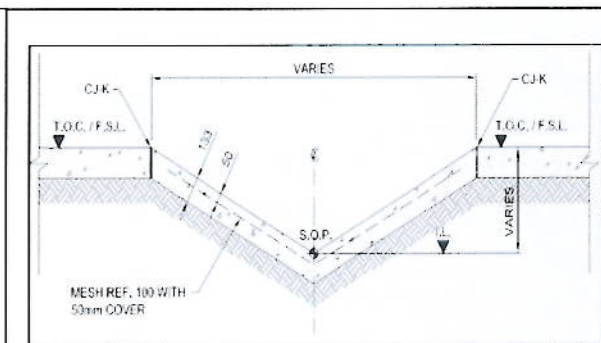


Figure 3: Side elevation of the lined drains running from East/West

To ensure no infiltration of rain water (that would fall onto the solar PV arrays, and subsequently into the drains/channels) into the ADF and no erosion of the ADF, the channels will be constructed out of steel mesh and concrete. It is assumed that the arrays will cover approximately 45% of the exposed surface area of the old ADF. The principle of the drainage will be to construct lateral secondary concrete lined collector ‘V’ drains (Figure 2 and Figure 3) running East - West and West – East to the proposed primary South – North concrete lined ‘V’ drains which discharge through suitably designed energy dissipation structures, into the existing

natural drainage lines of the old ash disposal facility platform, which have developed over the past approximately 40 years (i.e since the old ash disposal facility ceased usage and was closed), see Figure 4. The energy dissipation structure is designed to reduce the storm water's velocity by obstructing the water flow which prevents erosion and allows the water to flow into the natural drainage lines at a lower velocity.

The drains will also assist in reducing the concentration times of the surface runoff on the old ash disposal facility, further reducing permeation, if permeation does occur. The permeability of the old ash disposal facility is also low due to the lime content which creates a pozzolanic reaction between the lime and the ash which makes up the fly ash which has resulted in hardening (cementation) with time. Potential siltation will similarly be reduced as less area is presented to the elements, due to the PV panels providing protection of the old facility against direct rainfall and wind and therefore reducing erosion

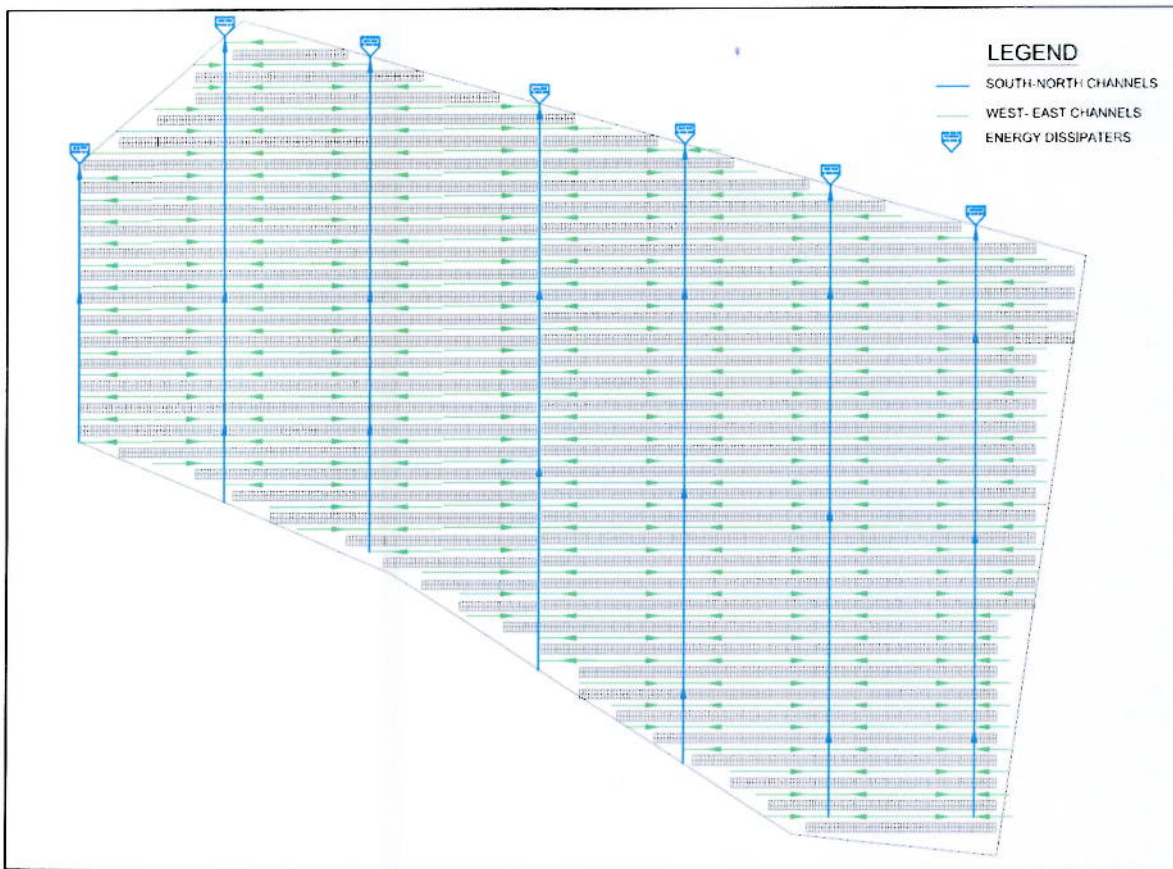


Figure 4- Drainage proposed for the proposed PV array on the old ADF at Grootvlei Power Station

APPENDIX B:

Photographs of and from the Alternative site 4



Figure 1: Alternative site #4, looking east towards the ash disposal facility (ADF). Note the secondary grassland in the foreground and the ADF rising to 2m in height in the background



Figure 2: Alternative site #4 looking south east, with the ADF in the background.



Figure 3: Alternative site #4, looking south



Figure 4: Alternative Site #4, looking North.



Figure 5: Alternative site #4, looking West



Figure 6: Alternative site #4, looking North West