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REPORT

Application for Variations to the existing Waste Management License (12/9/11/L50/5/R1) for the Medupi Power Station Ash Disposal Facility, Limpopo Province

WML License No.: 12/9/11/L50/5/R1

EDM Reference: WL 147014

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TABLE OF CONTENTS

SECTION **PAGE**

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS

ADF	Ash Disposal Facility
$CaCl_2$	Calcium Chloride
CaF_2	Calcium Fluoride
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
FEPA	Freshwater Ecosystem Priority Area
FGD	Flue Gas Desulphurisation
LCT	Leachable Concentration Thresholds
$MgSO_4$	Magnesium Sulphate
NAAQS	National Ambient Air Quality Standards
NADF	Northern Ash Disposal Facility
NAGDF	Northern Ash and Gypsum Disposal Facility
NEMA	National Environmental Management Act, No 107 of 1998
NEM:WA	National Environmental Management: Waste Act, Act 59 of 2008, as amended
SWMS	Storm Water Management System
TCT	Total Concentrations Threshold
VIA	Visual Impact Assessment
WDF	Waste Disposal Facility
WML	Waste Management Licence

1 INTRODUCTION

1.1 Background

Medupi Power Station is one of two new coal fired power stations being constructed by Eskom to meet the power needs of South Africa. An integral part of the power station is an ash disposal facility that to be used for disposal of the residue of the coal combustion process for the power station.

Medupi uses new super-critical boilers which operate at higher temperatures and pressures than older boilers, thus providing better efficiency. The process of power generation results in production of SO_x emissions. The power station will incorporate wet limestone Flue Gas Desulphurisation (FGD) technology which will be retrofitted after 6 years of each Unit's commissioning, to manage the SO_x emissions. The FGD plant will produce gypsum, salts and sludge as by-products, which need to be disposed of in an environmentally sustainable manner.

Previously, in terms of the classification processes based on DWAF's Minimum Requirements Documents Series (1998), which was the applicable legal provision, ash was classified to be hazardous and thus the 0 to 4 year ashing area was designed according to the Minimum Requirements, and a H:h liner system was installed. However, regulations were later promulgated by the Department of Environmental Affairs (DEA) in terms of NEM:WA on the 23rd August 2013. Upon following the NEM:WA waste classification processes, the ash and gypsum now classify as Type 3 wastes, and would require to be disposed of on a Class C barrier system. This barrier will be implemented at the facility from the 4 year area onwards. It is proposed that, in the first years of FGD operation, the gypsum from the FGD plant will also be disposed of on the Ash Disposal Facility (ADF), together with the ash. With the disposal of ash and gypsum, the ADF will be referred to as the Waste Disposal Facility (WDF). In terms of the same legislation, salts and sludge classified as Type 1 wastes and would be disposed of on a Class A barrier system[1].

The presence of a wetland system to the southwest of the Waste Disposal Facility (WDF), previously referred to as an Ash Disposal Facility (ADF), necessitated the need to amend the engineering designs of the WDF. This redesign resulted in a reduced footprint in the southwestern section of the facility and a subsequent increase in height of 12m from an initial height of 60m to a new proposed height of 72m. The raising of the height is an optimisation processes to compensate for disposal capacity lost due to the wetland system on the southwest of the facility. A Visual Impact Assessment (VIA) was undertaken to assess the impacts of the subsequent increase in height of the WDF.

[1] Permitting of salts and sludge management will be done through a registration process, in terms of National Norms and Standards for Storage of Waste (GN. 926 of 29 November 2013).

1.2 Contact details

Table 1-1: Contact details of the applicant

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EAP Registration/Associations	SACNASP - *Pr.Sci.Nat.* (400136/12), IAIAsa		

1.3 Existing WML

The current Waste Management Licence (WML) was issued to Eskom on 18 September 2015 for three listed waste management activities (**Table 1-3**) as listed in Category B of Government Notice No 921 of 29 November 2013.

Table 1-3: Waste activities authorised in the existing WML

Category B: Activity 4	The treatment of hazardous waste in excess of 1 ton per day calculated as a monthly average; using any form of treatment excluding the treatment of effluent, wastewater or sewage.
Category B: Activity 7	The disposal of any quantity of hazardous waste to land.
Category B: Activity 10	The construction of facilities for activities listed in Category B of this schedule (not in isolation to associated activity)

The existing WML was authorised for the construction of the aboveground ashing facility and its associated infrastructure, which includes the installation of the above-ground ashing facility and construction of the overland ash conveyor belt to dispose ash only from the power station to the ashing facility. The existing WML furthermore authorised the treatment and disposal of ash at the Medupi Power Station ashing facility located on 1000ha of the Farm Eenzaamheid 687 LQ within the jurisdiction of the Lephalale Local Municipality. The existing WML is included in **Appendix E** to this WML Variation Application.

1.4 Commencement of activities authorised by the WML

The waste management activities that have been authorised in the existing WML have commenced. The facilities for the conditioning of the ash and emergency ash storage facility have been constructed and are operational. The disposal of ash at the ash disposal facility is currently ongoing within the 0 – 4 year phase of the facility development.

2 PROPOSED VARIATIONS TO EXISTING WML

2.1 Scope of proposed variations

The variation applied for includes the following:

1. Disposal of gypsum together with ash on the authorised disposal facility footprint (with redesign)
2. Increase in height of the authorised disposal facility, from 60 – 72 magl;
3. Construction of associated infrastructure for conveyance and disposal of gypsum, which include:
   - Conveyor for transport of gypsum to a connection point at the existing ash conveyor,
   - Transfer houses for transferring gypsum onto the existing ash conveyor and along proposed gypsum conveyor;
   - Temporary gypsum loading area for loading of saleable gypsum onto trucks for re-use by external service providers; and
   - Gypsum Storage Building for the storage of saleable gypsum via rail.

2.2 VARIATION: Disposal of ash and gypsum together on exiting disposal facility

2.2.1 Motivation for proposed variation

The original application for waste management licence for the disposal of ash generated from the Medupi Power Station only included the application for its disposal to the disposal facility. The application for the waste facility licence was undertaken following principles of the DWS Minimum Requirements Documents Series (1998). In 2012, Medupi Power Station acquired an Atmospheric Emission Licence (AEL), which required Eskom to install and operate a Flue Gas Desulphurisation (FGD) plant at each of the six (6) power generating units. Installation and operation of the chosen FGD plant would result in production of waste, namely, gypsum, salts and sludge.

On 23 August 2013, the DEA promulgated the National Norms and Standards for the Assessment of Waste for Landfill Disposal, and National Norms and Standards for Disposal of Waste to Landfill. In terms of these promulgations, the classification of the FGD wastes as well as the appropriate barrier system to be utilised for the disposal of these wastes to landfill should be determined through the NEMWA standards.

Since no FGD gypsum, salts or sludge has been produced from the plant to-date, a conservative theoretical waste assessment of these wastes was undertaken in terms of the promulgated National Norms and Standards for the Assessment of Waste for Landfill Disposal, and National Norms and Standards for Disposal of Waste to Landfill. This conservative assessment concluded that the FGD gypsum would classify as a Type 3 waste and could therefore be disposed of on a disposal facility with a Class C barrier. FGD salts and sludge, however, were likely to classify as a Type 1 waste and must be disposed on a facility with a Class A barrier system.

In the interests of supporting the immediate operation of the FGD with respect to gypsum management, and considering that the existing Medupi Power Station disposal facility will be lined with a Class C barrier system from year 6 of the station's operation, it is recommended that gypsum, which is also a Type 3 waste, be disposed together with ash on the authorised disposal facility.

In conclusion, it is recommended that the WDF footprint be lined with a Class barrier system, as per the current WML, and that ash and gypsum be disposed in the same facility, since they are classified as the same waste class, i.e. Type 3 waste.

2.2.2 Gypsum as a by-product of the FGD process

Gypsum will be produced as a by-product of the wet scrubbing process of the FGD plant operations. Slurry exiting the FGD process will comprise gypsum, a mixture of salts (Magnesium Sulphate ($MgSO_4$) and Calcium Chloride ($CaCl_2$)), limestone, Calcium Fluoride (CaF_2), and dust particles.

The gypsum discharged from the dewatering infrastructure will be dropped onto a collecting conveyor by means of bifurcated chutes. An online monitoring system installed within the gypsum production process will be utilised to assess gypsum quality. Gypsum leaves the Gypsum Dewatering Building via gypsum collecting conveyor in an eastward direction.

At the gypsum transfer house 1, gypsum is either transferred onto gypsum link conveyors that will transport gypsum to the gypsum storage building, or onto a gypsum link conveyor that will link the gypsum stream to the overland ash conveyor that transports ash to the existing ADF.

A direct gypsum offtake area will be constructed at the gypsum transfer house 1 for small scale off-take of gypsum by offtakers. This will consist of a road leading off an internal road and loading bay area where gypsum will be loaded on to vehicles/trucks. At this point, the ground will be prepared for management of any gypsum that is not contained and the vehicles/trucks will be washed before leaving this area. The washing is a means to minimise the spread of the gypsum to the environment.

The site arrangement of the FGD system for the Medupi Power Station is provided in **Appendix B-1** and shows the infrastructure associated with the gypsum dewatering and conveyance. Infrastructure associated with the gypsum dewatering and conveyance includes:

- Gypsum bleed tanks and forwarding pumps;
- Piping and elevated FGD utility rack;
- Gypsum dewatering building containing gypsum hydrocyclones and waste water hydrocyclones;
- Belt filter and reclaim tank;
- Gypsum conveyer belt system;
- Gypsum truck loading facility; and
- Gypsum storage building and offtake via rail.

Depending on the demand and off-take potential from commercial off-takers, infrastructure to convey gypsum from the gypsum transfer house 1 to the gypsum storage building and rail way yard for transport of large volumes of gypsum via rail will be constructed at a future date. At the gypsum storage facility commercial grade gypsum will be fed onto an elevated mobile tripper car. Material from the car will be stacked into three indoor day storage stockpiles. The separate storage piles will allow for one pile to be stacked while another is being reclaimed and a third is quality tested.

The gypsum storage facility will accommodate 100% of the total gypsum production for three days, but it is anticipated that only 20% of the gypsum may be required for commercial sales. This will have a significant impact on the amount of gypsum that will require disposal. The gypsum storage building will be used in conjunction with the rail siding only. The storage building is a future use facility that will be built with the rail siding. The gypsum storage building will not be constructed with a facility for loading of gypsum onto vehicles, i.e. gypsum will only be loaded onto railway locomotives via conveyor belt and hopper or will be conveyed to a connection point with the existing overland ash conveyor system that delivers ash to the disposal facility. Use of gypsum will be subjected to quality assessments, which will be done at the storage facility. If the quality is not usable, the gypsum will be taken for disposal.

In the event that no large-scale commercial offtake of gypsum is secured, gypsum from transfer house 1 will be conveyed to the existing overland ash conveyor. In this conveyor system, the gypsum will be mixed with ash and will be disposed together on the footprint of the existing authorised WDF. The conveyor route and transfer houses for gypsum onto the overland ash conveyor are shown in **Appendix B-2**.

Gypsum disposal at the ADF will be carried out from the 6th year of the power station operation, at which point the ash facility will have a Class C liner, which is appropriate for the gypsum and ash waste types (Type 3). **Appendix B-3** provides a flow diagram of the activities involved in gypsum handling.

2.2.3 Classification of gypsum waste

The management of waste in South Africa is governed under the National Environmental Management: Waste Act, Act 59 of 2008, as amended (NEM:WA). On 23 August 2013 the "*Norms and Standards for the Assessment of Waste for Landfill Disposal*" (National Norms and Standards) were promulgated in the form of Government Notice Regulations (GNR) 635 (Department of Environmental Affairs, 2013a). These regulations are used to assess the potential impacts that a waste may have on the receiving environment and the outcome of the assessment is used to determine the barrier (liner) system required for the waste disposal facility. The barrier systems are prescribed in GNR 636 of August 2013, the "*National Norms and Standards for Disposal of Waste to Landfill*" (Department of Environmental Affairs, 2013b).

A conservative literature waste assessment of Flue Gas Desulphurisation (FGD) Gypsum was undertaken as per the Norms and Standards for the Assessment of Waste for Landfill Disposal, as referenced above. As the FGD plant was not operational at the time of the waste assessment it was not possible to undertake laboratory analysis on the actual FGD Gypsum that will be produced. Therefore the conservative assessment was undertaken using literature values from the USA and Europe. In this study, total elemental concentrations and summary data from analysis of a total of 53 FGD gypsum samples were used in the assessment, and are listed in the waste assessment report undertaken by (Jones and Wagener, 2015). This waste assessment report is included as **Appendix C-1**.

2.2.4 Results from gypsum waste classification

Results from the gypsum waste assessments are provided below:

<u>Total Concentrations</u>

The total concentrations of elements in the FGD gypsum at times exceeded the TCT0 concentrations but at no time were the TCT1 or TCT2 thresholds exceeded. Data sources below are as referenced in (Jones and Wagener, 2015). The exceedances of the TCT0 thresholds are summarised below:

- **Arsenic**: The EPRI (2011) maximum value and Chen et al 2008 exceeded the TCT0 value.
- **Chromium (VI)**: Assuming total Chromium was equal to Chromium (VI) the total concentrations exceeded the TCT0 value for the maximum value of the EPRI dataset, one sample of the VGB dataset, and two of the values from Chen et al (2012) (Indiana and Alabama).
- **Lead**: One of the VGB samples and the En-Chem sample exceeded the TCT0 for lead.
- **Antimony**: The concentration of total antimony in the Indiana sample (Chen et al, 2012) exceeded the TCT0 for antimony.
- **Selenium**: The maximum value in the EPRI dataset, the sample from En-Chem and 2 samples from the VGB data set exceeded the TCT0 for selenium.

- **Fluoride**: Only the En-Chem dataset contained total concentration for fluoride, this value exceeded the TCT0 for fluoride.

The predicted total concentrations of salts in the gypsum (calculated by Eskom and Black & Veatch) are presented in **Table 2-1** along with the assumptions used to predict the leachable concentrations of the salts in the gypsum.

Table 2-1: Predicted total concentrations of salts and inert material in the FGD Gypsum solids and assumptions regarding their solubility (taken from (Jones and Wagener, 2015)

Component	Concentration (% dry weight)	Concentration mg/kg (dry weight)	Assumed solubility for prediction of leachable fraction (mg/ℓ)	Assumption
Gypsum	88.9	889 000	2 050	Literature solubility limit (CRC, 2005)
$CaCO_3$	2.8	28 000	6.6	Literature solubility limit (CRC, 2005)
$CaSO_3$	0.1	1 000	70	Total solubility 1 mg of FGD gypsum in 20 mℓ water
$MgCO_3$	0.3	3 000	150	Total solubility 1 mg of FGD gypsum in 20 mℓ water
Inert Material	7.9	79 000	0	Completely insoluble.
TDS	NA	NA	2 276.6	Sum of assumed solubility for major soluble components: gypsum, $CaCO_3$, $CaSO_3$, $MgCO_3$
Note: Values calculated by Eskom				

<u>Leachable concentrations</u>

The leachable concentrations are summarised in **Table 2-2** and **Table 2-3** for trace elements and inorganic ions respectively. The following summarises the results:

- The maximum values for boron, manganese and selenium in the EPRI dataset exceeded the LTC0s for those elements.
- The concentration of selenium in the TCLP leach test results (En-Chem, 2008) exceeded the LTC0 threshold.
- The predicted concentrations of sulphate and TDS exceed the LCT0 threshold.
- No exceedances of the LCT1, LCT2 or LCT3 thresholds were measured or predicted.

Table 2-2: Measured LCs in SPLP and TCLP tests on FGD Gypsum (taken from Jones and Wagener, 2015)

Elements & Chemical Substances in Waste	Leachable Threshold (mg/L)				EPRI 2011 Maximum from SPLP (N=32) (mg/ℓ)	En-Chem 2008 TCLP (N=1) (mg/ℓ)
	LCT0	LCT1	LCT2	LCT3		
Arsenic	0.01	0.5	1	4	<0.005	<0.02
Boron	0.5	25	50	200	20.1	0.09
Barium	0.7	35	70	280	0.048	0.07
Cadmium	0.003	0.15	0.3	1.2	0.0019	<0.001
Cobalt	0.5	25	50	200	0.0106	0.25
Chromium Total	0.1	5	10	40	0.00109	<0.003
Chromium (VI)	0.05	2.5	5	20	0.00109	<0.01
Copper	2	100	200	800	0.0025	0.02
Mercury	0.006	0.3	0.6	2	-	<0.001
Manganese	0.6	25	50	200	7.52	0.04
Molybdenum	0.07	3.5	7	28	0.0289	0.007
Nickel	0.07	3.5	7	28	0.0094	0.007
Lead	0.01	0.5	1	4	0.00128	<0.01
Antimony	0.02	1	2	8	0.00142	<0.01
Selenium	0.01	0.5	1	4	0.47	0.06
Vanadium	0.2	10	20	80	0.00662	-
Zinc	5	250	500	2 000	0.0847	-
Note: Blue shading indicates above the LCT0 threshold						

Table 2-3: LCs of inorganic anions used for the assessment (taken from Jones and Wagener, 2015)

Inorganic Anions	Leachable Thresholds (mg/L)				Calculated values Refer Error! Reference source not ound. (mg/ℓ)	EPRI 2011 DI water leach Measured values (mg/ℓ)	En-Chem 2008 TCLP Results Measured values (mg/ℓ)
	LCT0	LCT1	LCT2	LCT3			
TDS	1 000	12 500	25 000	100 000	2 277[1]	-	-
Chloride	300	15 000	30 000	120 000	-	76.9	5.2
Sulfate	250	12 500	25 000	100 000	1 481[1]	1 550	2 387
Fluoride	1.5	75	150	600	-	13.7	7.5
Note: 1: Refer to Table 2-2 assumptions regarding calculations. Blue shading indicates exceedance of the TCT0 threshold							

2.2.5 Gypsum waste assessment conclusion

Based on the assessment described above, the FGD Gypsum is predicted to be a **Type 3 waste** and could therefore be **disposed of in a landfill with a Class C barrier** system, in terms of the Norms and Standards for Disposal of Waste.

2.2.6 Recommendations from waste assessment

The following recommendations were made:

- The Medupi Power Station ash and the FGD Gypsum can be disposed of on a waste disposal facility of which the barrier system complies with the performance requirements of a Class C landfill.
- The FGD gypsum should be re-assessed once generated in order to confirm the theoretical assessments.

2.2.7 Consideration of potential impacts of the disposal of gypsum with ash

Potential impacts associated with the disposal of gypsum together with ash on the existing ash facility were considered by a number of specialists that assessed the impact of the FGD system retrofit to the receiving environment. These potential impacts were either assessed or a professional opinion provided by the relevant specialist on the potential impact the disposal of ash and gypsum together on the existing disposal facility. These include:

- **Potential groundwater impact:** A qualitative opinion on the impact on groundwater was provided by the groundwater specialist (Brink & van der Linde, 2018) and concluded that considering the ADF is authorised to have a Class C liner, in line with waste classification as per the NEMWA National Norms and Standards for disposal of waste to landfill, since both ash and gypsum classified as Type 3 wastes will be disposed, the disposal of ash and gypsum together will probably not have a significant impact on the groundwater regime.
- **Potential impacts on soil and landuse, noise levels, heritage resources:** No potential impact on these aspects is predicted as the disposal of gypsum will occur together with ash on the existing authorised disposal facility footprint. Any impacts associated with these aspects were therefore already considered during the initial application for the waste management licence.
- **Potential impacts on surface water resources:** No additional impact on surface water runoff or quality has been identified by the surface water specialist (Sithole & Jordaan, 2018). The surface water management system associated with the existing disposal facility will continue to manage and mitigate potential surface water quality and quantity impacts.
- **Potential impacts on air quality:** Potential impacts in air quality of the FGD retrofit, and disposal of gypsum with ash on a 72m disposal facility were assessed by Airshed Planning Professionals (von Gruenewaldt, et al., 2018). The specialist confirmed that the gypsum material, if disposed together with ash on the disposal facility, is expected to create a crust when mixed with water. To what extent this material will crust will depend on how the

material is disposed (i.e. mixed with the ash or deposited as layers of gypsum material in between the ash material) and how much water is added to the disposal facility. It was also concluded that the crust may also be disturbed from time to time with activity on the disposal facility. However, for the assessment undertaken by Airshad, the effectiveness of this crust in lowering windblown emissions could not be quantified. The specialist did however conclude that no exceedances of the National Ambient Air Quality Standards (NAAQS) for PM_{10} and $PM_{2.5}$ were simulated at sensitive receptors due to proposed operations resulting in **LOW significance**. The specialist recommended that the FGD Retrofit Project (including the increase in height of 12 m at the ADF) be implemented. The air quality assessment is included as **Appendix C-5**.

- **Potential impacts on social environment:** The disposal of gypsum with ash on the existing disposal facility would reduce the reuse and economic benefits associated with the commercial offtake of gypsum, if there were high market requirements for the gypsum. The social specialist concluded that Eskom should maximise the economic benefit resulting from the offtake of gypsum by local beneficiaries in the event that economic offtake of gypsum is proven viable once the FGD system is operational (Tomose, et al., 2018). This however is dependent on the quality of the gypsum produced and offtake potential by beneficiaries and still need to be confirmed.
- **Potential impacts on biodiversity and wetlands:** The impacts associated with biodiversity and wetlands were investigated by Natural Scientific Services (NSS) (Abell, et al., 2018). Impacts associated the actual disposal of gypsum with ash on the existing waste disposal facility were not identified as significant. The specialist however did conclude that gypsum is not likely to a have a major toxicological impact although it may be associated with increase pH levels, however the likelihood of such a contamination event is expected to be low given the proposed mitigation in the design philosophy (installation of an appropriate barrier system) together with the arid nature of the site, the ephemeral nature of the wetland systems and the distance of the storage areas from the semi-ephemiral washes, hence this impact has been given a Medium Moderate significance rating.

2.2.8 Assessment on combined disposal of ash and gypsum

The combined disposal of ash and gypsum together on the same disposal facility was assessed by (Jones and Wagener, 2015) during their assessment of the FGD gypsum and other wastes (**Appendix C-1**). Jones and Wagener (2015) concluded that the ash from the Medupi Power Station and the FGD gypsum are both assessed as Type 3 wastes that can be disposed of on a landfill with a Class C barrier. The gypsum is likely to result in near neutral to alkaline leachate while the ash has an alkaline pH leachate. Neither of these wastes is likely to contain organic matter that could decompose to result in a pH change of the leachate and both wastes are likely to be stable with respect to oxidation.

Therefore, given that both wastes are likely to generate alkaline leachate and will be stable with respect to oxidation, the leaching characteristics of the wastes are unlikely to be significantly altered should the wastes be disposed of in the same facility and the combined waste would be suitable for disposal on a facility of which the performance of the barrier system complies with that of a Class C landfill.

2.3 VARIATION: Reduction in disposal facility footprint, but increase in height

2.3.1 Motivation for the proposed variation

During the Environmental Impact Assessment (EIA) process undertaken for the proposed retrofit of the FGD system at the Medupi Power Station, a sensitive Freshwater Ecosystem Priority Area (FEPA) associated with one of the tributaries of the Sandloop River system located just to the southwest of the existing Ash Disposal Facility footprint of the Medupi Power Station was identified. Other sensitive pans also exist within the footprint of the ADF.

In an attempt to reduce the direct impact on the 1km buffer zone of the Sandloop tributary FEPA and the calculated 1 in 100 Floodline of the Sandloop tributary, a redesign of the existing disposal facility was required. The engineering designs for the existing disposal facility were subsequently amended (**Appendix C-2**) to reduce the footprint of the disposal facility at the southwestern corner. However, as a result of the reduced disposal facility footprint, the height of the disposal facility increased by 12m from the authorised 60m to a maximum height of 72m.

The proposed deviation therefore aims to authorise the proposed increase in height, from 60m to 72m. The increase in height could potentially result in a detrimental visual impact. A Visual Impact Assessment (VIA) was subsequently undertaken to assess potential visual impacts associated with the increase in the height of the disposal facility.

2.3.2 Amendments to disposal facility footprint and facility height

The authorised ash disposal facility footprint will cater for 20 years of disposal capacity. Since disposal of ash is currently ongoing on the first 4-year lined footprint, amendments to the authorised footprint was considered for a period of 16 years, i.e. from end of year 4 to year 20 by Jones and Wagener (Pty) Ltd. The design report is provided in **Appendix C-2** to this report.

The original concept model for the Northern Ash Disposal Facility (NADF), as it was referred to at the time, shows an extension on the western side in the direction of normal operations. The aim is to have both stackers, which are ashing in a western direction, continue to do so. The geometry of the original NADF is shown in Figure 2-1 below.

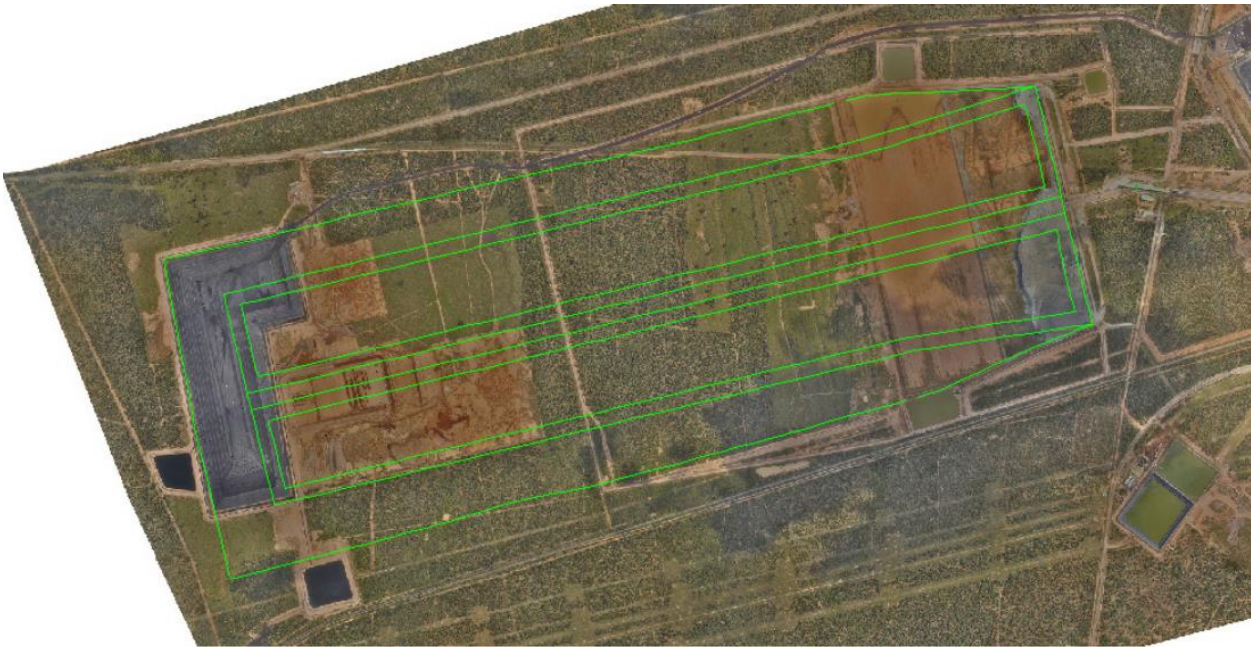

Figure 2-1: Original NADF geometry

The environmental specialists' field surveys revealed that a number of small depressions and semi-ephemeral drainage features occur around the NADF. Of greatest importance are those wetlands that are situated, and which feed into, the upper reaches of the Sandloop Spruit tributary. It was thus advised that the designing engineers consider a buffer to these wetlands in the Sandloop Spruit Tributary.

As a result alternatives to avoid the proposed buffer areas to the Sandloop Spruit Tributary at the southwestern extent of the NADF were considered. Assuming an ash deposition rate of 791 452.50 m^3/month, i.e. including gypsum deposition, the loss in disposal capacity of the facility was calculated in order to determine how this loss in capacity would be accommodated.

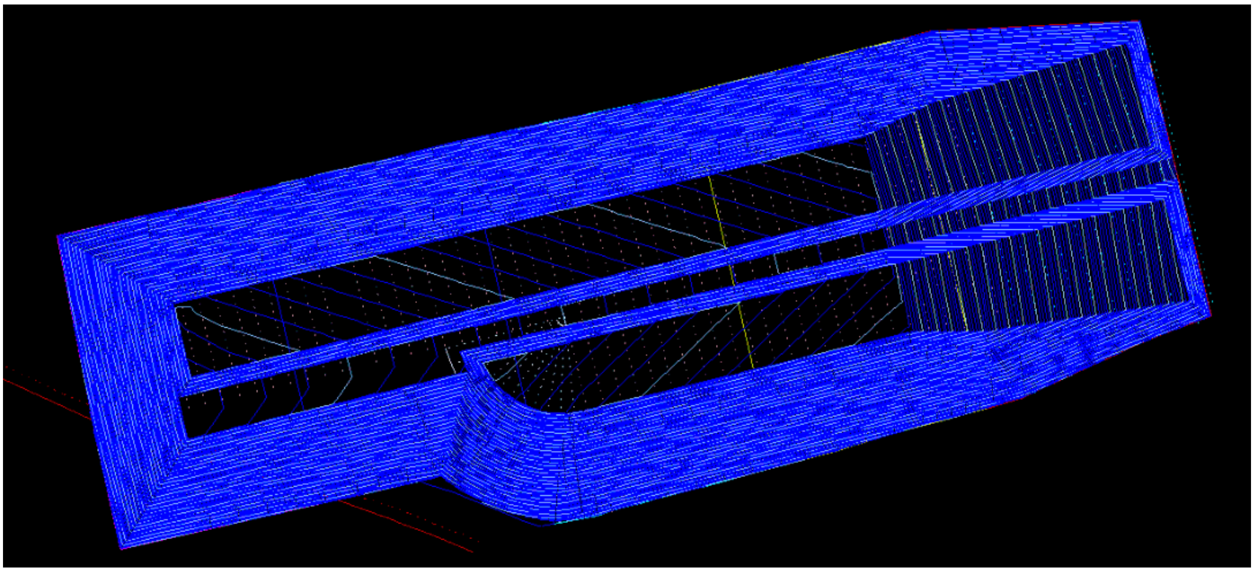

Figure 2-2: Final landform of the amended ash and gypsum disposal facility

The reduction in the footprint of the proposed Northern Ash and Gypsum Disposal Facility (NAGDF), as is now termed by the design engineers, was determined and is provided in Figure 2-2. This final landform model has side slopes at 1:5 slope and a plateau with a long fall of 1:300. Using this new footprint and the height of 72 m the total storage volume comes to 193 315 105 $m^{3,}$ which converts to a total life of 19.2 years. The original footprint had a total life of 19.3 years.

Detailed descriptions of the amendments to the original NADF geometry, Class C barrier design and other relevant design considerations can be viewed in the concept design report provided in **Appendix C-2**.

2.3.3 Assessment of Visual Impacts

A Visual Impact Assessment was undertaken by Newtown Landscape Architects cc and is included as **Appendix C-3**. The visual impact assessment assessed the raising of the height of the existing ash disposal facility to 72 m with the addition of gypsum to the ash being disposed at the ADF.

Receiving environment

A description of the receiving environment reveals that the area is mostly known for its game farms but also for the renowned Eskom Power Stations, Matimba and Medupi. The vegetation type of the study area is predominantly classified as Bushveld and is characterised by undulating or irregular plains traversed by several tributaries of the Limpopo River, which is characteristic of the western part of the study area. The vegetation is short open woodland but in disturbed areas the vegetation is characterised by thicket.

The surrounding land use consists of residential, agricultural, and tourism activities. In addition there are also mines, industries and associated infrastructure and transportation routes. Dominant landform and land use features (e.g., hills, rolling plains, valleys and urban areas) of similar physiographic and visual characteristics, typically define the landscape character.

The residential component of the study area is a combination of farmsteads (both game farms and cattle farms), towns such as Lephalale (previously known as Ellisras) and Onverwacht as well as more informal residential areas such as Marapong.

Agricultural activities that occur in the study area include cattle farming and are mostly located to the south and west of the project site.

Lephalale is located on the western side of the Waterberg Biosphere. One of the major attractions in the area is the game farms which include activities such as game viewing and trophy hunting. The Waterberg and Mokolo Rivers offer great opportunities for camping, horse riding, hiking and other eco-tourism activities as is evident by the amount of advertisements placed by the tourist destinations.

Lephalale is also home to two Eskom Power Stations, Medupi and Matimba as well as the Grootgeluk Mine and other infrastructure associated with the power stations and coal mines such as ash dump facilities, substations and the power lines.

Transportation systems include the main access roads between Lephalale, Grootgeluk Mine and the Power Stations (D1675), the roads that link Lephalale with the surrounding farms (D1925 and D2649), and smaller farms roads (dirt roads). Other transportation includes a railway link, which is used by the FGD operation or disposal facility operation and the Grootgeluk Mine.

Impact Assessment

The most sensitive viewer sites are located south of the Project site along the D1925 (Komunati Lodge, Landelani Game Farms, Lephalale Game Farm / Lodge, Geelhoutskloof, Rietfontein, Rhenosterpan, Kalamahala Lodge and Pretorius Kloof) and east of the project site along the D1675 (Hooi Kraal).

Over the extent of the study area (12 km) from the project site, the visual impact resulting from the proposed height increase and its associated activities is predicted to reduce due to the diminishing effect of distance and atmospheric conditions (haze – particularly in the winter months) on visibility. Also, at this distance the facility would recede into background views that already consist of mining activities.

The expansion of the ADF would be highly visible and sensitive viewing areas would be impacted. Whilst visibility is potential very high, the flat nature of the terrain along with the bushveld cover, would effectively block many views to the ADF site with only the top of the waste disposal facility being visible above the tree line. Therefore, visibility of the project will remain relatively low for the first number of years of operation, until the facility has reached a general height of 72m. The project will however be highly visible from elevated areas such as at the Lephalale Game Traders lodge.

Visual exposure is considered high when Project activities are visible in foreground views (i.e. up to 2 km from the site) and would greatly contribute to the intensity of visual impact. The two sensitive viewing locations that would experience foreground views of the proposed ADF are the farmstead located (0.8km) west of the site and viewers travelling along the D1675 that come within 2 km or closer to the site. Farmsteads and lodges that would experience moderate exposure (between 2 km and 5 km from the project site) are: Hooi Kraal, Landelani Game Farm and Komunati Lodge.

Sensitive areas where the project would occur in background views (beyond 5km from the project site - low visual exposure) are: Lephalale Game Traders, Geelhoutskloof and Rietfontein. Even though Lephalale Game Traders are located outside the 5km zone it must be noted that the tourist accommodation is located on top of the koppie and therefore the project will be clearly visible from that property.

Visual intrusion deals with the notion of contextualism i.e. how well does a project component fit with / enhance or disrupt the ecological and cultural aesthetic of the landscape as a whole. Considering the present views and after establishment views, the ADF will have a varying effect on sensitive viewing areas. The greatest intrusion would be on viewers driving along the public roads, especially along the D1675. The ash disposal facility is located close to the road and would be visible between the trees and above the tree line. The intrusive nature on these views is therefore considered moderate because the ADF is partially compatible with the land use along the D1675 road and would therefore result in moderated changes to the landscape.

Visual intrusion on viewers living or visiting the farmsteads and lodges to the south of the site (Landelani Game Farms, Komunati Lodge and Lephalale Game Traders) would be low as only the upper portions of the ash disposal facility would appear above the tree line and in the background of views. The accommodation facilities for the Lephalale Game Traders lodge are located on a small koppie and visitors to the farm will have a clear view towards the proposed site. The ash disposal facility will occur in the middle to background of the views and will result in a high visual intrusion. Geelhoutskloof and Rietfontein are located behind small koppies and therefore the views towards the ash disposal facility will be blocked resulting in a negligible visual intrusion when viewed from the homestead but a low visual intrusion when viewed from the roads leading to the homestead.

Impact Severity

The severity of the visual impact for the construction and operating phases is predicted to be **MODERATE** as the ADF will:

- Have a moderate negative effect on the visual quality of the landscape. The ADF is partially compatible with the patterns that generally define the character of the study area's landscape. The visual quality of the study area has already been compromised by other mining developments east and north of the site and the presence of the proposed Project will have an increasing effect and further compromise the scenic and aesthetic value of study area.
- Have a moderate negative effect on key views from the residential areas and lodges south and west of the project site.

The original visual assessment for the ash disposal facility, undertaken by MetroGis, determined that the visual impact significance of the disposal facility over a short distance (0 – 2 km) to be of **Medium significance**. This was illustrated in the original Environmental Impact Assessment as Table 10.6, as shown in Figure 2-3. This assessment was based on a proposed ash dump height of 45m - 50m high, and approximately 2000m long and 600m wide.

When compared to the visual impact assessment undertaken by Newtown Landscape Architects, it is evident that the impact significance has not increased the degree of significance of the visual impact as the impact significance for the &2m disposal facility was determined to be Moderate, which is equivalent to the Medium significance.

Table 10.6: Short distance visual impacts - ash dump.

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Cleared areas	Negative	Local	Long term	Medium-high	Highly probable	Medium	Low-medium
Vegetated areas	Negative-neutral	Local	Long term	Low-medium	Probable	Medium	High

Figure 2-3: Visual impact assessment undertaken for original Medupi Power Station ash dump shown in table format

Proposed Mitigation

The following mitigation measures are suggested and should be included as part of the Environmental Management Programme (EMPr) associated with the existing WML.

- It is proposed that as little vegetation as possible be removed during the construction phase, while vegetation cover is maintained during the operation of the power station. Especially the vegetation along the D1675 since the vegetation along this road will form a visual buffer.
- Ensure, wherever possible, all existing natural vegetation is retained and incorporated into the project site rehabilitation.
- The affected areas shall be rehabilitated back to the natural vegetation associated with the Limpopo Sweet Bushveld vegetation unit.
- A registered Professional Landscape Architect, working alongside the project ecologist should be consulted to assist with the rehabilitation plan for the project.
- Rehabilitate and restore exposed areas as soon as possible after construction and other operational activities are complete.
- Only indigenous vegetation should be used for rehabilitation / landscaping purposes.
- The side slopes of the disposal facility should be hydro-seeded to avoid erosion during the rehabilitation period.
- An attempt should be made to visually soften steeper slopes by avoiding strait engineered ridges and sharp changes of angle.
- Grass seeding of the slopes should be undertaken to emulate the groupings of natural vegetation in nearby hills.
- During construction / operation, rehabilitation and closure of the Project, access and haul roads will require an effective dust suppression management programme.

Impact Significance

The significance of the impact of the ADF during construction and decommissioning is rated as moderate. During the operational phase the significance will remain moderate even when mitigation measures are implemented because the ash facility will become more visible once it rises above the tree line. At closure phase the significance will remain moderate due to the presence of the disposal facility, although reshaped and landscaped to blend into the surrounding environment to a greater degree.

2.4 VARIATION: Inclusion of infrastructure associated with gypsum handling and disposal

2.4.1 Motivation for the proposed variation

The operation of the proposed FGD system retrofit that aims to significantly reduce the SO_2 levels in the emitted flue gases will result in the generation of gypsum, and chemical salts and sludge. The chemical salts and sludge were classified as Type 1 wastes during a conservative literature/theoretical assessment of the FGD wastes, and would therefore need to be disposed at a Class A disposal facility. Gypsum, however, was classified as a Type 3 waste, which suggests that it can be disposed together with ash, which is also a Type 3 waste, on the authorised Medupi Power Station ash disposal facility.

Eskom furthermore proposes to provide opportunities for gypsum offtake from the FGD system if the gypsum is of acceptable quality. Management and handling of the gypsum waste stream require infrastructure to convey gypsum to the Medupi Power Station disposal facility. This variation therefore aims to include the construction of infrastructure associated with the conveyance of gypsum generated from the FGD process.

2.4.2 Infrastructure associated with the conveyance of gypsum

The transportation of gypsum from the gypsum dewatering plant will be undertaken through a conveyance system that will link the gypsum dewatering plant with the existing overland ash conveyor from the Medupi Power Station generation units to the existing disposal facility (**Figure 2-4**). From the gypsum dewatering plant, gypsum will be dropped onto the conveyor belt that will transport the gypsum in a southwest direction towards the Gypsum Transfer House 1 (GTH-1) that will load gypsum onto the gypsum link conveyor, which is denoted by no 214 and coloured in red in **Figure 2-4**.

Gypsum delivered by the gypsum link conveyor will load gypsum onto the existing overland ash conveyer via another transfer house (denoted by no. 215 in **Figure 2-4**) where it will mix with ash and be disposed together on the existing disposal facility. The area covered by the gypsum conveyor system to the overland ash conveyor is demarcated by the area marked by the green rectangle labelled as “1” in the Site layout plan provided in **Appendix B-2**.

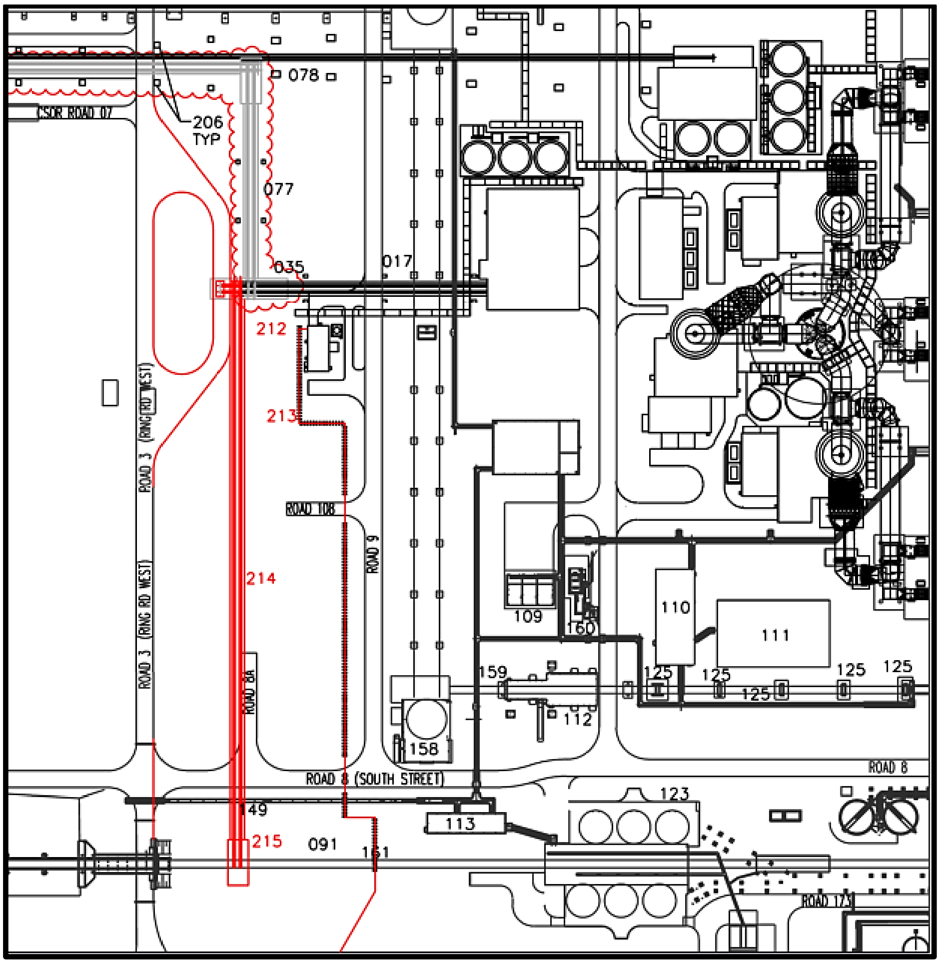

Figure 2-4: Exceprt of the gypsum link conveyor and transfer house between the gypsum dewatering plant and existing overland ash conveyor

In the event that the feasibility of large-scale offtake of gypsum is proven from the Medupi Power Station FGD process, conveyors for the transport of gypsum from GTH-1 to the gypsum storage facility (discussed in section **2.4.3**) in the rail yard development footprint will be constructed. From the gypsum storage facility a conveyor will either transport gypsum to the rail infrastructure for loading onto rail cars, or a second conveyor will transport gypsum to a connection point along the existing overland ash conveyor for mixing with ash and disposal on the existing disposal facility.

The gypsum conveyor belt system will be covered to prevent possible rehydration during rain events or becoming airborne during windy conditions. A typical example of an enclosed conveyor belt system is included in **Figure 2-5** for illustration purposes.

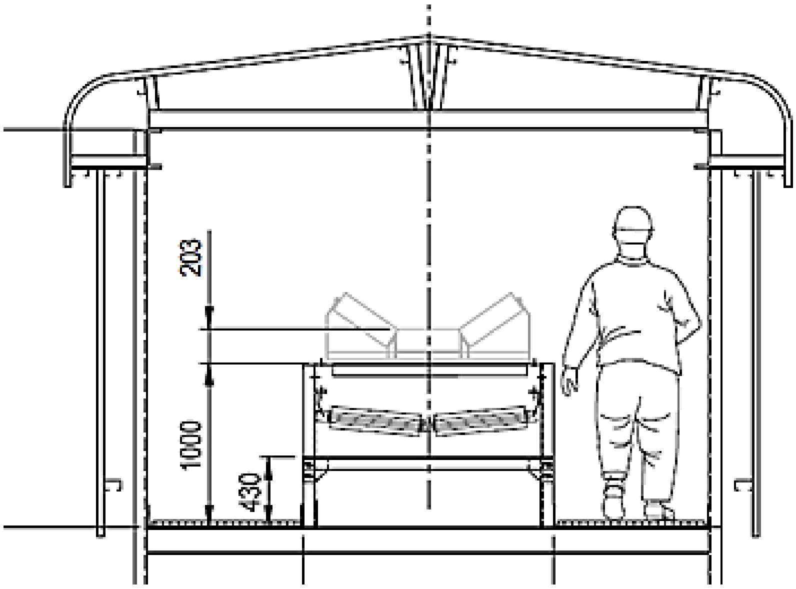

Figure 2-5: Conveyor belt typical cross section

2.4.3 Gypsum storage areas

The proposed gypsum management and handling system will contain two temporary storage areas demarcated by the blue rectangles labelled as “2a” and “2b” in the Site layout plan provided in **Appendix B-2**.

The area labelled as “2a” represent the gypsum storage facility that will feed the loading of gypsum onto rail wagons, vehicles or trucks in the event that a viable gypsum offtake programme is established. This facility and conveyors associated with it will not be constructed until such time as a viable market for offtake of gypsum has been established or developed.

The area labelled as “2b” represent a temporary gypsum storage area from where small volumes of gypsum will be stored for small-scale offtake of gypsum by vehicles/truck. This area will also function as an area where gypsum can be loaded onto trucks and disposed directly onto the existing disposal facility in the event of conveyor downtime.

Detailed information regarding the gypsum storage areas was obtained from the concept design report on limestone and gypsum handling areas undertaken by Aurecon (Aurecon, 2018), Medupi FGD Basic Design report (Eskom Holgins SOC Limited, 2014), and the Medupi FGD Retrofit Plot Plan drawing (Eskom Holdings SOC Limited, 2016) included in **Appendix B-2.**

<u>Gypsum Storage Building (“2a”) for marketable gypsum</u>

Gypsum Storage Building will be used for the storage of marketable gypsum produced by the Gypsum Dewatering Plant. The gypsum storage building has been sized to accommodate a linear gypsum pile of three days storage. The gypsum storage building will be a covered storage area with a portal frame structure roof. The portal frame will be a trussed frame with a span depth of 5m and roof pitch of 12 degrees. The length of the building is determined by the span of the bays and accounts to 14 bays spanning 7.9 m each (**Figure 2-6**).

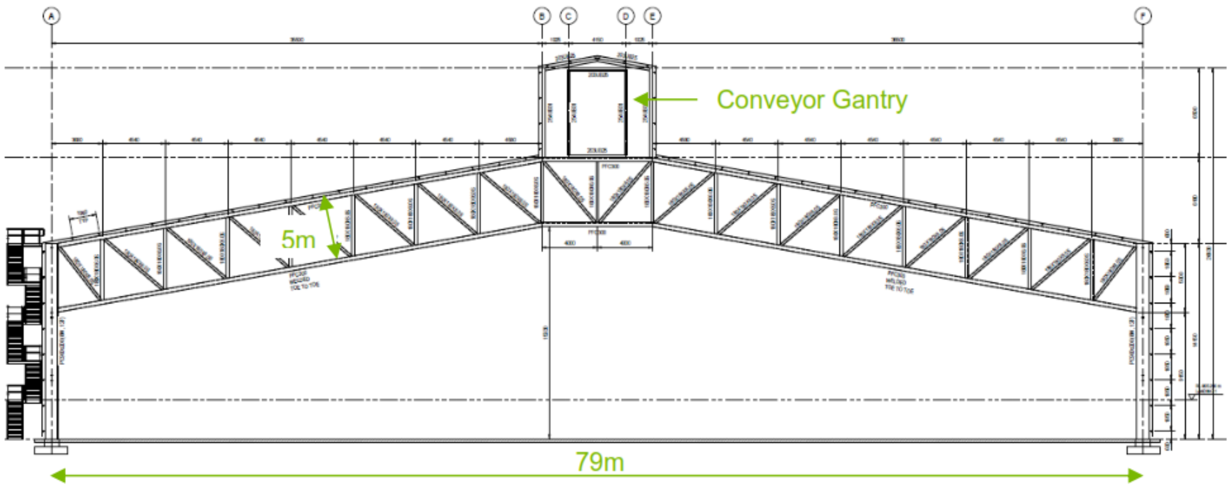

Figure 2-6: Typical cross section of portal frame

The portal frame type structure can satisfy the size and span requirements and also has the ability to support the load of the tripper located in the roof. A 3D representation of a portal frame building including operations inside the building is provided in Figure 2-7 below.

Figure 2-7: 3D representation of a portal frame building

The floor surface of the gypsum storage building will be concrete lined with the following specifications in order to prevent contamination of sub-surface layers. The liner design of the gypsum storage building comprises of the following with reference to the components shown in Figure 2-8:

- 250 mm thick reinforced concrete slab;
- 1.5 mm HPDE liner;
- Compacted base - 2 x 150 mm layers of selected material (semi-pervious) compacted to 95% Proctor Density at - 1% to + 2% OMC;
- In-situ material;

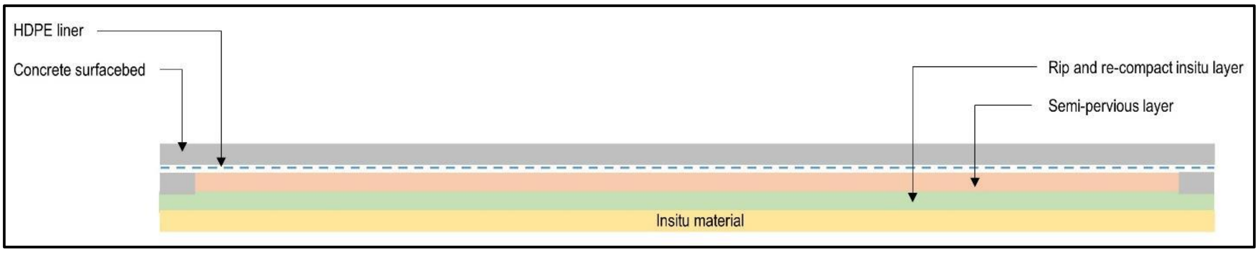

Figure 2-8: HDPE liner and surface bed detail

Coordinates of the corner points of the Gypsum Storage Building are included in **Table 2-4**. The centre point of the area is also included in the table as Corner point E.

Table 2-4: Corner point coordinates for the Gypsum Storage Building

Number of Corners	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)
A	27.55080 E	23.71175 S
B	27.55241 E	23.71093 S
C	27.55307 E	23.71204 S
D	27.55145 E	23.71286 S
E (Centroid)	27.55194 E	23.71189 S

Temporary gypsum storage area ("2b")

The temporary gypsum storage area will be located just southwest of the Gypsum Transfer House 1 (GTH-1) for loading into trucks for small-scale offtake of gypsum or temporary storage of gypsum in the event the conveyor system is out of commission.

The waste classification of gypsum requires the use of a HDPE and subsoil liner system, as per **Figure 2-8**, for facilities where gypsum will be stored. The liner system consists of layer works, a HDPE liner and concrete surface bed. The surface bed will be 250mm deep with nominal reinforcement. It is recommended that the road surrounding the gypsum storage building should be designed on-terrace roads, with the terrace sloping 1:80 in the north-eastern direction.

Coordinates of the corner points of the Temporary gypsum loading area are included in **Table 2-5**. The centre point of the area is also included in the table as Corner point E.

Table 2-5: Corner point coordinates for the Temporary Gypsum Loading Area

Number of Corners	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)
A	27.55877 E	23.70755 S
B	27.55993 E	23.70694 S
C	27.56096 E	23.70858 S
D	27.55982 E	23.70919 S
E (Centroid)	27.55986 E	23.70806 S

2.4.4 Storm Water Management Plan

The Storm Water Management Philosophy associated with the existing disposal facility was proposed by Jones and Wagener (Jones and Wagener, 2017). An effective surface water management system is essential to protect surrounding natural resources from pollution emanating from the waste disposal facility. This is accomplished by diverting clean water away from the site, capturing and containing dirty runoff, and separating clean water from the rehabilitated NAGDF and the operational area. Dirty runoff volumes will be minimised by preventing the inflow of clean runoff into dirty areas and keeping dirty areas as small as possible.

2.4.5 Consideration of potential impacts of the construction of associated infrastructure

Potential impacts associated with the construction of infrastructure associated with the management and handling of gypsum was considered by a number of specialists. These potential impacts were either assessed through a quantitative impact assessment or a professional opinion provided by the relevant specialist on the potential impact the construction of the associated infrastructure. These include:

- **Geotechnical considerations:** A geotechnical assessment of the Railway Yard and Gypsum Handling facilities, amongst other facilities, were undertaken using existing information only (Owens-Collins, 2018). The specialist concluded that as there are no deep excavations required for the construction of the gypsum management and handling infrastructure, standard footing systems such as shallow pad and strip footings are expected to be applicable for these structures. No significant geotechnical hazards or fatal flaws were identified.
- **Potential groundwater impacts from construction:** A qualitative opinion was given by the groundwater specialist whether potential impacts relating to construction of the FGD would adversely impact in groundwater resources (Brink & van der Linde, 2018). The specialist concluded that during any construction phase involving disturbing of top soil by earth moving equipment and trucks, possible spillage could occur that could contaminate the groundwater. This contamination, however, will be point source only and within the site boundaries. The specialist concluded that potential impact on groundwater resulting from construction of the FGD system, therefore including gypsum infrastructure, within the Medupi Power Station footprint is considered to be of low to moderate significance and can be managed and mitigated through continued monitoring of groundwater and construction activities. At the Medupi Power Station.
- **Potential Heritage and Palaeontological impacts:** A heritage (Tomose & Sutton, 2018) and palaeontological impact assessment (Tomose & Bamford, 2018) was undertaken to assess the possible impacts on heritage and palaeontological resources within the rail yard, disposal facility and FGD footprint. The specialists highlighted the fact that the development footprint has been transformed. It was concluded that no heritage and archaeological resources were identified within the area proposed for the railway yard, limestone storage

and associated infrastructure and the Medupi PS FGD technology construction sites, as well as the disposal facility. The palaeontological impact assessment further concluded that it was highly unlikely that sensitive palaeontological artefacts would be found in the underlying bedrock.

- **Potential Noise Impacts:** A noise impact assessment was undertaken by a noise specialist to assess the potential impact of the construction phase and operation of the rail yard, gypsum and limestone handling facilities and FGD system on ambient noise levels (von Gruenewaldt & von Reiche, 2018). It was found that the existing noise levels in the area are representative of suburban districts, while noise levels due to WDF construction is expected to remain local but can be notable. With mitigation, the residual noise impact will be reduced to levels similar to existing noise levels. The specialist concluded that the residual noise impact associated with the construction phase would be of low significance, therefore construction noise would be well within acceptable limits for the active construction areas.
- **Potential Air Quality Impacts:** An air quality impact assessment was undertaken by an air quality specialist to assess the potential impact of the construction phase and operation of the rail yard, gypsum and limestone handling facilities and FGD system on ambient air quality levels (von Gruenewaldt, et al., 2018). While the focus of the assessment was mainly in the impact of reduced SO_2 levels due to operation of the FGD plant, the only main impact considered during the construction phase was impacts relating to suspended fine particulate matter, i.e. PM_{10} and $PM_{2.5}$. The specialist concluded that impacts from the railway siding, gypsum handling and limestone handling operations as well as vehicle entrainment from the new access road would contribute to the particulate matter, however, will be localised and will not exceed ambient National Ambient Air Quality Standards (NAAQS) offsite. These potential impacts were therefore not deemed significant and were thus not assessed further by the specialist.
- **Potential Social Impacts:** A Social Impact Assessment of the proposed FGD retrofit project, including construction of the rail yard and gypsum handling infrastructure was undertaken by a social specialist (Tomose, et al., 2018). Impacts identified during the construction phase were largely universal for all construction activities and revolved around the creation of job and economic opportunities for the local communities, as well as improvement of local conditions and quality of life. The specialist concluded that the significance of positive social impacts generally exceeds the significance of negative social impacts in the implementation of the FGD, the disposal facility, railway siding and construction of gypsum and limestone handling infrastructure throughout all four stages of the project. Therefore construction of the gypsum handling infrastructure would have a residual positive impact on the quality of life of local communities.
- **Potential impacts on soils and land use:** A soils specialist was appointed to assess the potential impact of the construction of infrastructure associated with the FGD, rail yard, and gypsum and limestone handling infrastructure (Jones, 2018). During the assessment the specialist specifically noted that the areas where the construction of the gypsum handling infrastructure would be constructed was already heavily disturbed, which would factor into the assessment. The specialist identified the loss of soil resources as the main issue of concern during all phases of the project. However, with management, it was concluded that the loss of soil resources, degree of contamination, compaction and erosion of this resource

could be mitigated to within acceptable levels resulting in impact significance of Moderate or Low.

- **Potential impact on surface water hydrology:** Impacts on surface water hydrology, quality and quantity was assessed by a surface water specialist (Sithole & Jordaan, 2018). The specialist concluded that during construction it is possible that there may be increased contaminants reaching the surface water resources. The specialist concluded that with mitigation during construction (Existing Storm Water Management System (SWMS) maintained and well operated to deal with an increased pollutant load as per GN704), the residual surface water pollution impact will be reduced to a Low impact significance.
- **Potential biodiversity and wetland impacts:** A biodiversity and wetland specialist was commissioning to assess the potential impact of the FGD retrofit, including the rail yard and gypsum and limestone handling facilities on the surrounding natural environment (Abell, et al., 2018). The specialists identified a number of potential impacts including loss of habitat, loss of conservation important species, and increase in floodpeaks, sediment loads and erosion to wetlands. Even though it was noted that the area where the gypsum handling and storage facilities would be located was already transformed to varying degrees, the general residual impact significance was largely of Moderate significance. With implementation of the proposed mitigation measures and recommendations, as well as adherence to Eskom's existing Environmental Management Programmes and systems, mitigation would be reduced to within acceptable levels to allow construction of the gypsum handling and associated infrastructure without resulting in significant adverse environmental impacts on the biodiversity and wetland features on and adjacent to the Medupi Power Station development footprint.

2.4.6 Proposed management and mitigation measures for gypsum handling infrastructure

The following specific mitigation and management measures for gypsum handling and conveyance infrastructure are recommended:

- The dirty and clean run-off areas must be kept separate to ensure that dirty water is contained in the dirty water system and does not discharge into the environment and into the clean water system. Clean water will be collected in unlined trapezoidal channels and conveyed to the existing stormwater channel north of the site where it will be discharged.
- Dirty water from the gypsum storage areas will report to a Primary PCD system (referenced as "210" in in the Site layout plan provided in **Appendix B-2**) and will be constructed within the proposed rail yard area. The Primary PCD will function in conjunction with a Secondary PCD system which will be used as an evaporation pond. Water from the Primary PCD system will be transferred via a pumping main to the Secondary PCD system.

All impacts resulting from the construction of infrastructure associated with the handling and conveyance of gypsum was also assessed during the Environmental Impact Assessment application process undertaken in terms of the National Environmental Management Act, No 107 of 1998 (NEMA) for construction of the Medupi FGD infrastructure, rail yard and associated infrastructure. Appropriate mitigation measures were included in the Draft Environmental Management Programme (EMPr) for the Medupi FGD Retrofit project. All mitigation measures relevant to the construction of the gypsum management facilities in the EMPr are therefore applicable to this application. The Draft EMPr, in terms of the NEMA EIA Application, for the Medupi FGD Retrofit has been included as **Appendix D** to this WML Variation Application.

3 CONCLUSION AND RECOMMENDATIONS

The Medupi Power Station is currently under construction and received a Waste Management License to dispose of ash on the ash disposal facility. However, with the requirement to retrofit a Flue Gas Desulphurisation system at the Medupi Power Station to reduce the SO_2 emissions of the power station, the need has arisen to manage and dispose of gypsum, which is a waste by-product of the FGD process.

This application for Variation of the existing WML therefore aims to motivate for the inclusion of the following within the existing WML:

1. Disposal of gypsum together with ash on the authorised ash disposal facility footprint (with redesign)
2. Increase in height of the authorised disposal facility, from 60 – 72 magl;
3. Authorise the construction of associated infrastructure for conveyance and disposal of gypsum

The following conclusions were reached from the assessment undertaken:

1. The disposal of gypsum and ash on the authorised disposal facility should be authorised as both ash and gypsum has been found to be wastes of the same type, i.e. Type 3 waste in terms of the Norms and Standards for the Assessment of Waste for Landfill Disposal. The disposal of Type 3 waste require disposal on a facility with a Class C barrier system installed in terms of the National Norms and Standards for Disposal of Waste to Landfill. Since the existing WML already require future cells for waste disposal at the Medupi Power Station disposal facility to be lined with a Class C barrier system, as per condition 6.2.1 of the WML, the potential impact significance of disposal of ash and gypsum together on the facility will be the same as that expected for the disposal of ash only on the Class C barrier system.
2. The reduction and optimisation of the waste disposal facility footprint resulted in an increase in height of 12m to a maximum height of 72m. The resultant increase in height may have a visual impact on sensitive visual receptors surrounding the Medupi Power Station. The Visual Impact Assessment undertaken by a specialist indicated that the impact associated with the height increase of the waste disposal facility would likely result in an impact significance of moderate, but did not constitute an unacceptable

impact. It is therefore recommended that the increase in height of the existing authorised waste disposal facility be approved.

3. The impacts associated with the construction of the gypsum handling infrastructure largely revolve around clearing, disturbance or loss of vegetation, habitat and fauna inhabiting that habitat. Overall impacts associated with the construction of the gypsum handling infrastructure, amongst others, as described in section 2.4.5 will remain of low significance and can be successfully mitigated to within acceptable levels. Furthermore, considering that the Medupi Power Station cannot continue to operate if the gypsum handling and associated infrastructure, amongst others, are not constructed, and the significant adverse impact this would have on local economic development and security in supply of electricity on a national and international scale, it is submitted that the overwhelmingly positive impact associated with the implementation of the FGD system, of which the gypsum handling infrastructure is a part of, outweigh the potential adverse impacts associated with the loss of vegetation and habitat.

It is therefore recommended that the proposed variations to the existing WML for the Medupi Power Station ash disposal facility be considered and approved in light of the fact that potential negative impacts can be successfully mitigated, while the expected positive impacts will have a significant positive impact on reduced SO_2 levels and increased economic opportunities and quality of life for the local communities living around the Medupi Power Station.

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