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Heritage Impact Assessment for the Proposed Medupi Power Station Flue Gas Desulphurisation Retrofit Project and associated infrastructure, Lephalale, Limpopo Province, South Africa

REVISION: 02

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This report has been compiled by NGT on behalf of Zitholele and Eskom. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision-making process for the project.

DECLARATION OF INDEPENDENCE

This report has been compiled by Dr Morris Sutton for NGT. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the project.

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EXECUTIVE SUMMARY

NGT was appointed by Zitholele to make amendments to the HIA study and a PIA study conducted for site selection process for the Medupi Waste Disposal Facility which was submitted to Zitholele in February 2016. The site selection process focused on three sites, namely Site 2, Site 12 and Site 13, and it aimed at selecting the most suitable site for the handling and disposal of various waste stream that are by-products of the proposed Flue Gas Desulphurisation (FGD) technology at Medupi, which is proposed to be retrofitted in the six units currently under construction at Medupi Power Station. The aim of the FGD technology is to reduce the amount of Sulphur Dioxide (SO_2) emitted from coal fired power stations; Medupi with its six units as a coal fired powered station. From this study, (Revision 01 HIA), two potential graves sites were identified on Site 13 and Site 12 built environment ruins of no heritage significance were identified (***Annexure 1*** – *Revision 01 Heritage Impact Assessment Study Executive Summary with Conclusions and Recommendations)*.

In 2017, however, there were amendment to the project scope of works; Eskom decided on utilising the existing and licensed Ash Disposal Facility to dispose of ash and gypsum. It proposed a railway yard within the Medupi footprint for offtake of lime and handling of commercial gypsum. Within the footprint temporary storage facilities for hazardous salts and sludge have also been proposed. These new developments prompted the amendments to Revision 01 HIA and the development of the current HIA report (Revision 02). This HIA is site-specific HIA to the Medupi footprint, which also contains the site for the proposed railway yard and the existing and licensed ADF (***Annexure 3*** – *Revised Project Scope of Works*). The current study results and conclusions are also informed by the Phase II HIA study and heritage public participation process (PPP) undertaken within the Medupi PS footprint by Mbofho Consulting and Project Managers; this HIA attempted to reconstruct the environment prior to construction of Medupi and through heritage PPP with the affected community remapped the areas known to have contained graves that were accidentally disturbed or desecrated with the construction of Medupi.

Conclusions:

- It is concluded that there are no heritage and archaeological resources 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 AFD. The land in which the proposed construction activities have been transformed from previous construction activities at Medupi Power Station.
- There were also no heritage and archaeological resources around the existing and licensed ADF ash disposal facility – during the survey of the ADF the site were already constructed.
- The assessment of historic maps of the area Medupi PS also did not yield any burial grounds or graves as well as stone walls and historic buildings. However, the assessment of a Phase II HIA report by Mbofho Consulting and Project Manager yielded burial grounds and graves as well as areas that are known to have contained graves (e.g. *Figure 13 -15*).
- Based on the findings made by Mbofho Consulting and Project Managers one cannot rule out the subterranean burial grounds and graves since in some areas they identified areas with soil heaps that are reportedly to have been dumped on top of graves. *NGT was not part of this Phase II HIA study conducted on site; it therefore not take full responsibility or liability for any issues that were raised and addressed in this report other than to make reference to it as an important document to consider in dealing with heritage issues at Medupi PS. may be addressed by the current heritage social consultation on site.*
- It is concluded, that based on the exiting engineering drawings of the proposed FGD technology development footprint and its survey thereof that there are no archaeological or heritage resources. Like with the railway yard and the existing and licensed ADF facility the land in which the proposed FGD technology is to be constructed is already transformed through previous construction activities. *Once more NGT was not part of this Phase II HIA study conducted on site; it therefore not take full responsibility or liability for any issues that were raised and addressed in this report other than to make reference to it as an important document to consider in dealing with heritage issues at Medupi PS. may be addressed by the current heritage social consultation on site.*

Recommendations

- It is recommended that Eskom should continue with the implementation of Phase 2 HIA recommendations made by Mbofho Consulting and Project Managers which state that:
    - Eskom should consider constructing a memorial on site to memorialized the names of those whose graves were accidentally disturbed during the construction of Medupi PS six units and the associated infrastructure. All the names and surnames of those who were buried in areas that have been reconstructed as per Figure 13, 14 and 15 should be included in the memorial. This will be in addition to cleansing ceremonies and other cultural practices that have already been undertaken such as repatriation of spirits.
- A general recommendation with transcend heritage issues at Medupi PS is that, project proponents and environmental consultants alike, should always involve heritage consultants in the early stages of environmental management process. For example, from project conceptualization where a heritage screener of the development footprint can be undertaken. To project planning phase whereby archaeologist and heritage consultants form part of the project planning team. Heritage management process should not be taken as a tick box tool that fulfills compliance requirements, rather an important and integral part of the environmental management process.

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ABBREVIATATIONS

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Heritage Impact Assessment
I&AP	Interested & Affected Party
Kya	Thousand years ago
LIHRA	Limpopo Provincial Heritage Resources Authority
LSA	Late Stone Age
LIA	Late Iron Age
MIA	Middle Iron Age
MSA	Middle Stone Age
Mya	Million years ago
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NEMA	National Environmental Management Act
PHRA	Provincial Heritage Resources Agency
PSSA	Paleontological Society of South Africa
PDAFP	Proposed Development Area Footprint
SAHRA	South African Heritage Resources Agency

TERMS AND DEFINITIONS

Archaeological resources

This includes:

- Material remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures
- Rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation
- Wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation
- Features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in the change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- Construction, alteration, demolition, removal or change in use of a place or a structure at a place
- Carrying out any works on or over or under a place
- Subdivision or consolidation of land comprising a place, including the structures or airspace of a place

- Constructing or putting up for display signs or boards
- Any change to the natural or existing condition or topography of land
- Any removal or destruction of trees, or removal of vegetation or topsoil

Heritage resources

This means any place or object of cultural significance

1. INTRODUCTION

1.1.Project Description and Background

The current study is a Heritage Impact Assessment (HIA) for the proposed Medupi Power Station FGD-RP, the operation of the existing Medupi Power Station ADF and the proposed railway yard , Limestone storage, PCD, diesel storages, hazardous waste temporary storage (salts and sludge) (south-west of Medupi six units and south conveyor transport Medupi FGD-RP waste materials). The aim of the study was to identify archaeological and heritage resources within the affected development areas. To assess impacts on the identified archaeological and heritage resources resulting from the proposed development activities in four stages of the project: planning, construction, operational and decommissioning.

Medupi Power Station (PS) is located in Lephalale Local Municipality (LLM), within Waterberg District Municipality (WDM) in Limpopo Province, South Africa (*Figure 1*). Medupi PS is one of two South African mega power generation projects under construction, with other being Kusile Power Station in Mpumalanga Province. Medupi, like Kusile Power Station, is a coal fired power station in its completion stages. It is located on an Eskom owned property, Farm Naauw Ontkomen 509 LQ, in LLM. The power station consists of six units with a total power generation capacity of 4800 Megawatts (MW) (Eskom, 2006). The first of the six units came online on mid-2015.

Coal fired power stations are known to emit pollutants such as Sulphur Dioxide (SO_2). SO_2 is one of the most harmful gases produced through combustion of solid fossil fuel such as coal (World Health Organisation, 2014). Coal is the main solid fossil fuel that will be used in Medupi PS to generate electricity through combustion. Like with combustion of fossil fuel, there are other emissions that are produced throughout the coal life cycle such as nitrogen oxide (NO_2), ozone (O_3) and particulate matter (PM) of various sizes (World Health Organisation, 2014). To mitigate the impact of SO_2 and other pollutants in the atmosphere, Eskom is proposing to retrofit Medupi PS six units with FGD technology. The FGD technology has by-products such as gypsum, chemical salts and sludge which will need to be stored and/or disposed of at appropriately licensed facilities. The technology also requires lime as one of

the agents for the functioning of the FGD technology and a railway yard is proposed for lime off-loading on site as well as offtake of commercial viable gypsum.

Electricity and access to electricity are essential to improved human quality. The South African Bill of Rights puts electricity as one of the three pillars of social service resource, others being water and sanitation (Constitution of the Republic of South Africa, 1996). However, this essential social service may come at a detrimental cost to the environment affecting biodiversity, aquatic life and cultural heritage resources, unless managed properly. This study assesses the impact of the proposed Medupi PS FGD on heritage resources, as well as the impact of the proposed existing and licensed ADF and proposed railway yard, Limestone storage, PCD, diesel storages, hazardous waste temporary storage (salts and sludge)on these resources.

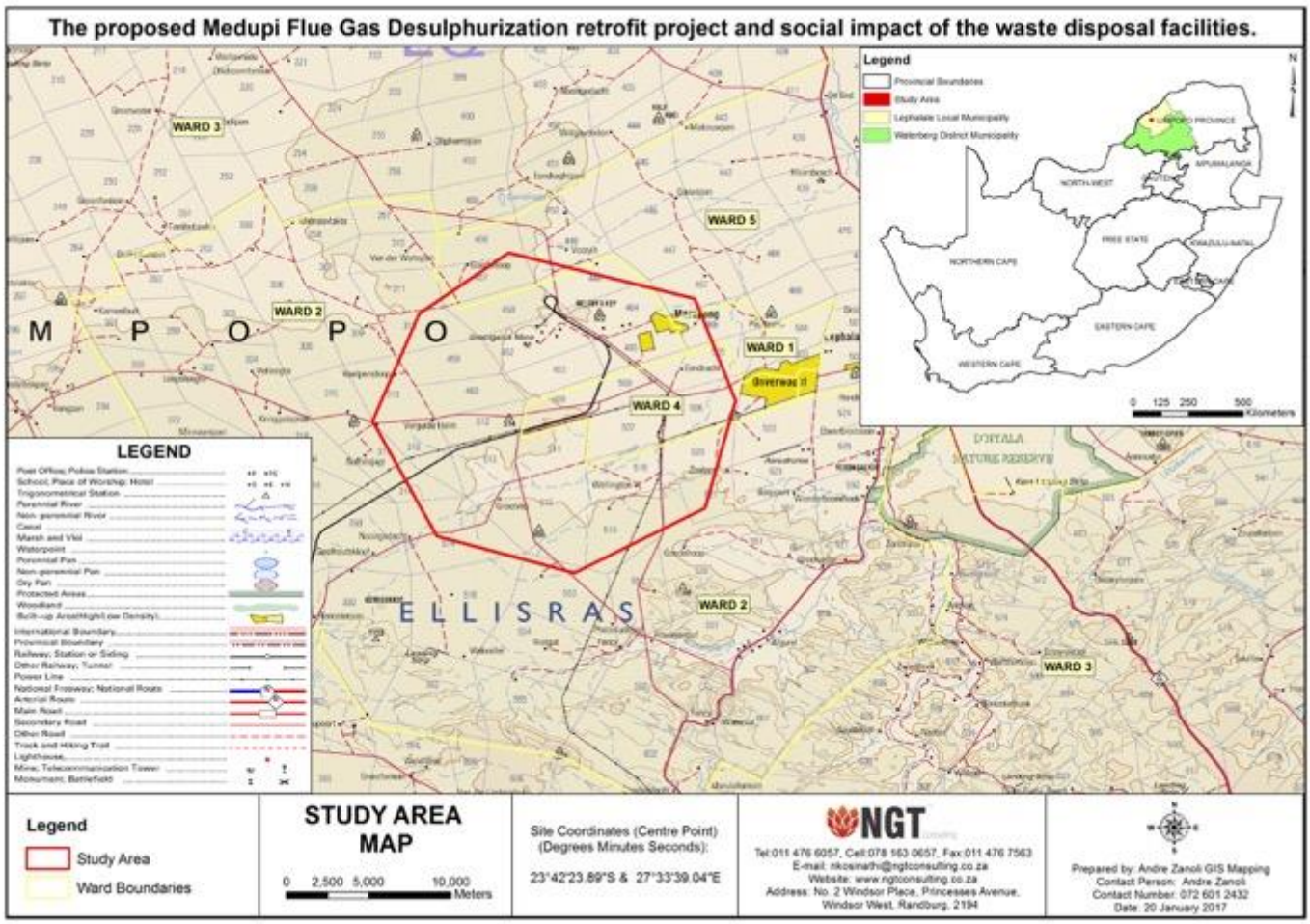

Figure 1– Location of the project area in Lephalale Local Municipality within Waterberg District Municipality, Limpopo Province, South Africa.

The following images show the location and the design of the proposed railway yard (*Figure 2*), the proposed Medupi PS FGD technology construction site (*Figure 3*) as well as the licensed ADF site (*Figure 4*).

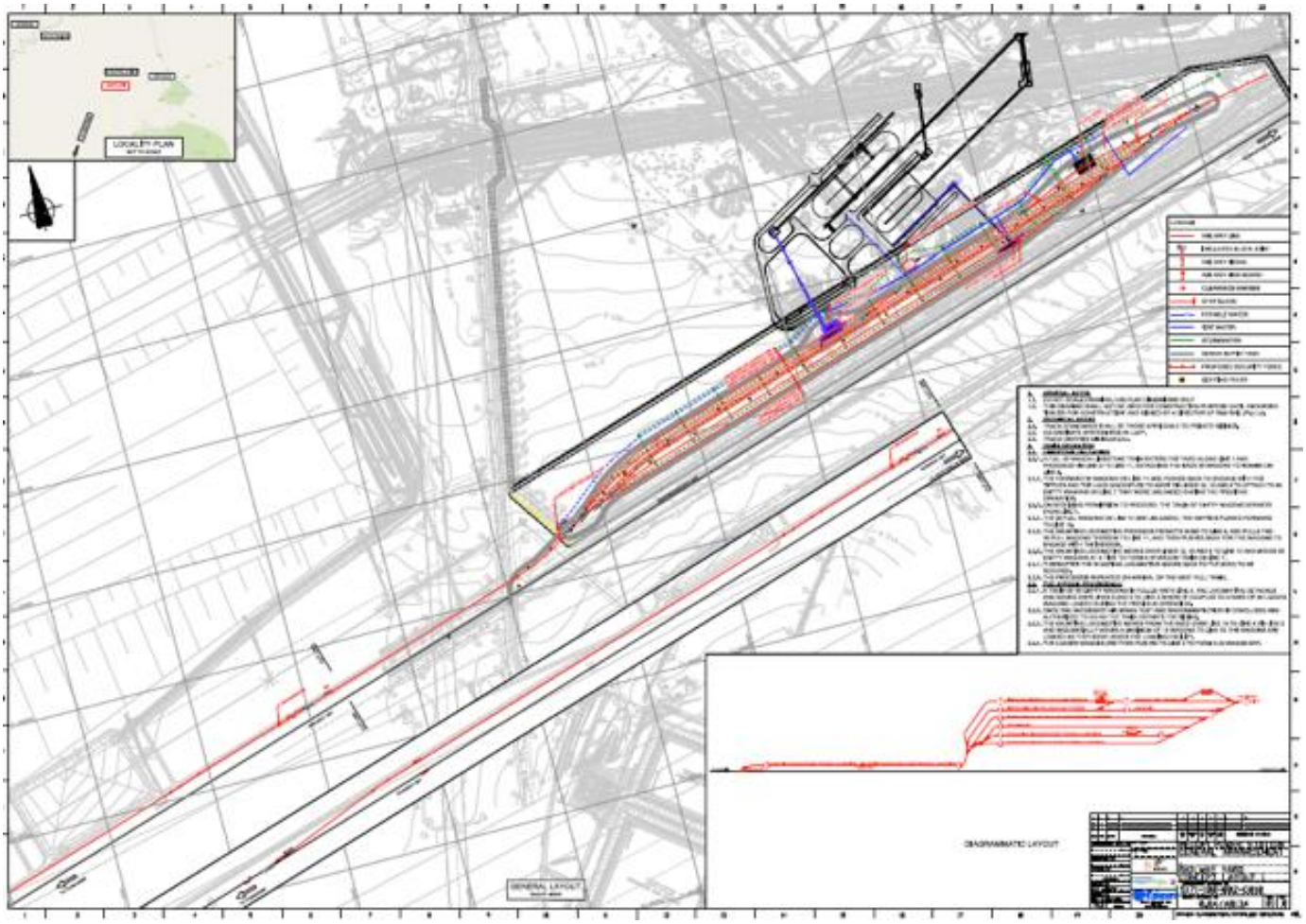

Figure 2- The proposed railway yard south-west of Medupi six units and south east of the existing and licensed ADF

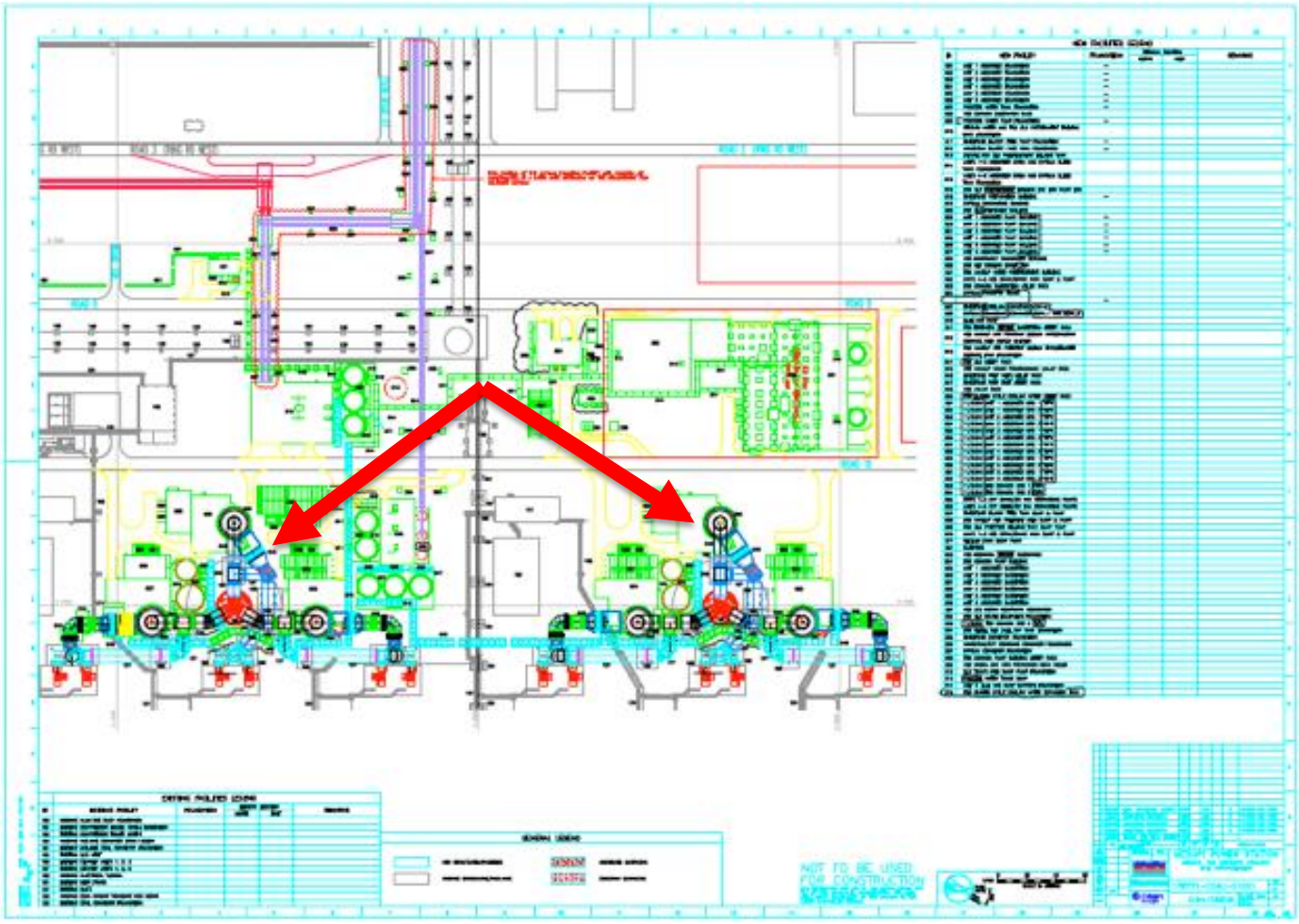

Figure 3- Location of the proposed FGD technology construction sites (red arrows)

Figure 4- Existing and licensed ADF as well as the associated dams and proposed storm was management plan

1.1.1. Project Aims

- To conduct HIA (inclusive of PIA) for the proposed construction of the FGD technology to be retrofitted at Medupi, impact assessment study on heritage resources of the existing and licensed ASF and the proposed railway yard. The objective is to inform the decision making process on the current EIA and EMPr conducted for the proposed project on the status and nature of heritage resources within development footprint and how to manage and mitigate impacts on heritage resources.
- Before giving any advice on the management and mitigation of heritage resources; the first step is to identify any heritage material (Cultural, Archaeological, Built Environment and Paleontological) that may be impacted by the proposed activities on site.

- Following an impact assessment process for the various stages of the project; propose mitigation measures for those heritage resources that may be affected by the proposed activities on site. These measures will be within acceptable norms and standards for the management of South African Heritage Resources as stipulated in the NHRA, No. 25 of 1999.

1.1.2. Legislation Triggered and Terms of Reference for the Appointment of an Archaeologist and Heritage Specialist

The nature and size of the proposed project requires environmental authorization. As a result, the following legislation applies:

- The environmental application process developed in terms of the old environmental legislation, the National Environmental Act (NEMA), No. 107 of 1998 as amended and read together with the 2010 Environmental Impact Assessment (EIA) Regulations.
- Additional legislation is also relevant – the water management (and NWAA, 2014), waste management (NEMWA, 2008), the management of the natural environment l (NEMA, 1998 and NEMLAA (National Environmental Management Laws Amendment Act), 2014) and,
- The management of cultural environment triggers NEMA, No. 107 of 1998 and the National Heritage Resources Act (NHRA), No. 25 of 1999.

The environmental management process for the proposed FGD technology, the authorized existing ADF and the proposed railway involves the identification and assessment of environmental impacts through specialist studies. Eskom appointed Zitholele to manage the environmental process and associated licenses, Zitholele sub-contracted NGT as an independent Cultural Resources Management (CRM) firm to conduct a HIA study. Dr Morris Sutton (Principal Heritage Consultant) for NGT conducted the study for the FGD retrofit project and site selection process which formed part of Revision 01 report. With the amendment of project scope, which excludes the site selection process; Mr Nkosinathi Tomose from NGT conducted the field survey and amended the report to meet the current project scope. This report is referred to as Revision 02.

The appointment of NGT as an independent CRM firm is in terms of Section 38 of the National Heritage Resources Act (NHRA), No. 25 of 1999, the NEMA as well as other applicable legislations.

2. AFFECTED ENVIRONMENT

The proposed development occurs within the existing Medupi Power Station footprint and already transformed environment. Below is the background to archeology and heritage of the broader study areas.

2.1. Desktop Study: Archaeological and Heritage (Built Environment & Landscape)

South African cultural heritage extends as far back as 2.0 million years ago (m.y.a) in the form of Stone Age artefacts that represent some of the earliest tool types found. The South African archaeological record covers all the Stone Age periods, Iron Age periods and more recent historical periods. This rich cultural heritage also includes culturally significant places on the landscape that became important to the many varied groups of people that once lived here and whose descendants continue to live here.

2.1.1. Prehistoric Archaeology (Stone Ages) of the Limpopo Province and study area (see Appendix A for a description and summary of the Stone Age periods)

There have been recorded scattered finds of Stone Age sites, rock paintings and engravings in the larger region. Most of the Stone Age sites can be classified as open (surface) sites which imply that most of the artefacts occur in secondary context. There are a number of known Stone Age sites in the Limpopo Province. Southeast of the study area, but less than 150km away, is Makapansgat. This site complex includes the Makapansgat Lime Works site which has yielded fossils dated to greater than 4.0 mya. The Lime Works has also yielded hominin fossils of Australopithecus Africanus (Tobias, 1973; Reed et al., 1993). Adjacent to the Lime Works is Cave of Hearths. This site has one of the longest sequences of occupation in southern Africa, yielding Earlier Stone Age tools beyond 300k years old up to Later Stone Age artefacts. Southwest in the Waterberg Plateau area a number of MSA and LSA sites have been identified. In the Waterberg the MSA sites, though undated, appear, technologically, to reflect the early MSA. The LSA material represents the late LSA, suggesting a long period in between when there was little human presence in the Waterberg Plateau. Van der Ryst (1998) hypothesizes the LSA artefacts are the remains of hunter-gathers who followed the early Iron Age agro-pastoralists people into the area. This seems in contrast to the Mokolo River basin area that has yielded ESA stone tools as well as many MSA and LSA artefacts; though most finds are in secondary context. A good example of a primary context site is Olieboomspoort rock shelter less than 30km south of Lephalele, located in the Mokolo

River basin this rock shelter site was used for thousands of years by Stone Age people and has yielded material that spans the Stone Age sequence (Mason, 1962; Van der Ryst, 2006). Included among the large assemblage of lithics are large quantities of ochre from the MSA sequence (Mason, 1962, 1988; Mitchell, 2002). Also recovered is a wide variety of LSA tool types as well as preserved macroscopic plant material (Van der Ryst, 2006).

A large (9,000ha) survey conducted by Huffman and Van der Walt (2013) northwest of the current area identified a number of MSA sites. The scatters of artefacts were primarily located in the calcrete pans of the area. They identified the technological attributes of the stone tools to a post-Howiesons Poort industry that falls <70k years ago. However, no formal sites or sites within primary context were noted. One Rock Art site has been noted in the area. Nelsonskop, near Lephalale contains engravings and cut markings on the rock face (van Schalkwyk, 2005).

While there exists a low probably of primary context Stone Age material being recovered, there is a higher probably of finding secondary context scatters. These are expected to be of low significance.

2.1.2. Iron Age and History of the study area (see Appendix A for a description and summary of the Iron Age)

The earliest agro-pastoralists (~2000 years ago) preferred areas with higher rainfall than that present in the study area. Thus there is only little evidence of Early Iron Age activity around Lephalale. North of the study area across the Limpopo River is one of the earliest Iron Age sites in the region, Maunatlala. This site may provide evidence of agro-pastoralist movement in reaction to climatic condition changes. As cooling temperatures and more wet conditions developed, the agro-pastoralists begin moving into the area.

The southern African Iron Age is divided by ceramics into two traditions--Urewe and Kalundu. The southern side of the Waterberg, including in the wider study area, has EIA sites that have yielded pottery representative of the Happy Rest sub-branch of the Kalundu tradition. Sites in the Sand River Valley and the Boschoffsberg Valley are EIA sites with Happy Rest material (Hall, 1981). Huffman (2007) sees these EIA sites clustering around the Waterberg and having a sub-set of Happy Rest pottery called the Diamant facies. The Diamant type site lies near the study area. Beads from these sites indicate trade

with sites in the Limpopo River Valley northeast of the study area. These complex trade networks continued well into the MIA.

Further west in Limpopo along the Makgabeng Plateau there is a higher density of Iron Age evidence. The region has yielded pottery of the Eiland style that falls in the late EIA. The Eiland facies is contemporary with one of the more important Limpopo Iron Age sites, Mapungubwe. Mapungubwe, northeast of the study area in the Limpopo River Valley, was inhabited from 1220 AD to 1300 AD (Huffman, 2000). The people of Mapungubwe were ancestors of the Shona people of southern Africa. Mapungubwe is considered southern Africa's first state (Huffman, 2000). It consisted of a complex society of a much larger political scale than had been seen before in southern Africa. There were clear separations in political power, leadership and organization between the controlling royals and commoners. The people of Mapungubwe were wealthy agro-pastoralists who farmed with cattle, sheep and goats and produced large harvests that allowed them to trade and store extra food. They became advanced traders exchanging ivory and minerals, such as gold, in wide trading networks. Mapungubwe people traded with Arabia, China and India through East African harbours. But they also traded with groups south and east, including groups living in the wider study area.

By the 1200's Middle Iron Age Sotho- Tswana people followed by the precursors of Venda groups moved into the area (Eastwood et al., 2002).

In the southern Waterberg, the contemporary Eliland facies has been identified at sites such as Rhenosterkloof 3 in the Sand River valley and near Rooikrans Hill in the Boschoffsberg valley. In northern parts of the Waterberg, a variant of the Eiland facies known as the Broadhurst facies appears between 1300 AD and 1430 AD (van der Ryst, 1998).

The LIA in the Waterberg is marked by the appearance of Moor Park pottery of the Blackburn Branch and Madikwe pottery of the Moloko branch (Huffman, 2007). Huffman has argued these branches have a common Urewe origin in the EIA in East Africa and migrated separately into southern Africa. The Madikwe material has been recovered from sites in the Sand River Valley and Rooiberg Valley. The presence of Moor Park pottery indicates movements of Nguni-speakers from present day KwaZulu Natal westward (Huffman, 2007). Also associated with these groups are extensive hilltop stone wall settlements, which have been identified in northern Waterberg.

North of the study area, decorated pottery has been identified as Early Moloko by Beimond (2012). Moloko pottery diverges into three sub-branches of which one is Letibogo (ibid.). Pottery identified by Huffman and van der Walt (2013), near the study area, belong to the stylistic facies, Letsibogo, which was made by the Sotho-Tswana Bakaa cultural group. Huffman (2007) dates this period to between 1550 AD and 1750 AD. Nearby on Nelsonskop, van Schalkwyk (2005) identified remains of stone walling and attributed them to early Sotho-Tswana.

2.1.3. Built Environment and Landscape within the historic context

Throughout the middle of the 18th Century the Limpopo Province witnessed a range of settlement patterns- the occupation and reoccupation of the region by different culture groups contributed to the contemporary peopling of the present day Limpopo Province. There are various factors that contributed to this historical settlement of the region. The first has to do with the availability of natural resources. The attraction of people to natural resources available in this province date as far back as the 1st Millennium AD, to the MIA and the LIA periods (Tomose, 2013).

The first Europeans arrived in the region in the middle of the 19th Century, but the dry conditions and the intermittent presence of the tsetse fly resulted in more permanent settlements only developing toward the end of the 1800s. These early Europeans were Afrikaner Voortrekkers and passed through areas such as present day Modimolle on trading and hunting expeditions.

During historical times the availability of natural resources also played a pivotal role in the choice of settlement of people, based not only from a subsistence point of view but also driven by commerce or commercial gains resulting from the exploitation of available natural resources such as coal, iron ore and tin. The town of Thabazimbi, for example - located south of the current study area, developed from the exploitation of its rich haematite deposits (iron ore) during the early 1900s (ibid.)

A second factor contributing to historical settlement of people in the area is politically linked. For example, the Great Trek was a politically motivated movement of people. Another example is the presence of Ndebele people in the region, a result of the mfecane conflicts, which involved Zulu King Shaka's expansions and battles for control of more land and people. They can trace their roots to

Mzilikazi (ibid.). These conflicts provided an opportunity for the colonists to move into areas largely devoid of people. As they began settling in larger numbers, the conflicts spread from the African groups to include the Afrikaners. An example of this was the siege of Makapan Cave in the Makapansgat site complex. Here Ndebele Chief Makapane and his people were sieged in the Cave after retreating there during a conflict with the Voortrekkers. After Makapane's warriors had killed a hunting party of Voortrekkers led by Hermanus Potgieter near Moorddrift a much larger group of commandos sought revenge. The siege lasted almost a month and resulted in the deaths of close to 1500 of Chief Makapane's people. It was only much later that the local towns were established. Lephalale was originally named Ellisras. This name comes from a combination of the surnames of Patric Ellis and Piet Erasmus who settled in the 1930s on the farm Waterkloof 502LQ. The railway line coming through the area resulted in growth. Soon after the farm was subdivided with portions including river frontage (Lephalale 2009). Along with Ellis and Erasmus, another of the founding families of the area were the van Rooyens. Today decedents of this family still farm the area. The family currently own the Nooitgedacht farm, adjacent (South) to Site 2.

In the mid-20th century the area continued to be important due to its mineral reserves. "In 1941, the geological Survey Division of the then Department of Mining, launched an exploration programme. Iscor, the country largest steel producer, and also the biggest consumer of coking coal, actively partook in this programme. Drilling was completed in 1952. In 1957, Iscor obtained the property rights to six farms, including Grootegeluk and in 1979, a mining authorization was granted" (Lephalale 2009). Iscor maintained a presence in the area through the 1980s and was primarily responsible for the growth of the area. Ellisras was changed to Lephalale in 2002 along with several other towns as well as the provincial name from Northern to Limpopo.

2.1.3.1. Migrant Labourer and Associated Built Environment and Landscape Features

The establishment of these towns and later the mining industry between and around them required supporting efforts in terms of skilled and unskilled labourers. There was a need to establish infrastructure to support the labour pool, thus the first organized township Marapong was established on the farms Nelsonskop 464LQ and Grootestryd 465LQ. In addition, there may be other areas that include built hostels and compounds for labourer accommodation.

In summary:

- The migrant labour system, both historically and presently, is central to the labour force in the industry.
- In the past the hostel dwelling system that was meant to accommodate and confine migrant labourers within the mining premises.
- There are both marked and unmarked graves associated with migrant labourers in some of the historical mining areas.

2.1.4. Previous Heritage/Archaeological Impact Assessments in the area

A number of heritage assessment reports have been conducted in the wider area that reflects varying degrees of heritage present (*Table 4*). While these reports did not cover the current project footprint, areas around the project have been surveyed.

Table 1-List of some of the more recent (since 2009) HIAs conducted in the area. The results of these reports vary regarding identified heritage.

Author	Report Title	Year	Prepared for	Heritage Identified
Birkholtz	Proposed Development of the Grootegeluk Mine Construction Camp for the Market Coke and Co-Generation Plant Project on a Part of the Farm Enkelbult 462 LQ near Lephalale, Lephalale Local Municipality, Waterberg District, Limpopo Province	2014	Synergistics Environmental Services	Nothing found
Hutten	Proposed Development of the Steenbokpan Extension 3 Township on the Remainder and Portions 1, 2, 3 and 4 of the Farm Grootdoorn 292 LQ, Portions 20, 22 and 25 of the Farm Theunispan 293 LQ and Portion 3 of the Farm Steenbokpan 295 LQ at Steenbokpan, west of Lephalale in the Lephalale Local Municipality, Waterberg District, Limpopo Province.	2014	Flexilor Properties (Pty) Ltd	Historic Structures and Graves
Hutten	Proposed Development of a Shopping Centre on Portion 114 of the Farm Waterkloof 502 LQ, in the Town of Lephalale in the Lephalale Local Municipality, Waterberg District, Limpopo Province	2014	Tekplan Environmental	Nothing found
van Schalkwyk	Heritage Impact Assessment for the proposed continuous ash disposal facility for the Matimba Power Station, Lephalale, Limpopo Province	2014	Royal Haskoning DHV	Nothing found
van der Walt	Archaeological Assessment for the proposed Thabametsi Coal-Fired Power Station, Lephalale, Limpopo Province	2014	Savannah Environmental (Pty) Ltd	Historic Structures, Graves and Rock Art
Tomose	A Heritage Impact Assessment study for the proposed Medupi-Borutho 400kv transmission line, Limpopo Province, South Africa.	2013	Baagi Environmental Consultancy	Stone Age scatters/sites, Historic Structures, Cultural landscape and Graves
Huffman and van der Walt	Sasol Limpopo West Heritage Report	2013	SRK Consulting	Numerous MSA scatters/sites identified in the calcrete pans. Several Iron age occurrences and several historic (>60 years) structures.

Author	Report Title	Year	Prepared for	Heritage Identified
Kruger	Groothoek Coal Mine: Archaeological Impact Assessment on the farms Groothoek 504 lq and Eendracht 505 lq, Lephalale, Waterberg district municipality, Limpopo Province	2013	AGES	MSA scatters (2), Historic Structures and Graves
Pistorius	A phase 1 Heritage Impact Assessment (HIA) study for Eskom's proposed Community Network Centre in Lephalale in the Limpopo province	2013	Eskom Land Development	Nothing found
Karodia	Heritage statement for the Dalyshope Project: Phase 1 NEMA application, Lephalale, Limpopo Province	2013	Anglo American Thermal Coal	Iron Age pottery, Historic Sturctures and Graves
Karodia and Higgitt	Heritage Impact Assessment for the proposed Thabametsi Project, Lephalale, Limpopo Province	2013	Exxaro Coal (Pty) Ltd	MSA scatters, Iron Age pottery, Historic Structures and Graves
Pelser	Draft report on a Phase 1 HIA for the Peerboom Farm Opencast Coal Mine, near Lephalale and Marapong, Limpopo Province	2012	Ecopartners	Nothing found
van Vollenhoven	A report on the assessment of a possible grave site on the farm Eenzaamheid 687 lq, close to Lephalale in the Limpopo Province	2012	Basil Read	Inconclusive
Biemond	Specialist report on the analyses of excavated African ceramics for the Boikarabelo project Waterberg area, Limpopo province	2012	Digby Wells and Associates	Ceramic materials
van der Walt	Archaeological Scoping Report for the Proposal Sekoko Waterberg Colliery, Lephalale, Limpopo Province	2012	Savannah Environmental (Pty) Ltd	Nothing found
van Schalkwyk	Heritage Impact Assessment for the proposed Mixed Use Development and Solar Park on portion 1 of the farm Steenbokpan 295lq and the remainder of farm Vangpan 294lq in the Lephalale Region, Limpopo Province	2012	Interdesign Landscape Architects	Graves and Memorial Structure
Nel	Addendum to phase 1 archaeological impact assessment for the for Boikarabelo coal mine (Proposed railway link from the farm Kruishout to the farm	2011	Digby Wells	Historic Structures, Graves and Pottery

Author	Report Title	Year	Prepared for	Heritage Identified
	Buffelsjagt) Lephalale local municipality, Waterberg district, Limpopo Province			
Fourie	Res Gen SA Boikarabelo Coal Mine Project on portions of the farms rson 700 LQ, Zeekoevley 421 LQ, Vischpan 274 LQ, Kruishout 271 LQ, Kalkpan 243 LQ, Witkopje 238 LQ, and Diepspruit 386LQ, District Lephalale, Limpopo Province	2010	Digby Wells and Associates	Modern Cemeteries and Archaeological sites
van Schalkwyk	Heritage Impact Assessment for the proposed Medupi Power Station conveyor route, Lephalale Region, Limpopo Province	2010	Savannah Environmental (Pty) Ltd	Nothing found
van der Walt	Heritage walkthrough for the 132 km Medupi - Spits kop Transmission power line project, Northam, Limpopo Province	2009	PBA International	Graves and Iron Age pottery
Prins	Cultural heritage screening of the extended Medupi landfill site	2009	Strategic Environmental Focus	Nothing found
van Schalkwyk	Heritage Scoping Assessment for the proposed development of coal mining activities west of Lephalale, Limpopo Province	2009	Cabanga Concepts	Nothing found

3. FINDINGS

The finding of the current study in terms of paleontological resources within the development area have not changed from those made in terms of Revision 01 report. The Paleontological Desktop Study determined that there are no paleontological fossils or material exists within the geology of the area.

In terms of archaeology and general heritage, both Revision 01 and Revision 02 literature review yielded information about archaeological and heritage resources within Medupi PS footprint currently being assessed and the wider area. The known archaeological resources include: Stone Age occurrences, Rock Art, Iron Age occupations and historical activity. The Phase II HIA study of the Medupi PS footprint conducted by Mbofho Consulting and Project Managers has resulted to information that has been used to construct the receiving environment showing areas known to have contained graves (e.g. *Figure 13 and 14 below*). These are graves who according to the local communities were destructed with the construction of Medupi PS and the associated infrastructure. To mitigate social issues that resulted from such disturbance, a heritage PPP has been conducted in association with the Phase II HIA to find ways in which the local communities working with the appointed heritage consultants can resolve challenges resulting from graves destruction. Among others solutions that have been proposed and applied in an attempt address issues on site has been reburial of those graves that could still be identified, repatriation of spirits for those graves that were desecrated and cleansing of the affected families.

The current study did not result to the identification of any heritage resources. A survey of the existing ADF footprint and the Medupi precinct in which the FGD technology and the proposed railway yard is to be constructed was undertaken by Nkosinathi Tomose in January 2018. The proposed development area for the construction of the FGD technology and the proposed railway yard has been significantly transformed through previous construction activities. For example, the foundations for the FGD technology are within an area that was deeply excavated during the construction of the Medupi PS six units. The proposed railway yard is within an area where there has been disturbances associated with Medupi PS associated infrastructure such as storm water management systems, the existing ADF and site roads.

In terms of **Revision 01** findings:

No heritage material was identified on site 2 and only two built structures were identified on site 12 but these are not heritage features.

On site 13 two potential graves were identified and these required a verification process following a grave test application permit with SAHRA Burial Grounds and Grave (BGG) Unit.

3.1. Summary of Revision 01 Survey Results (Not applicable in the Current Application but Important for Future Development Around Medupi PS)

A physical survey of the project area took place on 31 August – 2 September and 17 and 18 November 2015 by Dr Morris Sutton.

3.1.1. Site 2

Ground visibility during the survey was poor in most areas. The undergrowth was dense to very dense with trees and shrubs covering large portions of the landscape (Figures 3 and 4). However, the survey was extensive with no areas inaccessible.

- Palaeontological
    - The geological formation pre-dates any large bodied plant or vertebrate fossils thus it is not likely any fossils exist in the area.
- Archaeological
    - No Stone Age, Rock Art or Iron Age material was identified.
- Built Environment
    - No historic built environment and landscape features where structures were identified on site such as farmstead buildings or ruins, gate posts and other landscape features such as plantation.
- Burials or Graves
    - No burials or graves were identified.
    - No heritage was identified on site 2 or along the proposed conveyer and road routes.

<u>No heritage was identified on site 2 or along the proposed conveyer and road routes.</u>

Figure 5-View of the high density vegetation present on site 2

Figure 6-Another view of the vegetation present on site 2.

3.1.2. Site 12

Ground visibility during the survey was fair to good (Figure 5). The survey was extensive. However, portions of the farm included cattle paddocks which were not surveyed (Figure 6).

- Palaeontological
    - The geological formation pre-dates any large bodied plant or vertebrate fossils thus it is not likely any fossils exist in the area.
- Archaeological
    - No Stone Age, Rock Art or Iron Age material was identified.

Built Environment

Two old brick structures were identified on the farm Kromdraai (site 12) (Figures 7 and 8). However, it was not possible to determine the actual age of the structures. Both are in an extremely dilapidated state and are not salvageable. Both are considered of low significance and have no heritage value (see below for an impact assessment of the two structures and appendix C for methodology used).

Site	EMFGD 01 Built Structures
Type	Brick (Block) building structures
Location/Coordinates	S 23^0 44' 28.33" E 27^0 32' 18.59"
Density	Two buildings
Approximate Age (> 60 or <60 years old) or Archaeological Time Period	< = > 60 years (date is unknown)
Applicable Section of the NHRA, No 25 of 1999:	Section 34
Site Description:	These two structures are of unknown age, but could be 60 years or older. Both structures are nearly completely collapsed with only a few sections of walls remaining. Both are simple brick (block) and mortar construction. Neither building has any unique features. The structures have no historic value.

Burials or Graves

- No burials or graves were identified.

No significant heritage was identified on site 12 or along the proposed conveyer and road routes.

Figure 7-View of the low density vegetation present on site 12.

Figure 8-View of cattle on site 12.

Figure 9-Remains of old brick structure on site 12.

Figure 10-Remains of second old brick structure on site 12.

3.1.3. Site 13 (This site was not surveyed for this report, but the results of previous surveys are included here for the site selection process.)

- Palaeontological
    - The geological formation pre-dates any large bodied plant or vertebrate fossils thus it is not likely any fossils exist in the area.

Site 13 is on the farm Eenzaamheid 512LQ. The location was previously assessed by other specialists. An initial HIA (van Schalkwyk, 2005) was conducted on the farm and no heritage material was identified. The project was granted approval. Subsequent to this, a site with two possible graves was identified on

the farm. Two stones, placed two meters apart in an area where no other stones were located suggested a possible grave marker. A second study (van Vollenhoven, 2012) was commissioned and conducted to determine if the stones were, in fact, markers for graves and if the area included burials. The second study was inconclusive but made a recommendation that a "watching brief" option be followed.

A watching brief "entails that the earth-moving equipment start with the necessary work on site and an archaeologist is present on site to monitor the situation. The archaeologist would specifically be looking for any indication of possible human remains or burials" (van Vollenhoven, 2012: 17). "This option is used when the opinion is that there more likely are no graves in an area to be developed, but where the possibility that human remains may be unearthed still exists. This usually occurs when graves have been exhumed and there is a possibility that some, which are not marked above ground, may still be present. It is also applied when there are information indicating the possibility of graves, but not enough above ground evidence to support this" (van Vollenhoven, 2012: 17).

However, in 2012 several families came forward claiming graves had been destroyed during the construction of the Medupi Power Station. This compelled another study (Silidi and Matenga, 2015) which was commissioned and conducted to access the validity of the claims and to make recommendations to finding a solution with the aggrieved families. This study included the Medupi Power Station location as well as the immediate surrounding farms (including Eenzaamheid Site 13). The results of this study identified a number of graves, including a possible grave on the Eenzaamheid farm (Site 13). As part of the public participation process of the report a family name (Molisiwa) was identified in relation to the grave. The report recommends protection measures for this probable grave and the second possible grave. However, it is recommended by this current study that mitigation measures include confirmation of the graves and, if confirmed, then exhumation and relocation processes be conducted (see 7. Recommendations).

In addition, there is another potential grave identified outside of the current project footprint but could potentially be impacted by additional construction and expansion of the area. This grave is situated between the Medupi Power Station and the proposed Site 13. While it is not located along the transport route or within the site boundary, the close proximity requires attention and mitigation.

Site	EMFGD 02 Graves
Type	One probable grave and a second possible grave
Location/Coordinates	S23˚ 42' 39.4" E027˚ 30' 12.4"
Density	Two graves, Low Density
Approximate Age (> 60 or <60 years old) or Archaeological Time Period	> 60 years (date is unknown) SAHRA regulations stipulate graves with unknown dates be treated as >60 years
Applicable Section of the NHRA, No 25 of 1999:	Section 36
Site Description:	The first probable grave has still not been confirmed as an actual grave. Previous studies have been inconclusive. The second grave is less likely to be a grave but is currently treated as possible (*Figure 11*).

Figure 11-Site EMFGD 02. Potential graves on farm Eenzaamheid (Site 13). (L) Probable first grave and (R) possible second grave. Photos from van Vollenhoven, 2012.

Site	EMFGD 03 Grave
Type	One possible grave
Location/Coordinates	S23˚ 42' 26.8" E027˚ 32' 49.5"
Density	One grave, Low Density
Approximate Age (> 60 or <60 years old) or Archaeological Time Period	> 60 years (date is unknown) SAHRA regulations stipulate graves with unknown dates be treated as >60 years
Applicable Section of the NHRA, No 25 of 1999:	Section 36
Site Description:	The possible grave has still not been confirmed as an actual grave. But should be confirmed and area fenced and treated as a no-go area with a 10 meter buffer (*Figure 12*).

Figure 12-Aerial map of the area reflecting the locations of the identified heritage resources from Revision 01 heritage study. (1) Dilapidated buildings on farm Kromdraai near the current modern

farmhouse; (2) two possible graves in northwest corner of farm Eenzaamheid and (3) possible grave east of farm Eenzaamheid just off project footprint.

4. IMPACT ASSESSMENT

This chapter includes the Impact Assessment methodology used to measure the project impacts on the identified heritage resources. It also includes the Impact Assessments on the heritage resources identified in Chapter 3. The heritage sites were assessed using the Zitholele Consulting methodology (4.1).

4.1. Impact Assessment Methodology

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria, as discussed below.

4.1.1. Nature of the impact

Each impact should be described in terms of the features and qualities of the impact. A detailed description of the impact will allow for contextualisation of the assessment.

4.1.2. Extent of the impact

Extent intends to assess the footprint of the impact. The larger the footprint, the higher the impact rating will be. The table below provides the descriptors and criteria for assessment.

Table 2-Criteria for assessment of the extent of the impact.

Extent Descriptor	Definition	Rating
Site	Impact footprint remains within the boundary of the site.	1
Local	Impact footprint extends beyond the boundary of the site to the adjacent surrounding areas.	2
Regional	Impact footprint includes the greater surrounds and may include an entire municipal or provincial jurisdiction.	3
National	The scale of the impact is applicable to the Republic of South Africa.	4
Global	The impact has global implications	5

4.1.3. Duration of the impact

The duration of the impact is the period of time that the impact will manifest on the receiving environment. Importantly, the concept of reversibility is reflected in the duration rating. The longer the impact endures, the less likely it is to be reversible.

Table 3. Criteria for the rating of the duration of an impact.

Duration Descriptor	Definition	Rating
Construction / Decommissioning phase only	The impact endures for only as long as the construction or the decommissioning period of the project activity. This implies that the impact is fully reversible.	1
Short term	The impact continues to manifest for a period of between 3 and 5 years beyond construction or decommissioning. The impact is still reversible.	2
Medium term	The impact continues between 6 and 15 years beyond the construction or decommissioning phase. The impact is still reversible with relevant and applicable mitigation and management actions.	3
Long term	The impact continues for a period in excess of 15 years beyond construction or decommissioning. The impact is only reversible with considerable effort in implementation of rigorous mitigation actions.	4
Permanent	The impact will continue indefinitely and is not reversible.	5

4.1.4. Potential intensity of the impact

The concept of the potential intensity of an impact is the acknowledgement at the outset of the project of the potential significance of the impact on the receiving environment. For example, SO_2 emissions have the potential to result in significant adverse human health effects, and this potential intensity must be accommodated within the significance rating. The importance of the potential intensity must be emphasised within the rating methodology to indicate that, for an adverse impact to human health, even a limited extent and duration will still yield a significant impact. Within potential intensity, the

concept of irreplaceable loss is taken into account. Irreplaceable loss may relate to losses of entire faunal or floral species at an extent greater than regional, or the permanent loss of significant environmental resources. Potential intensity provides a measure for comparing significance across different specialist assessments. This is possible by aligning specialist ratings with the potential intensity rating provided here. This allows for better integration of specialist studies into the environmental impact assessment.

Table 4-Criteria for impact rating of potential intensity of a negative impact.

Potential Intensity Descriptor	**Definition of negative impact**	**Rating**
High	Any impact to human health/mortality/loss of a species.	16
Moderate-High	Significant impact to faunal or floral populations/loss of livelihoods/individual economic loss	8
Moderate	Reduction in environmental quality/loss of habitat/loss of heritage/loss of welfare amenity	4
Moderate-Low	Nuisance impact	2
Low	Negative change with no associated consequences.	1

Table 5-Criteria for the impact rating of potential intensity of a positive impact.

Potential Intensity Descriptor	**Definition of positive impact**	**Rating**
Moderate-High	Met improvement in human welfare	8
Moderate	Improved environmental quality/improved individual livelihoods.	4
Moderate-Low	Economic development	2
Low	Positive change with no other consequences.	1

It must be noted that there is no HIGH rating for positive impacts under potential intensity, as it must be understood that no positive spinoff of an activity can possibly raise a similar significance rating to a negative impact that affects human health or causes the irreplaceable loss of a species.

4.1.5. Likelihood of the impact

This is the likelihood of the impact potential intensity manifesting. This is not the likelihood of the activity occurring. If an impact is unlikely to manifest, then the likelihood rating will reduce the overall significance.

The rating for likelihood is provided in fractions in order to provide an indication of percentage probability, although it is noted that mathematical connotation cannot be implied to numbers utilised for ratings.

Table 6-Criteria for the rating of the likelihood of the impact occurring.

Likelihood Descriptor	Definition	Rating
Improbable	The possibility of the impact occurring is negligible and only under exceptional circumstances.	0.1
Unlikely	The possibility of the impact occurring is low with a less than 10% chance of occurring. The impact has not occurred before.	0.2
Probable	The impact has a 10% to 40% chance of occurring. Only likely to happen once in every 3 years or more.	0.5
Highly Probable	It is most likely that the impact will occur and there is a 41% to 75% chance of occurrence.	0.75
Definite	More than a 75% chance of occurrence. The impact will occur regularly.	1

4.1.6. Cumulative Impacts

Cumulative impacts are reflected in the in the potential intensity of the rating system. In order to assess any impact on the environment, cumulative impacts must be considered in order to determine an accurate significance. Impacts cannot be assessed in isolation. An integrated approach requires that cumulative impacts be included in the assessment of individual impacts.
The nature of the impact should be described in such a way as to detail the potential cumulative impact of the activity.

4.1.7. Significance Assessment

The significance assessment assigns numbers to rate impacts in order to provide a more quantitative description of impacts for purposes of decision making. Significance is an expression of the risk of damage to the environment, should the proposed activity be authorised.

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

Impact Significance = (extent + duration + potential intensity) x likelihood

Table 7-Significance rating formulas.

Score	Rating	Implications for Decision-making
< 3	Low	Project can be authorised with low risk of environmental degradation
3 – 9	Moderate	Project can be authorised but with conditions and routine inspections. Mitigation measures must be implemented.
10 – 20	High	Project can be authorised but with strict conditions and high levels of compliance and enforcement. Monitoring and mitigation are essential.

21 – 26	Fatally Flawed	Project cannot be authorised

An example of how this rating scale is applied is shown below:

Table 8-Example of Rating Scale.

Nature	Extent	Duration	Potential Intensity	Likelihood	Rating
Emission of SO_2 to the environment in concentrations above the minimum emissions standards. The area is a priority hotspot in terms of air emissions and there are several industrial operations that contribute to extensive emissions of SO_2.	*Global*	Long term	HIGH	**Probable**	High
	5	4	16	0.5	12.5

4.1.8. Notation of Impacts

In order to make the report easier to read the following notation format is used to highlight the various components of the assessment:

- Extent- *in italics*
- Duration – in underline
- Potential intensity – IN CAPITALS
- Likelihood - in **bold**

Please note that the impact rating system may change slightly to accommodate ease of use. However, the basic principle of the rating system will remain the same.

4.2. Impact Assessments on Identified Heritage Resources

Table 9-Impact assessment of the two built structures located on site 12. EMFGD 01.

PRE-CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Two Built Structures (Block buildings)	Direct Impact:	Existing	1	5	1	0.1	1 - LOW	No mitigation is recommended as the structures are not expected to be impacted during this phase.	Historic structures represent the history of the local inhabitants.
	Destruction of the Built Structures. Two block (brick and mortar) structures identified on Site 12 (farm Kromdraai)	Cumulative	1	5	1	0.1	1 - LOW		Air quality will remain high impact with Medupi coming on-line
		Residual	1	5	1	0.1	1 - LOW		No impact is expected during this phase so there is no potential loss of heritage.

CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Two Built Structures (Block buildings)	Direct Impact:	Existing	1	5	1	0.75	5 - MOD	The buildings have been noted and recorded. No additional mitigation is recommended. While it is probable the structures will be impacted during this phase, the buildings lack any heritage value.	Historic structures represent the history of the local inhabitants.
	Destruction of the structures (two block buildings) during the this phase will result in loss of the historic built environment.	Cumulative	1	5		0.75	5 - MOD		These structures lack any historic backstory. No history is associated with the buildings and they lack any heritage signficant features.
		Residual	1	5	1	0.75	5 - MOD		As the buildings lack historic significance there is no residual loss of heritage.

OPERATIONAL PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Two Built Structures (Block buildings)	Direct Impact:	Existing	1	5	1	0.75	5 - MOD	The buildings have been noted and recorded. No additional mitigation is recommended. While it is probable the structures will be impacted during this phase, the buildings lack any heritage value.	Historic structures represent the history of the local inhabitants.
	Destruction of the structures (two block buildings) during the this phase will result in loss of the historic built environment.	Cumulative	1	5	1	0.75	5 - MOD		These structures lack any historic backstory. No history is associated with the buildings and they lack any heritage signficant features.
		Residual	1	5	1	0.75	5 - MOD		As the buildings lack historic significance there is no residual loss of heritage.

DECCOMMISSIONING PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Two Built Structures (Block buildings)	Direct Impact:	Existing	1	5	1	0.2	1 - LOW	No mitigation recommended as the historic value is low.	Historic structures represent the history of the local inhabitants.
	Loss of historic built environment	Cumulative	1	5		0.2	1 - LOW		These structures lack any historic backstory. No history is associated with the buildings and they lack any heritage signficant features.
		Residual	1	5	1	0.2	1 - LOW		No additional impact is expected during this phase.

Table 10-Impact Assessment of graves on Site 13. EMFGD 02.

PRE-CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Graves (one probable grave and a second possible grave)	Direct Impact:	Existing	1	5	1	0.1	1 - LOW	No mitigation is recommended as the graves are not expected to be impacted during this phase.	Human burials are protected by law/legislation. Importantly, invasion of a burial greatly effects the family and community.
	Damage/desecration of interred human remains	Cumulative	1	5	1	0.1	1 - LOW		Potential law violations and litigation
		Residual	1	5	1	0.1	1 - LOW		No impact is expected during this phase so there is no potential loss of heritage.

CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Graves (one probable grave and a second possible grave)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	It is recommended for exhumation of the remains, relocation and reburial in a proper local cemetery. Fencing (bordering) the graves is not seen as a viable alternative.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off and continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		Loss or desecration of burials has long-term implications on a family's peace of mind and, among many groups, on angering ancestral spirits.

OPERATIONAL PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Graves (one probable grave and a second possible grave)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	It is recommended for exhumation of the remains, relocation and reburial in a proper local cemetery. Fencing (bordering) the graves is not seen as a viable alternative.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off and continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		Loss or desecration of burials has long-term implications on a family's peace of mind and, among many groups, on angering ancestral spirits

DECCOMMISSIONING PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Graves (one probable grave and a second possible grave)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	No additional mitigation recommended. Mitigation should take place prior to this phase.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off; continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		No additional impact is expected during this phase.

Table 11-Impact Assessment of possible grave adjacent to Site 13. EMFGD 03. ***These are not within the development footprint but within a kilometre zone from Medupi development footprint – therefore will not be impacted. The assessment is included to bring attention to them in case the development activities move beyond the current site boundary.***

PRE-CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Grave (probable)	Direct Impact:	Existing	1	5	1	0.1	1 - LOW	No mitigation is recommended as the grave is not expected to be impacted during this phase.	Human burials are protected by law/legislation. Importantly, invasion of a burial greatly effects the family and community.
	Damage/desecration of interred human remains	Cumulative	1	5	1	0.1	1 - LOW		Potential law violations and litigation
		Residual	1	5	1	0.1	1 - LOW		No impact is expected during this phase so there is no potential loss of heritage.

CONSTRUCTION PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Grave (probable)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	It is recommended that this potential grave be fencd and a no-go zone of 5m established around the site.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off and continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		Loss or desecration of burials has long-term implications on a family's peace of mind and, among many groups, on angering ancestral spirits.

OPERATIONAL PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Grave (probable)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	It is recommended that this potential grave be fencd and a no-go zone of 5m established around the site.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off and continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		Loss or desecration of burials has long-term implications on a family's peace of mind and, among many groups, on angering ancestral spirits

DECCOMMISSIONING PHASE									
Activity	**Nature of Impact**	**Impact type**	**Extent**	**Duration**	**Potential Intensity**	**Likelihood**	**Rating**	**Mitigation**	**Interpretation**
Grave (probable)	Direct Impact:	Existing	1	5	8	0.75	11 - HIGH	No additional mitigation recommended. Mitigation should take place prior to this phase.	Human graves are considered sacred. Additionally, graves are direct links to families and communities ancestral spirits.
	Damage/desecration of interred human remains	Cumulative	1	5	8	0.75	11 - HIGH		The damage would be once-off; continued activity will not increase the level of impact. However the social negative impact would increase.
		Residual	1	5	8	0.75	11 - HIGH		No additional impact is expected during this phase.

5. DISCUSSION

The current study takes into account the findings, conclusions and recommendations of the heritage study conducted by NGT for Medupi Waste Disposal Facility site selection process (Revision 01). Revision 01 is important in terms of giving context for the current study, which evolved from Revision 01. It also considered the heritage study that has been undertaken by Mbofho Consulting and Project Manager in retrospect for the identification of places known to have contained burial grounds and graves within the Medupi PS precinct (*Figures 13, 14 & 15*).

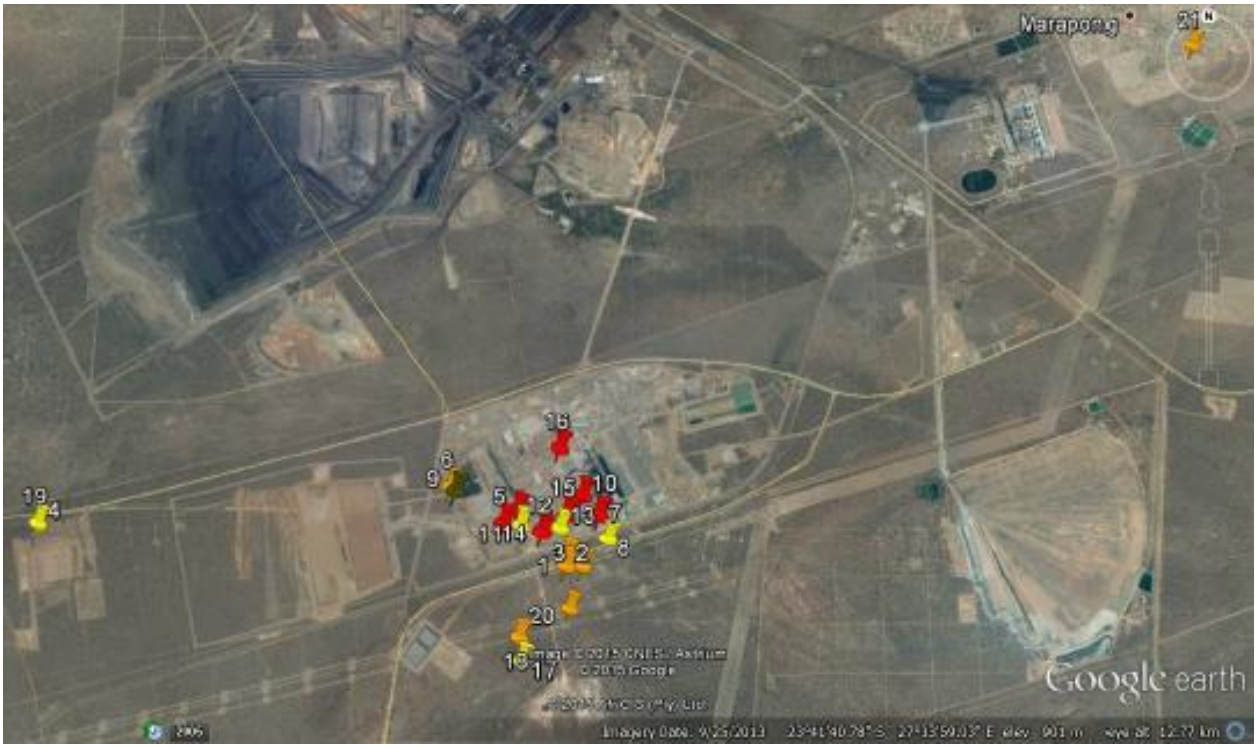

Figure 13- Markers of areas reported to have contained graves within and outside the Medupi footprint (Source: Silidi &. Matenga, 2015).

Figure 14- Markers of areas known to have contained graves before the construction (Source: Silidi &. Matenga, 2015).

Figure 15- Sand heaps where two infants graves are reportedly to have been buried (Source: Silidi &. Matenga, 2015).

In terms of the current study, it has been determined that the proposed scope of works at Medupi PS will not impact on archaeological, heritage and palaeontological resources. The survey of the proposed development footprint did not yield any archaeological or heritage resources (e.g. burial grounds and graves or historic built environment and landscape features such as old farm houses). However, potential graves were identified by Dr Sutton of NGT within a kilometer south of Medupi Power Station but outside the proposed development footprint. Although these potential graves fall outside the proposed development footprint they were assessed and it was found that they may be highly impacted should construction activities move beyond the current Medupi site boundary. Literature review for the current study has resulted to information about graves sites (and a map showing these graves) that were destructed during the construction phase of Medupi PS six units and the associated infrastructure (*Figure 10*). However, no such resources were identified during the field survey of the proposed FGD technology construction sites, the proposed railway yard and the existing and licensed ADF. The area proposed for the construction activities have been transformed during previous construction activities (e.g. *Figures 11 -22*). The ADF is an existing facility and the area around has also been transformed therefore there were no heritage resources identified. Based on these findings, the following conclusions and recommendations are made about the proposed construction of Medupi PS FGD technology, the railway yard and the implementation of the existing and licensed ADF as a multi-waste storage facility for ash and excess gypsum.

Figure 16-Signage to Medupi Ash Disposal facility (entrance point)

Figure 17- Available land that has been cleared for the growth of the Ash Disposal Facility (AFD). Image taken from the west facing east

Figure 18- The width of the facility facing Medupi from the west end of the ADF

Figure 19 – The western end on the AFD

Figure 20- Northern end of the AFD

Figure 21- Northern dam associated with the AFD

Figure 22- Current ash heap at the ADF facility

Figure 23- Conveyor belt system associated with the AFD

Figure 24- Land dedicated to the facility. Taken south of the facility facing north. This is the area where the proposed railway yard will be built

Figure 25- Image of the land dedicated to the facility and ash heap from Medupi power station. Taken from the south facing north-east

Figure 26- Two dams associated with the facility located south-west of the current ash heap

Figure 27- Fence line demarcating the facility with the southern property and the railway line. The area with left of the road is the proposed railway yard area.

6. CONCLUSIONS

- It is concluded that there are no heritage and archaeological resources 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 AFD. The land in which the proposed construction activities have been transformed from previous construction activities at Medupi Power Station.
- There were also no heritage and archaeological resources around the existing and licensed ADF ash disposal facility – during the survey of the ADF the site were already constructed.
- The assessment of historic maps of the area Medupi PS also did not yield any burial grounds or graves as well as stone walls and historic buildings. However, the assessment of a Phase II HIA report by Mbofho Consulting and Project Manager yielded burial grounds and graves as well as areas that are known to have contained graves (e.g. *Figure 13 -15*).
- Based on the findings made by Mbofho Consulting and Project Managers one cannot rule out the subterranean burial grounds and graves since in some areas they identified areas with soil heaps that are reportedly to have been dumped on top of graves. *NGT was not part of this Phase II HIA study conducted on site; it therefore not take full responsibility or liability for any issues that were raised and addressed in this report other than to make reference to it as an important document to consider in dealing with heritage issues at Medupi PS. may be addressed by the current heritage social consultation on site.*
- It is concluded, that based on the exiting engineering drawings of the proposed FGD technology development footprint and its survey thereof that there are no archaeological or heritage resources. Like with the railway yard and the existing and licensed ADF facility the land in which the proposed FGD technology is to be constructed is already transformed through previous construction activities. *Once more NGT was not part of this Phase II HIA study conducted on site; it therefore not take full responsibility or liability for any issues that were raised and addressed in this report other than to make reference to it as an important document to consider in dealing with heritage issues at Medupi PS. may be addressed by the current heritage social consultation on site.*
- The only potential graves were identified south of Medupi within a kilometre zone by Dr Sutton of NGT in 2016 but these are outside the current development footprint and will not be impacted even though an impact assessment measure has been undertaken of them (EMFGD).

7. RECOMMENDATIONS

- It is recommended that Eskom should continue with the implementation of Phase 2 HIA recommendations made by Mbofho Consulting and Project Managers which state that:
    - Eskom should consider constructing a memorial on site to memorialized the names of those whose graves were accidentally disturbed during the construction of Medupi PS six units and the associated infrastructure. All the names and surnames of those who were buried in areas that have been reconstructed as per Figure 13, 14 and 15 should be included in the memorial. This will be in addition to cleansing ceremonies and other cultural practices that have already been undertaken such as repatriation of spirits.
- A general recommendation with transcend heritage issues at Medupi PS is that, project proponents and environmental consultants alike, should always involve heritage consultants in the early stages of environmental management process. For example, from project conceptualization where a heritage screener of the development footprint can be undertaken. To project planning phase whereby archaeologist and heritage consultants form part of the project planning team. Heritage management process should not be taken as a tick box tool that fulfills compliance requirements, rather an important and integral part of the environmental management process.

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ANNEXURE 1: REVISION 01 HERITAGE IMPACT ASSESSMENT STUDY EXECUTIVE SUMMARY WITH STUDY CONCLUSIONS AND RECOMMENDATIONS

Eskom is the utility responsible for the generation, transmission and distribution of electricity to the South African consumer. Established in 1923 by the South African government, today it supplies approximately 95% of the country's electricity. The utility is the largest producer of electricity in Africa and is among the top seven utilities in the world in terms of generation capacity. It plays a major role in accelerating growth in the South African economy by providing reliable, high-quality electricity. Medupi Power Station, currently in the final stages of construction, is an important element of the Eskom "capacity building" initiative and is the largest construction project in the southern hemisphere. In order to reduce the emissions of sulphur dioxide into the environment and meet more stringent minimum Air Quality Emissions Limits for new power plants, Eskom will install wet limestone Flue Gas Desulphurisation technology (sulphur dioxide abatement technology) to the 6 power-generating units at the Medupi Power Station. Flue-Gas desulphurization (FGD) is a set of technologies used to remove sulphur dioxide (SO_2) from the exhaust flue gases of fossil burning power plants.

The FGD project consists of the retrofitting of FGD technology to remove sulphur dioxide from the exhaust flue gases of the Medupi Power Station operations and is expected to remove up to 95% of the SO_2. It is expected that the proposed FGD facility will have an estimated footprint of between 0.5 and 1 hectare, including associated infrastructure which may consist of: storage; handling and disposal of wastes; treatment of waste water within a Zero Liquid Discharge (ZLD) system; a conveyor belt or road route for the transportation of waste to the disposal site; services, including electricity and water supply in the form of power lines, pipelines and associated infrastructure and access and maintenance roads to the ash disposal facility (ADF).

The analysis report of the wastes generated from the FGD process resulted in the need to identify locations for disposal. The waste consists of Gypsum and Ash which are Type 3 wastes and Eskom has proposed disposing of them together in a Class C facility. The other by-products are Sludge and Salts which are Type 1 wastes and will be disposed in separate cells in a single Class A facility. To that end, a site identification process was initiated to locate an appropriate site for the Class A facility. This report forms part of the specialist studies assessing the three remaining identified locations. The three sites are located on farms within a 10km radius from the Medupi Power Station. These are Site 2 (farm

Kromdraai), Site 12 (farms Vergulde Helm and Enkeldraai) and Site 13 (Eenzaamheid). Site 13 has already been assessed and approved for waste disposal, as such it was not surveyed for this report. However, the findings from previous reports will be assessed for impacts on heritage or cultural material for this current project. All three sites are considered as part of the site selection process.

NGT was appointed by Zitholele to conduct the Heritage Impact Assessment (HIA) (inclusive of a Palaeontological Desktop Study). The heritage specialist assessment is in terms of Section 38 (1) of the National Heritage Resources Act, No. 25 of 1999 and the National Environmental Management Act (NEMA), No.107 of 1998 (as amended in 2014 & the applicable 2014 Regulations) as well as other applicable legislations. Morris Sutton, archaeologist and principal heritage consultant from NGT Consulting conducted the study. This study assesses the range of all manmade or human influenced/altered resources within the proposed locations for the selection of a waste disposal area (*Figure 1*).

The standard NGT HIA includes:

- Conducting a detailed background information search of the affected environment;
- Conducting a physical survey of the project foot print to identify, record/document and map out any heritage resources within and immediately around the development footprint;
- Field grading of the identified resources;
- Assessing impacts of the proposed development on the identified resources and making recommendations on how such impacts can be managed or mitigated.

The background information search yielded information about the existence of heritage resources in and around the project footprint, including the nearby town of Lephalale. The identified heritage resources included archaeological, rock art, burial grounds and graves and historic built environment.

The survey, conducted on 31 August – 2 September and 17 and 18 November 2015, revealed no heritage material within the project footprint or areas immediately outside the footprint.

Based on the desktop research, the physical survey and the assessment of the potential impact of the proposed project on farms Kromdraai (Site 12), Vergulde Helm and Enkeldraai (Site 2) the following conclusions and recommendations are made:

Conclusions:

The Palaeontological Desktop Study (Appendix B) determined the geological formations in the area pre-date any large bodied fossil plant or any vertebrate fossils. Micro-organisms such as algae had evolved by this time but they do not preserve in conglomerates. Sandstones are usually too coarse to preserve such small fossils. Therefore, there is an extremely small chance of finding any fossils of any kind in the three proposed areas.

The HIA desktop study identified 3 types of heritage resources that are likely to occur within the Medupi FDG retrofit waste site selection project areas. These resources include: burial grounds and graves, built environment and Iron Age and Stone Age activity/sites. Following a detailed survey of the proposed area, there were no identified resources within the project footprint. It is concluded that, from a cultural resources management point of view, that there are no objections to either of the sites and no negative perceptions regarding the selection of a waste disposal site. Neither of the two sites yielded heritage resources during the physical survey:

- Site 2- No heritage resources were identified
- Site 12- Two built structures were identified. Both are of low heritage significance and require no further mitigation.
- Site 13- One area was identified that may contain two graves. It is highly probable that the first is a grave while the second is only possibly a grave. Both of these need mitigation measures to a) determine confirmation of a grave site and, b) if confirmed, mitigate the impact by exhumation and relocation of the graves. A second area just east of the project footprint was identified as being a possible grave. This area, which is adjacent to the proposed project facility, can be fenced (bordered) with a 5m no-go zone and avoided during the construction, operational and decommissioning phases.

Recommendations:

As far as the palaeontology is concerned the proposed development can go ahead and no further impact assessment is required.

If in the extremely unlikely event that any fossils are discovered during the construction of the waste disposal site, then it is strongly recommended that a palaeontologist be called to assess their importance and rescue them if necessary.

No heritage of significant value was identified on either Site 2 or 12. On Site 13 mitigation will need to take place regarding the possible graves in the northwest corner of the site (EMFGD 02). This includes confirmation of actual graves and if confirmed these must follow the procedures for exhumation and reburial of human remains (see Discussion Chapter for detailed procedures for relocating the graves). If it is determined the site does not contain graves then no additional mitigation is necessary. It is also recommended that confirmation is made regarding the possible grave east, but adjacent, of the project footprint (EMFGD 03). If confirmed as a grave then the grave should be fenced and a 5m buffer be established to ensure the integrity of the grave during construction, operational and decommissioning phases of the project.

Following the mitigation recommendations for the graves, all three sites are viable options for the selection process. If proper mitigation is completed then, in regard to heritage, the three sites can be ranked equally for the site selection process.

It is noted, however that heritage material is, in many cases, found in sub-surface sediments thus if any heritage material is exposed during the construction/maintenance phases of this project then all work must stop and the appropriate agencies (LIHRA and SARHA) be notified. Additionally, should that heritage be in the form of graves then the South Africa Police Service must also be notified.

It is also recommended that a site specific HIA be conducted once the selection process has been completed. The site specific HIA should include a strong focus on the potential for graves. Both the site survey and a comprehensive public participation process should be conducted with an emphasis on identifying graves or burial places.

ANNEXURE 2: GRAVE MANAGEMENT PROCEDURE PROPOSED IN REVISION 01 HERITAGE STUDY

5.1 Burials/Graves

The possibility of graves being uncovered during the construction phase is of critical importance. Previous heritage studies conducted in the surrounding areas have, on occasion, failed to identify graves that were subsequently uncovered during construction. Though, not the fault of the heritage specialists, these situations create delays in the project and stress in the local communities. As often, in most areas, graves were marked by stones and those stones are sometimes moved (through natural fluvial or alluvial actions as well as by people) and thus it is not possible to discern these graves on the landscape. That was the case previously with the construction of the Medupi Power Station. Additionally, it is often not possible to identify a stone lying on the landscape as being a grave marker. That was the case with the current possible grave on Site 13.

As it is essential to anticipate the potential for graves on site, part of the report discussion includes a review of local burial customs. Currently the Lephalale area has a diverse population including many different cultural groups. Much of this diversity is the result of migrants, seeking work, entering the area over the last few decades. Migrant labourers and opportunistic entrepreneurs have both contributed to and benefited from the economic growth of the area. However, prior to a few decades ago the area was somewhat more culturally monogamous. Historically the largest population group in the area has been the Northern Sotho or, more specifically, the BaPedi. From the mid-18th century the group flourished reaching its most powerful point during the reign of Thulare from the late 18th century until 1820. During the mfecane the BaPedi were mostly driven out the area, but returned afterwards in the 1870s and slowly rebuilt. Since that time, in spite of much conflict with Afrikaners and the English, the Northern Sotho have remained in the area. Due to this long occupation, the most likely burials uncovered during the construction phase would be BaPedi or Northern Sotho people. Therefore this discussion will look at some of the customs and rituals associated with the Northern Sotho cultural group.

As with most cultural groups rituals are an important part of BaPedi group identity. Rituals operate beyond mere knowledge and human experience to integrate people. Burial rituals heal grief and enhance group membership ensuring the desired sense of belonging without being subject to scientific

logic (Ktagla, 2012). In the case of death and bereavement, rituals can reinforce and help to explain the persistence of religious practices in the face of the destructive forces of dilution and distortion by external influences (ibid.)

An important understanding in Northern Sotho ritual approaches to death and grieving is that they are greatly influenced by the group's beliefs regarding death and its role in the lifecycle. Rituals surrounding death of a person among the Northern Sotho are a structured activity that involves the collective of close family and extended families (Kgatla, 2012). "Attention is drawn away from an individual activity to a collective conformity. Individualism is annulled, and in its place there is collectivism" (ibid. p.83). Importantly, Northern Sotho people see death not an end to the person's soul, but only a change in the soul's place of abode. This manifests in the relevance or importance placed on ancestors' role in the lives of the living. During a burial, rituals are performed to continue the link. Thus disturbance of a grave is not just a defilement of the decease's body, but an insult to the ancestors. This can bring about punishment to the living. Therefore it is important that the proper rituals are followed when exhuming and re-burying human remains.

The burial ceremony is usually conducted in two parts. The first takes place at the home and the second at the cemetery. A re-burial of an exposed grave on site would preclude the first part.

The cemetery burial process is also very structured. During the Iron Age period, important members of a village were buried within the central kraal. This was done to signify their position or standing within the group. In more modern times, the burial place is often an area of cultural or heritage significance. This made be in the form of landscape features, such as long-standing old trees, rock outcrops or historic structures. The selected burial site is most often an area 30-100m west of the significant feature. Thus these landscape features are often markers for BaPedi burial places.

The actual burial ceremony follows a ritualized process (Mapaya and Mugovhani, 2014):

- Normally during transport from the home to the cemetery the coffin is covered in a blanket. This is a long tradition wherein originally the body or coffin was covered in a cow hide. This should be done once the remains have been interred in a new coffin after exhumation. The praise singing would also occur at this time. Importantly, this role is conducted by the rakgadi or aunt. Traditionally, in Nguni cultures praise singing is carried out by males and in BaPedi groups males do learn praise, but in most cases it is the females who are expected to perform the rite.
- The Diphiri or young men of the village of the deceased carry out the task of digging the new grave. This is often difficult in reburials as it would be expected to be carried out by the employees of the contracted funeral directors. But, when possible, should be followed.

- During reburial the Moruti or pastor begins with a prayer and conducts the interment.
- A representative of the Chief makes comments and gives thanks from the village level.
- The Diphiri give thanks with specific reference to those present. These young men are also responsible for the conduct of those present for the burial. This includes monitoring the group and politely correcting inappropriate behavior.
- Finally, the Balapa or Elders give thanks. At this point the structured rituals are complete and the ceremony is ended. The family may desire to remain longer to reinforce the bond/link with the deceased.

Process to follow in the event of the confirmation or exposure of a grave or burial.

A number of laws come into effect when dealing with human remains. SAHRA includes legislation (NHRA No 25 of 1999) for any heritage related human remains. These include graves or burials greater than 60 years of age or persons who were victims of conflict. Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Laws governing the granting of permission relating to exposure or removal of graves also include a number of government agencies. Guidelines were also established, internationally, regarding the treatment of graves. The World Archaeological Congress (WAC) passed the Vermillion Accord on Human Remains in 1989. Two key points from that accord include:

- Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable and lawful, when they are known or can be reasonably inferred.
- Respect for the wishes of the local community and of relatives or guardians of the dead shall be accorded whenever possible, reasonable and lawful.

A) Legislation pertaining to identification, exhumation and reburial of human remains.

1) South African Heritage Resources Agency (SAHRA)

The National Heritage Resources Act (Act No 25 of 1999) governs graveyards, burial grounds and graves older than 60 years. Graves and burial grounds are divided in six categories:

- ancestral graves;
- royal graves and graves of traditional leaders;
- graves of victims of conflict;

- graves of individuals designated by the Minister by notice in the Gazette;
- historical graves and cemeteries; and
- other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983).

Furthermore, no person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

2) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

- SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority— (a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and (b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

3) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of

the responsible heritage resources authority— (a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and (b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

4) Permission must also be obtained from the:

- Landowner (Eskom)
- Local (Mapela?) traditional council
- Lephalale Municipality
- Waterberg District Municipality
- Limpopo Government (Office of the Premier)
- Limpopo Department of Health
- National Department of Health
- South African Police Service

5) After a permit has been granted then the exhumation and reburial process must conform to the standards set out in the Ordinance on Excavations (Ordinance no. 12 of 1980) - including the Human Tissue Act, 1983 (Act No. 65 of 1983). Human remains can only be handled by a registered undertaker or an institution declared under the Human Tissues Act (Act 65 of 1983 as amended) and must be done in the presence of both a member of SAPS and a qualified Archaeologist.

B) Steps in identification, exhumation and reburial of Human Remains

The first task is to engage local communities with the aim to collect information on graves (or other heritage resources) in the project area. This public outreach should follow the normal Public Participation process, which includes collecting data, engaging members of the community and recording all necessary information.

- If family or descendants can be located/contacted and the grave identified, then a consultation procedure is started wherein the family's consent is necessary to begin a exhumation and reburial process

- If the grave cannot be identified, then it must be treated the same as graves >60 years old and the heritage laws apply.
- Obtain the necessary approvals from various governmental entities (see 3 above).
- Obtain the necessary permit from SAHRA (see 1 above).
- Contract a certified Mortuary Practitioner (i.e. Martins Funeral Services),
- Identification and arrangement of an acceptable cemetery for reburial (i.e. Marapong Cemetery).
- The grave excavation process is conducted by the Mortuary Practitioner. This process is overseen by an Archaeologist in the presence of a member of the SAPS. Also present are any family/affected community members/traditional leaders. This process includes any rituals or rites that had been agreed upon with family/community/traditional leaders.
- Interment in a new grave in a formal cemetery.

The built environment present in the project area is of low heritage significance. Of more concern is the possible grave on site 13 and the potential for the discovery of other graves during the construction phase of the project. The migratory behavior of many laborers, including farm laborers, results in a disconnect with the landscape and can lead to a lack of knowledge of locations of burials. Additionally, the often absence of birth and death certificates within black communities in the past can make it difficult to establish burial/grave connections.

ANNEXURE 3: PROPOSED NEW SCOPE OF WORK AT MEDUPI POWER STATION FOR THE CONSTRUCTION OF THE PROPOSED FGD TECHNOLOGY RETROFIT PROGRAMME, THE PROPOSED RAILWAY YARD AND THE IMPLEMENTATION OF THE EXISTING ADF AS A MULTI-WASTE STORAGE FACILITY

1 INTRODUCTION

This project focuses on the environmental authorization process for the Medupi Power Station Flue Gas Desulphurization (FGD) Retrofit. Medupi Power Station is a coal-fired power station that forms part of the Eskom New Build Programme. Medupi Power Station is located about 15km west of the town of Lephalale in the Limpopo Province.

2 CHANGES TO AUTHORISATION AND LICENCING APPROACH IN 2017

Towards the middle of 2017 changes to the authorization and licensing approach for the Medupi FGD Retrofit Project applications were proposed in order to streamline the application processes to ensure compliance with the NEMAQA compliance requirements by the year 2021. The following changes were subsequently implemented:

- Confirmation that the assessment of an additional multiuse disposal facilities, which would be used for the disposal of ash and gypsum, and salts and sludge have been removed from this current application scope and will be undertaken as a separate authorization process.
- The application for a Waste Management License (WML) for the existing ADF was removed from the integrated Environmental Impact Assessment process hence the EIA application will not be an integrated Environmental Impact Assessment application. The proposed disposal of gypsum together with ash on the existing authorized ADF footprint will be dealt with through a separate amendment process to the existing ADF WML.

- The EIA application in terms of the National Environmental Management Act, 107 of 1998, as amended, will include application for activities associated with the construction and operation of the FGD system within the Medupi PS footprint and the railway yard and siding, including

limestone and gypsum handling facilities, diesel storage facilities new access roads, Waste Water Treatment plant, facilities for temporary storage of salts and sludge.

- A Water Use License Application will focus on water uses triggered by the construction and operation of the FGD system, railway yard and limestone / gypsum handling areas, and within 500m of the approved ADF footprint.

3 DETAILED SCOPE OF WORK

The detailed scope of work for each of these applications is described in terms of the simplified process flow diagram in Figure 1 and listed in the sections below. The overall site layout encompassing the railway yard, limestone and gypsum handling areas and FGD system is provided in Appendix A to this technical memo. General layout of the existing ADF and storm water management philosophy is provided in Appendix B to this technical memo.

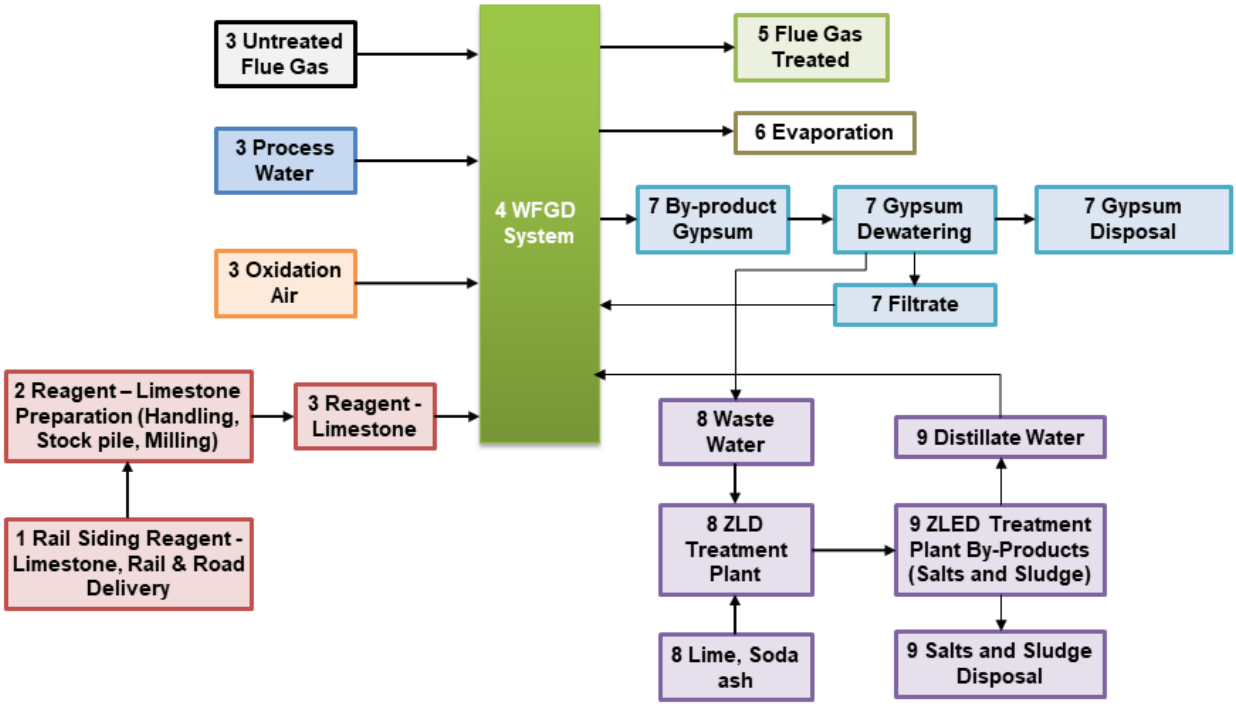

Figure 28-Basic process Flow Diagram for the FGD process at Medupi Power Station

3.1 Railway yard (Block 1 & 2)

Limestone is purchased off-site and is transported to the Medupi Power Station by rail and/or road. The limestone is offloaded at the proposed limestone storage facility, which includes a rail siding and road access, located south-west of the 6 power generation units within the Medupi Power Station footprint. The rail siding and access roads are a component of this environmental authorization (EIA) process.

Infrastructure associated with the railway yard and limestone / gypsum handling area include:

- Limestone will be initially delivered by road and will be delivered to a truck offloading facility in close proximity to the Limestone Stockyard.
- Rail infrastructure proposed parallel to the existing Thabazimbi – Lephalale railway with a proposed siding take-off point situated at kilometer point 107+250m. The general arrangement of the railway yard and take-off point is provided in Appendix C.
- Linear-type yard layout configuration with six lines parallel to each other, and split into two separate yards (limestone offloading and gypsum loading) linked by means of a locomotive run-around line.
- Limestone offloading facility: Tippler Area building will include side dispensing tippler, a limestone rail, truck offloading area and separate receiving area, Tippler for “tipping” limestone onto an underground inclined conveyor, limestone transfer house and emergency limestone offloading area at the stockyard. Excavations up to 15m deep will be undertaken during construction of the Tippler facility.
- Gypsum could be routed to the Gypsum storage facility in close proximity to the railyard. Gypsum storage loading facility will include gypsum reclaim hoppers that receive gypsum from the mobile reclaim equipment and discharge to the gypsum reclaim belt conveyor, which in turn discharges to the inclined gypsum belt conveyor. The inclined gypsum belt conveyor then discharges to the bin at the loading facility that feed the rail wagons with a controlled discharge.
- Administration building and operations tower for Eskom and a Services Provider’s personnel.
- Diesel locomotive workshop, utilities rooms and ablutions. This workshop area will have approximately 600m² service space for the shunting locomotive, various offices and store rooms (180m²) attached to one end of the building.
- Two Diesel Storage Facilities (each can be approximately 3.6m in diameter and 3.0m in height) with a maximum installed storage capacity of 28 000 liters each, in two above-ground horizontal

storage tanks, and will be bunded. One of these tanks will service the shunting locomotives while the other will service the Emergency Generator, and located at the rail siding area and the FGD complex area, respectively. A covered road tanker decanting area will be located alongside the bunded area. There is a third diesel tank in the FGD common pump building, the capacity of which is significantly less than 28 000 liters.

- Security office and infrastructure: A security office will be located adjacent to the fence line at the western extent of the proposed rail yard where the proposed rail infrastructure ties in with the existing rail network. The existing service road fence will be used as the boundary fence to the rail yard.
- Conveyor infrastructure.
- Sewerage and effluent management infrastructure: The security office, locomotive workshop and administration building will be served with ablution facilities with a sewerage conservancy tank system with capacities of 3200ℓ, 8500ℓ and 8500ℓ, respectively.
- Associated infrastructure (water, storm water, and lighting): Storm water channels and structures are designed to provide a division between storm water and the dirty water from the gypsum loading facility. Dirty storm water from the gypsum loading facility will be collected into an independent concrete channel and underground pipe network that will drain to the proposed Pollution Control Dam (PCD) that will form part of the FGD infrastructure. The estimated run off contribution to the PCD is expected to be 0.05m³/s for a 1:20 year return period. Eskom will provide the required power supply, while the rail yard mini substations will be constructed in accordance with Eskom's specification. PCDs will also be provided for the salts and sludge storage facility. The Medupi plant operates with two separate water networks supplying fire water and potable water. The water network required for the rail yard was designed to tie into connection points within the existing water network of the MPS.

3.2 Limestone preparation (Block 2)

An overview of the limestone handling and preparation infrastructure is presented below. The proposed limestone handling and conveyance infrastructure is shown in Appendix C. The limestone handling and conveyance will include the following infrastructure:

- Limestone stacking conveyor;
- Limestone storage area;
- Emergency limestone offloading area;
- Limestone reclaim conveyor;
- Limestone and gypsum handling substation;
- Storm Water Pollution Control Dams. The conceptual storm water management design has resulted in two separate PCDs being proposed in this area. It is also proposed that each of these PCDs is portioned to cater to maintenance activities in the future. A layout of proposed PCDs are presented in Appendix E;
- Lined channels for diversion of dirty water to Pollution Control Dams.

- Limestone is conveyed to the limestone preparation building where it is milled and combined with water to form limestone slurry for input into the FGD system. Limestone slurry is pumped to a limestone slurry feed tank from where it is pumped, via piping, on the elevated FGD utility rack to each absorber for utilization in the FGD system. Infrastructure thus includes:
- Limestone preparation building;
- Limestone slurry feed tank; and
- Piping and elevated FGD utility rack.
-

3.3 Input materials and processes (Block 3)

Input materials to the FGD process will include:

- SO2 laden flue gas received from the each generation unit. Untreated flue gas leaving the existing ID fans will be diverted to the absorber inlet, via additional ducting system;
- Process water received from process water tanks (two operational and one backup for redundancy);
- Oxidisation air; and
- Limestone slurry received from the limestone milling and preparation plant.

3.4 WFGD system (Block 4)

The site arrangement of the FGD system for the Medupi Power Station is provided in Appendix D. The FGD system includes infrastructure that is located within the previously cleared and transformed footprint of the power station. Infrastructure includes:

- An absorber unit associated with each of the 6 x generation units;

- Each absorber unit will include a flue gas duct, absorber tower, absorber pump building and absorber substation;
- Absorber drain and gypsum bleed tanks associated with each cluster of 3 absorber units, i.e. absorber units 1 – 3 and absorber units 4 – 6;
- FGD above-ground elevated utility racks containing piping to direct fluid from and to relevant systems within the absorber area.

3.5 Treated Flue Gas (Block 5) and evaporation (Block 6)

Treated flue gas is redirected from the absorbers via the flue gas ducts back to the chimneys for release with much reduced SO2 content. During the process evaporation losses are incurred.

3.6 Gypsum dewatering, re-use or disposal (Block 7)

3.6.1 Gypsum dewatering and conveyance

Gypsum will be produced from the FGD process as a by-product of the wet scrubbing process. Slurry will comprise gypsum, a mixture of salts (Magnesium Sulphate (MgSO4) and Calcium Chloride (CaCl2)), limestone, Calcium Fluoride (CaF2), and dust particles. A refinement process is carried out to separate and dewater the gypsum. Effluent is directed to the Waste Water Treatment Plant (WWTP), the overflow of the gypsum dewatering hydro cyclones goes to the waste water hydrocyclone (WWHC) feed tanks. The tanks are located in the gypsum dewatering building. From the WWHC feed tanks, the water goes through the WWHC where the underflow is directed to the reclaim tanks and the overflow to the Zero Liquid Discharge (ZLD) holding tanks. The ZLD holding tanks feed the WWTP.

Dewatered gypsum is transported via conveyor either to the existing ADF or to an offtake point where it is diverted to a storage facility from which it may be transported by rail or road to users. 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. There will be no facilities for gypsum recovery from the storage building to be loaded onto trucks. Road transport is used for immediate offtake for gypsum exploitation.

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.

The site arrangement of the FGD system for the Medupi Power Station is provided in Appendix D 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;
- Gypsum storage building and offtake via rail

3.6.2 Gypsum re-use or disposal

Initially, gypsum will be conveyed from the gypsum dewatering building via a gypsum link conveyor to a gypsum transfer house where it will be loaded onto the existing overland ash conveyor. In this conveyor system, the gypsum will be mixed with ash and will subsequently disposed together on the footprint of the existing authorized ADF. The conveyor route and transfer houses for gypsum onto the overland ash conveyor are shown in Appendix A. If there is a market for gypsum, the project has catered for an offtake point, wherein, the gypsum will be collected by trucks from overhead conveyor system. At this point, the ground will be prepared for management of any gypsum that is not contained and the trucks will be washed before leaving this area. The washing is a means to minimize the spreading of the gypsum.

In terms of the previous ash classification processes, i.e. the Minimum Requirements Documents Series, ash was considered to be hazardous and thus the 0 to 2 year area was designed and authorized according to the Department of Water and Sanitation (DWS) Minimum Requirements, resulting in a H:h liner system being installed, at the ADF. However, regulations were promulgated by the DEA in terms of NEM:WA on the 23 August 2013. In terms of the NEMWA regulations, ash and gypsum now classify as Type 3 wastes, and require to be disposed of on a Class C barrier system. This barrier will be implemented at the facility from the 4 to 19.2 year area.

An application to amend the existing ADF Waste Management License is being undertaken for disposal of gypsum and ash together on the existing footprint of the authorized ADF. Requirements to reduce impact on the wetlands in the southwest corner of the authorized ADF footprint have, furthermore, resulted in the re-design of the ADF. The proposed ADF amended design has the following attributes:

- The final layout of the ash and gypsum facility has side slopes at 1:5.
- The final layout of the ash and gypsum facility has a long fall of 1:300.
- The final height of the facility will be increased by 12 m from an original design height of 60 m, to 72 m above ground.
- The revised ADF design caters for the storage of a volume of 193 315 105 m3 which converts to a total life of 19.2 years.
- Storm water management caters for clean and contaminated storm water infrastructure, and includes berms, geocell lined trenches and pollution control dams.
- On-going rehabilitation will occur behind the advancing face as the facility develops to ensure a relatively small window of ash and gypsum being exposed to the environment.
- The proposed revised ADF design overlaid over the authorized ADF footprint is provided in Figure 2 below. Proposed PCDs are indicated in the bottom aerial image in Figure 2.

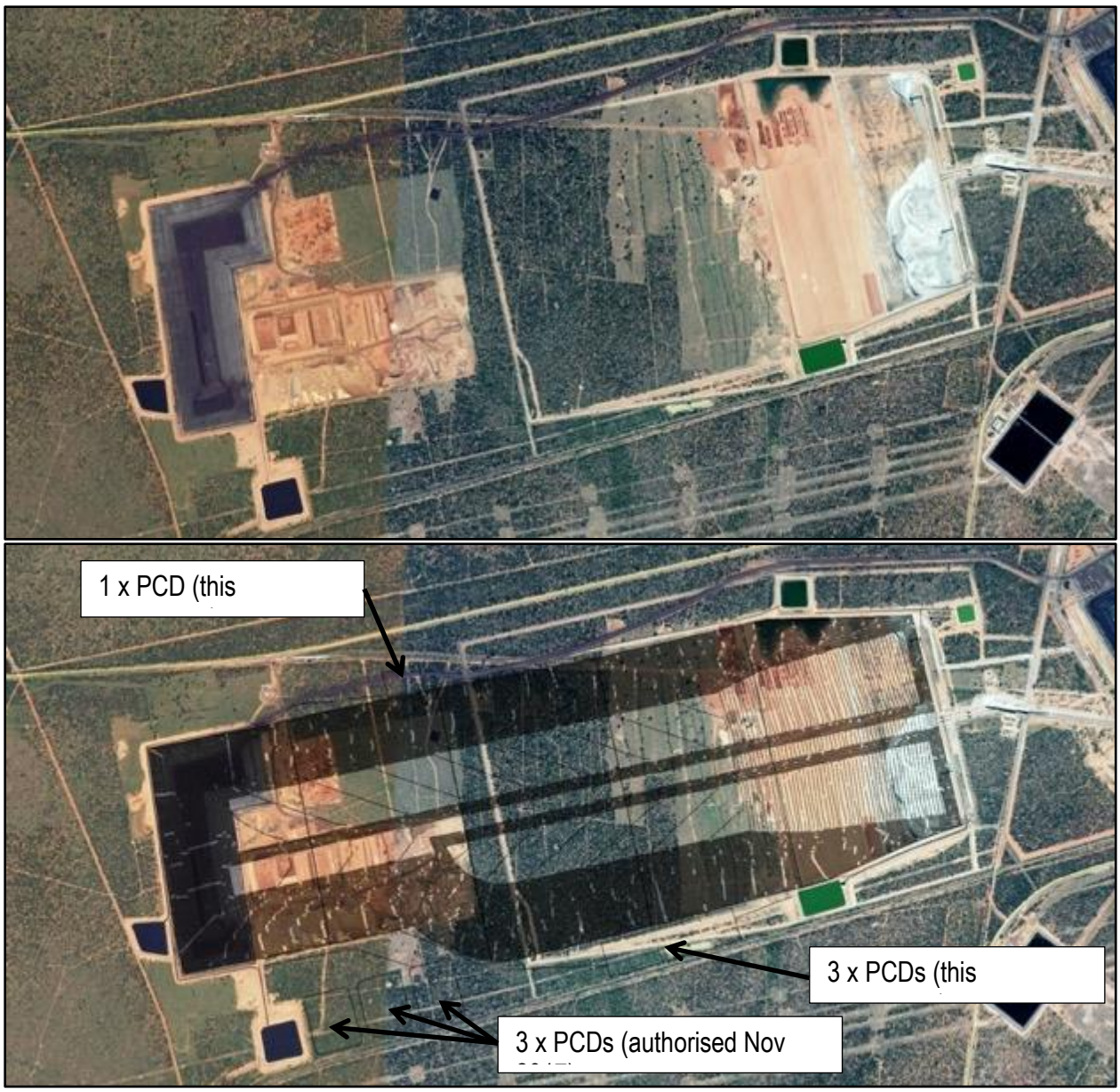

Figure 29-Authorised ADF area (top) with updated ADF design overlay (bottom) indicating layout of amended ADF design

3.7 Waste Water Treatment (Block 8)

The Medupi FGD Waste Water Treatment Plant is located directly west opposite generation units 1 to 3 at the Medupi Power Station. FGD chloride bleed stream and FGD auxiliary cooling tower blowdown stream are diverted to the ZLD holding tanks. The total organic carbon (TOC) scavenger regeneration

wastewater from the filter press system / existing water treatment plant (WTP) will be directed to FGD WWTP located next to the gypsum dewatering plant.

From the ZLD holding tank the wastewater is transported via pipes on the elevated FGD utility rack to the WWTP. The pre-treatment process will include physical/chemical treatment to precipitate solids and heavy metals from the water by making use of lime and soda ash in a softening clarification process. At the WWTP lime and soda ash are added to the wastewater to convert the dissolved calcium and magnesium into salts so that the clarified water can be effectively treated in the brine concentrators and crystallizers. Due to the large amounts of lime and soda ash required it is estimated that one 18 000kg capacity truck of lime will be required every 8 hours and one 18 000kg capacity truck of soda ash will be required every 5 hours. Lime and soda ash will be stored in lime silos and soda ash silos, respectively, at the chemical storage area.

The precipitates from this pre-treatment process are settled out in clarifiers as sludge, 50% of which is sent to a filter press dewatering system. The other 50% of the sludge is returned to the clarifier. The filter press filtrate will be returned to the pre-treatment holding tank. This pre-treatment process produces approximately 488t of sludge from 85% limestone, or approximately 243t of sludge from 96% limestone, which is expected to be generated during the pre-treatment process. After chemical treatment, the precipitates are settled out in clarifiers as slurry, 50% of which is sent to a filter press dewatering system. The other 50% of the slurry is returned to the clarifier. The filter press filtrate will be returned to the pre-treatment holding tank. The overflow from the softening clarifier is sent to the brine concentrator and crystallizer processes for further salt removal. Salts are settled out and crystallized during this process. Approximately 127t of salts are expected to be generated from 85% or 96% limestone, and will require environmentally responsible management. The distillate water produced from the brine concentrator and crystallization process is returned to reclaim tanks for reuse in the process. Chemical storage is likely to exceed 955m3 to provide sufficient capacity for storage of chemicals in the FGD process.

The distillate emanating from the process will be diverted back to the FGD system for re-use in the FGD process, while dirty water run-off will be utilised in the FGD process to improve water usage.

3.8 Storage and disposal of salts and sludge (Block 9)

Sludge and salts will be temporarily stored in appropriately designed storage facilities next to the WWTP. The storage facilities will have a 7-day storage capacity. Two storage areas will be provided for, with Salts and Sludge Storage Area 1 and 2 sized to approximately 4800m2 and 16000m2 in size, respectively. The storage areas will conform to the Norms and Standards for the Storage of Waste (GN926 of 29 November 2013) and will be registered as a waste storage facility in terms of these Norms and Standards.

Salts and Sludge will, subsequent to storage, be transported (trucked) and disposed of at a registered waste disposal facility for the first 5 years of operation. The waste disposal service provider has not been confirmed yet, although disposal at Holfontein has been considered as a suitable waste disposal service provider, among others. For transportation of this waste to a disposal site, Eskom will utilize the services of a service provider who has all required authorizations and systems to manage from the temporary storage to disposal facility.

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