Scoping and Environmental Impact Report (S&EIR) for the Construction and Operation of Attenuation Dams and Pollution Control Dams as associated infrastructure for the approved 60-year Ash Disposal Facility and Associated Infrastructure for the Kusile Power Station near Emalahleni in the Victor Khanye Local Municipality, Mpumalanga Province

DRAFT SCOPING REPORT

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Applicant:

Eskom Holdings SOC Limited

Competent Authority:

Department of Environment, Forestry & Fisheries (DFFE)

DFFE Ref No: ***To be issued.***

DATE: October 2024

Project Ref: Eskom Kusile ADF Dams S&EIR
Report Rev No: 03

PURPOSE OF THE DOCUMENT

The main aim of the **Scoping Process** of a Scoping and Environmental Impact Reporting (S&EIR) application process for Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and associated 2014 Environmental Impact Assessment (EIA) Regulations, as amended, is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and,
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

The purpose of this **Draft Scoping Report** is to give all Interested and Affected Parties (I&APs) and relevant State Departments the opportunity to review the report and comment on the proposed activity and level of assessment to be undertaken during the Environmental Impact Assessment (EIA) phase. All I&APs and State Departments have received notification of the availability of this report for review and comment. The **30 calendar day commenting period commences on 18 October – 18 November 2024**. The report is available for review on the Eskom (www.eskom.co.za) and EPCM (www.epcmholdings.com) websites. The Report can be accessed via the 'Reports' tab and is entitled '*Eskom Kusile ADF Dams S&EIR*'. All comments on this Draft Scoping Report are to be submitted to the following person on or before **18 November 2024.**

EAP: Vici Napier
Tel No: 078 278 2898; Email: vici.napier@outlook.com

Should you have any difficulty accessing the Report and/or have any questions please do not hesitate to contact the above-mentioned SE Solutions team member. All comments received on the Draft Scoping Report will be addressed within a **Comment and Response Report (CRR)** and included with the Final Scoping Report to be submitted to the Competent Authority, in this case, the Department of Forestry, Fisheries and the Environment (DFFE) for consideration and acceptance. Once DFFE accepts the Scoping Report, the S&EIR application process will proceed to the EIA Phase.

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	
EAP RESPONSIBLE FOR THIS REPORT & THEIR EXPERTISE	**Vici Napier:** Highest Qualification: Masters in Conservation Biology - University of Cape Town, South Africa. Years' Experience as an EAP: 18 years Summary of expertise (refer to detailed Curriculum Vitae in Appendix 1): • Registered Environmental Assessment Practitioner with EAPASA (Reg No. 2022/4749). • Registered Professional Natural Scientist with SACNASP (Reg No. 400215/09). • Experienced in managing large multi-disciplinary project teams for various types of environmental assessments • Undertaken numerous EIAs and Strategic Environmental Assessments (SEAs) • Undertaken numerous Water Use License Applications (WULAs) and other environmental authorisation application processes • Experienced in training and skills transfer within the Environmental Management field

EXECUTIVE SUMMARY

Eskom Holdings SOC Limited is proposing to develop larger attenuation dams and Pollution Control Dams (PCDs) with dam wall heights of more than 5m as supporting infrastructure to the already authorised Kusile Power Station's 60-year Ash Disposal Facility (ADF) and associated infrastructure project. Due to the reassessment of the original modelling assumptions and input values, the ADF footprint was reduced which allowed for the entire ADF footprint to be shifted approximately 500m southwards, thus avoiding the diversion of the Klipfonteinspruit (approved within the current IEA and WUL). Further design optimisation to improve temporary diversion of upslope runoff of the Holfonteinspruit and its associated tributary as well as improve safety and decrease risk of failure of the ADF pipeline, necessitated the reduction in the number of attenuation dams from fifteen (15) smaller dams (in the approved 2018 design) to only five (5) larger attenuation dams (updated 2024 design). A few of the PCDs (as originally designed), even with improvements based on the 2024 updated layout and design, also have dam wall heights greater than 5m. Thus, the larger attenuation dams and most of the PCDs trigger an ***additional listed activity*** from Listing Notice 2 of the Environmental Impact Assessment (EIA) Regulations requiring a Scoping and Environmental Impact Reporting (S&EIR) application process for Environmental Authorization (EA). ***The focus of this EA application is limited to the dams only and not the greater ADF and its associated infrastructure, which is already authorised.***

Key (applicable to this application) elements of the receiving environment include the Channel Valley Bottom (CVB) and Hillslope Seep wetlands associated with the Holfonteinspruit and its tributary as well as those of the Klipfonteinspruit. The stormwater and water management philosophy of the ADF and associated infrastructure project has already been approved by the Competent Authorities; the design change to improve water management on-site is viewed as an improvement to the 2018 design and will be assessed and articulated as the preferred alternative within this EIA. Potential environmental impacts have been identified using the nomenclature of activities and aspects and how these will potentially change the receiving environment.

As required by the EIA Regulations and good practice requirements, public participation will be a key component of the S&EIR process. The PP process will include identification of interested and affected parties (with Kusile Power Station's existing database forming the foundation), advertising the process and an invitation to participate, disclosure of important project information and opportunity to comment on the application documentation.

The Final Scoping Report will be an updated version of this Draft Report and address all comments received during the review period. The Final Report will be submitted to the authorities (in this case the National DFFE) for a decision.

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ABBREVIATIONS AND SYMBOLS

ADF	Ash Disposal Facility
AEL	Atmospheric Emissions License
APP	Approved Professional Person
AQMP	Air Quality Management Plan
bgl	below ground level
CBA	Critical Biodiversity Area
CRR	Comment and Response Report
CVB	Channel Valley Bottom
CWD	Clean Water Dam
DEA	Department of Environmental Affairs (now DFFE)
DEAT	Department of Environmental Affairs and Tourism (Now DFFE)
DFFE	Department of Forestry, Fisheries and the Environment (previously DEA and DEAT)
DWA	Department of Water Affairs (now DWS)
DWS	Department of Water & Sanitation (previously DWA and DWAF)
DWAF	Department of Water Affairs and Forestry (now, DWS)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act, 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIS	Environmental Importance Sensitivity
EMF	Environmental Management Framework
EMS	Environmental Management System
FoS	Factor of Safety
HGM	Hydrogeomorphic
HPA	Highveld Priority Area
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
MNCA	Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998)
MSDF	Mpumalanga Spatial Development Framework
NDCR	National Dust Control Regulations
NDM	Nkangala District Municipality

NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NGO	Non-Governmental Association
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NFEPA	National Freshwater Ecosystem Priority Area
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PCD	Pollution Control Dam
PES	Present Ecological State
PICC	Presidential Infrastructure Coordinating Commission
PM	Particulate Matter
PPP	Public Participation Process
REC	Recommended Ecological Class
RSA	Republic of South Africa
SANS	South African National Standard
SDF	Spatial Development Framework
S&EIR	Scoping and Environmental Impact Reporting
SEMA	Specific Environmental Management Act
SERO	Socio-Economic Review and Outlook
SIPs	Strategic Integrated Projects
TOPS	Threatened or Protected Species
VKLM	Victor Khanye Local Municipality
WESSA	Wildlife and Environmental Society of South Africa
WIS	Waste Information System
WMA	Water Management Area
WML	Waste Management License
WUL	Water Use License
WULA	Water Use License Application

1 INTRODUCTION & BACKGROUND

The Kusile Power Station (hereinafter referred to as "Kusile"), situated approximately 34km west of eMalahleni in South Africa's Mpumalanga Province, is one of the largest coal-fired power stations operated by Eskom Holdings SOC Limited (hereinafter referred to as "Eskom"). As a coal-fired power station, Kusile generates substantial volumes of ash as a byproduct of burning coal. The existing ash/gypsum co-disposal facility was designed to handle this waste; however, studies have shown that it will not suffice for the full operational lifespan of the power station. Thus, in 2014 Eskom initiated various authorisation applications for a new 60-year Ash Disposal Facility (ADF) to manage the expected volume of ash over the design life of the power station. The following environmental authorisations are applicable to the approved 60-year ADF and associated infrastructure project at Kusile:

- Integrated Environmental Authorisation (IEA) issued on 17 July 2015 by the (then) Department of Environmental Affairs (DEA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended [NEMA] and the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended [NEMWA].
- Water Use License (WUL) issued on 23 September 2021 by the Department of Water and Sanitation (DWS) in terms of the National Water Act, 1998 (Act No. 36 of 1998) [NWA].
- Detailed designs for Phase 1 of the ADF compiled by the Zitholele Joint Venture (JV) project team were submitted in 2018, and subsequently approved by the Department of Forestry, Fisheries and the Environment (DFFE) on 09 June 2021 as an approved concept. This approval included comments from National DWS dated 20 April 2021.

In February 2022, EPCM Bonisana (hereinafter referred to as "EPCM") was appointed by Eskom to undertake a review of the 2018 basic and detailed engineering design of the ADF compiled by the Zitholele Joint Venture (JV) project team. Due to the reassessment of the original modelling assumptions and input values, the ADF footprint was significantly reduced which allowed for the entire ADF footprint to be shifted approximately 500m southwards, thus avoiding the diversion of the Klipfonteinspruit (approved within the current IEA and WUL). Further design optimisation to improve temporary diversion of upslope runoff of the Holfonteinspruit and its associated tributary during the construction of the ADF allowed for the reduction in the number of attenuation dams from fifteen (15) to only five (5) larger attenuation dams.

*It is important to note that the ADF and associated infrastructure project has **already been authorised** in terms of NEMA, NEMWA and the NWA*; however, the larger attenuation dams, as well as five (5) of the Pollution Control Dams (PCDs), require EA by way of a Scoping and Environmental Impact Reporting (S&EIR) application as they trigger an ***additional*** Listed Activity in terms of Listing Notice 2 of the 2014 Environmental Impact Assessment (EIA) Regulations (amended in 2017). Thus, the focus of this EA application is limited to the dams only and not the greater ADF and its associated infrastructure, which is already authorised.

Ms Victoria Napier, was appointed by EPCM as the independent Environmental Assessment Practitioner (EAP), to undertake the required application for EA for the construction and operation of Attenuation Dams and Pollution Control Dams as associated infrastructure for the approved 60-year Ash Disposal Facility and Associated Infrastructure for the Kusile Power Station near Emalahleni in the Victor Khanye Local Municipality, Mpumalanga Province; and, to conduct the requisite Environmental Impact Assessment (EIA) required for that decision-making.

2 DETAILED PROJECT OVERVIEW

2.1.1 LOCALITY

The study area within which the ADF and its associated infrastructure are to be located is depicted in Figure 1 (refer also to Appendix 2). Kusile is located within the Victor Khanye Local Municipality (VKLM) and Nkangala District Municipality (NDM) on Farm Klipfontein 566 JR Portions 3, 7, 9, 10, 11, 19, 21, 25, 26, 30, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53 and 54. The ADF site is south of the Kusile Power station on open land that was under crop farming and animal grazing until relatively recently. The location co-ordinates of the centre of the ADF are 25° 57' 37.65"S and 28° 54' 32.46"E. The ADF covers approximately 740 hectares.

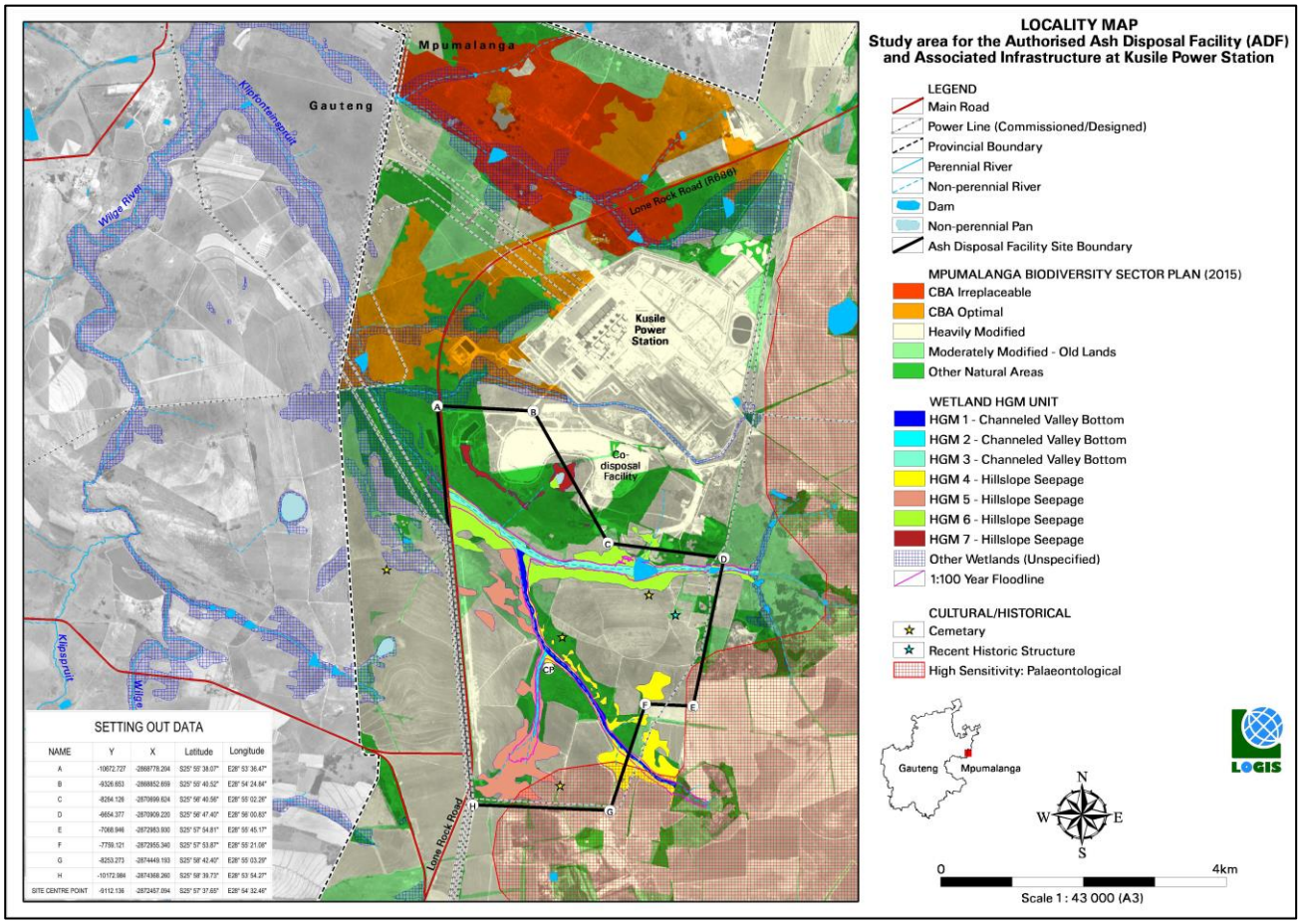

Figure 1: Locality Map for the study area within which the ADF and associated infrastructure will be located.

2.1.2 SURROUNDING LAND USE

Kusile Power Station is located ≈34km to the west of the town of eMalahleni. The surrounding land use is predominantly that of mining and agriculture. Iyanga Mining – Klipfontein coal mine is located to the south and Malachite Mine adjacent to the northern portion of the eastern boundary, of the ADF study area. The relatively large residential area of Phola is located ≈15km to the southeast.

2.1.3 PROJECT DETAILS

The authorised ADF and associated infrastructure project at Kusile is to provide a dedicated and long-term solution for ash disposal. The construction of the ADF is planned in multiple phases. Phase 1 focuses on constructing the foundational

infrastructure required for initial ash deposition. This includes activities such as topsoil stripping, base preparation, liner installation, and the construction of stormwater management systems. The ADF's design incorporates a comprehensive stormwater management system designed to control water flow across the site, prevent flooding, and manage runoff in a way that protects local water resources. This system includes the construction of attenuation dams, designed to capture and store stormwater during heavy rainfall, preventing uncontrolled discharge into the environment. Additionally, a network of diversion pipelines is planned to reroute natural watercourses around or under the facility, minimizing the risk of contamination and ensuring that clean water remains separate from potentially polluted runoff. The water management strategy also includes erosion control measures and the installation of stilling basins to reduce the velocity of stormwater flow, thereby minimizing the risk of erosion and sediment transport. This integrated approach is designed to ensure that all water management activities are compliant with regulatory requirements and contribute to the long-term sustainability of the facility.

2.1.4 UNCONTAMINATED UPSLOPE RUN-OFF

Unique to this site are two central valleys of the Holfonteinspruit and its western tributary that flow generally northwards, join together and then confluence with the Klipfonteinspruit, a tributary of the Wilger River (Figure 1). All upslope run-off water must be diverted away from the ADF and associated infrastructure footprint during the construction phase and either away from or under the ADF during the operational phase. The approved clean water cut-off drain along the southern and western boundaries of the ADF footprint diverts upslope run-off water around the ADF and drains into the Klipfonteinspruit north-west of the facility. Thus, the remaining upslope run-off would be the on-site catchment (i.e. within the ADF and associated infrastructure footprint) predominantly associated with the western tributary of the Holfonteinspruit; and the catchment to the east associated with the Holfonteinspruit. The streams, themselves, will be diverted through a large diameter reinforced concrete pipe underneath the ADF, roughly within the current drainage channel of the natural streams, and drain into the Klipfonteinspruit to the north, as is currently the case. The catchments reporting to each pipeline were delineated, and the runoff volumes were calculated based on a design storm of 1:200-year recurrence interval. In addition to runoff volumes through each leg of the pipelines, peak flows were calculated.

2.1.5 STORMWATER AND WATER MANAGEMENT SYSTEMS

A system of three open drains is proposed for the ADF surface water drainage:

1. The uncontaminated upslope runoff will be prevented from entering the ADF facility by means of temporary trapezoidal diversion clean *outer* drains along the higher southern, western and the eastern sides of the ADF (to be demolished and duplicated further upslope, south of the next ADF Phase being developed. With each phase the permanent clean drains to the east and west of the ash dump will be extended and joined to the current temporary southern drain). In other words, as each Phase of the ADF is constructed, these drains will “hug” the ash disposal footprint for that phase to prevent upslope runoff from entering the ash (Figure 2).
2. A *middle* dirty drain for polluted water.
3. An *inner* “dirty-to-clean” drain. Clean and dirty ash areas’ runoff is directed via the channels to a complex of PCDs and CWDs. With each phase the perimeter drains to the east and west of the ash dump will be extended.

Dirty channels from the ADF drain to PCDs, as well as the contaminated runoff from the conveyor corridors into the Road PCD. Clean runoff from clean/ rehabilitated areas drains via channels to the Clean Water Dams (CWDs). As areas of the ADF are rehabilitated, toe drains become “clean” drains, hence the term “dirty-to-clean” channel. Similarly, PCD-1B in time will become a CWD that receives clean runoff water.

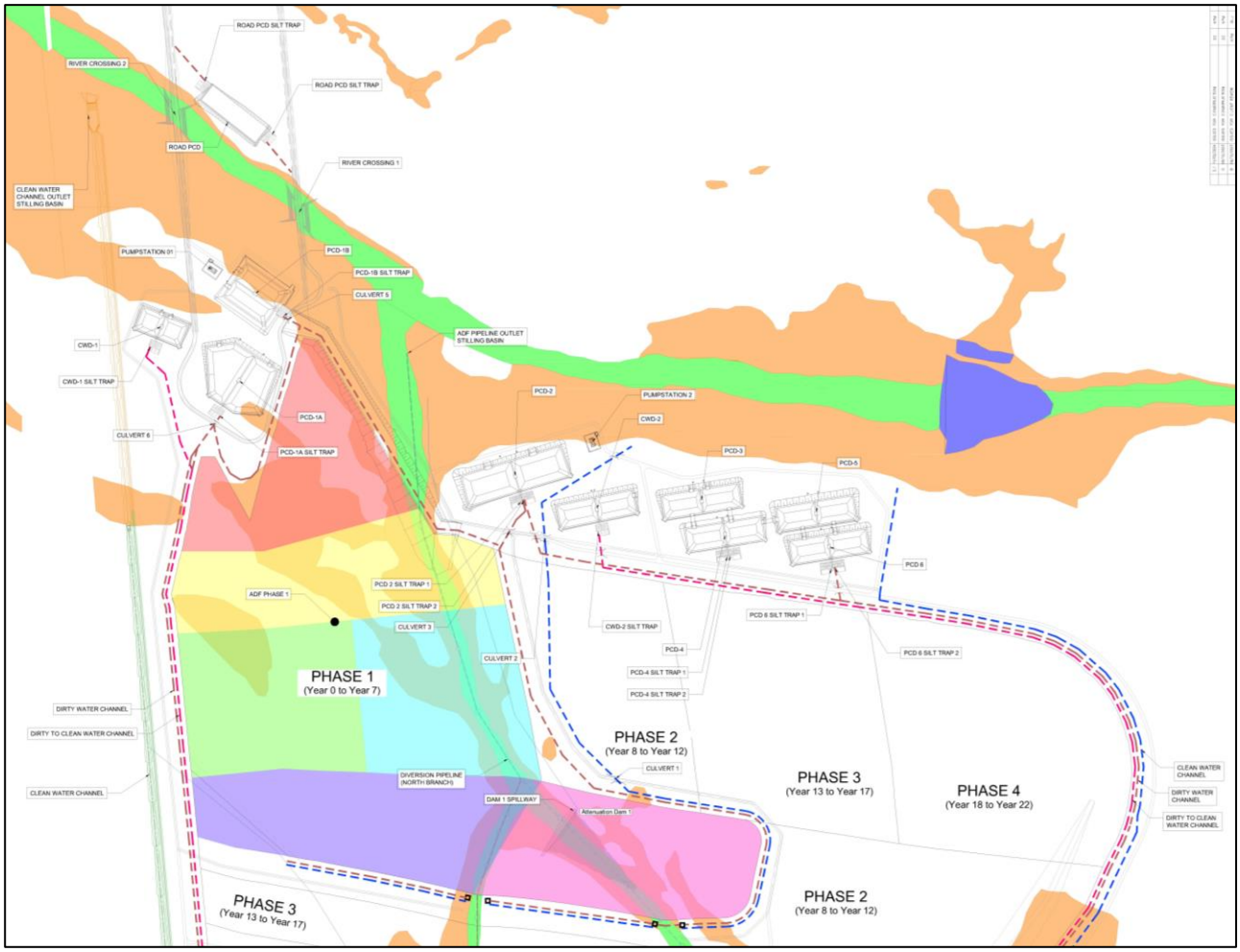

Figure 2: Extract of the ADF Phase 1 block plan highlighting the stormwater and water management system for Phase 1 of the ADF (refer to Appendix 2 for the full Block Plan)

2.1.6 ATTENUATION DAMS

2.1.6.1 Rationale and Construction Sequencing

A total of five (5) temporary attenuation dams will need to be constructed during Phase 1 of the 60yr ADF project in order to attenuate (i.e. contain) and divert upslope run-off to facilitate construction activities downstream (Figure 3). Short-term (i.e. less than 15 years) temporary attenuation dams will only serve to contain and allow for the diversion of runoff into temporary diversion channels (blue dashed lines in Figure 3) during the downstream construction of Phase 1 of the ADF and associated infrastructure and will not require a controlled underdrain outlet. The long-term (15-35 years) attenuation dams will have inlet/outlet systems which include spillways and controlled-outlet underdrains which will feed into the stream diversion pipelines. All of the attenuation dams will be constructed, with the following sequencing, within Phase 1 of the ADF construction phase.

1. Construct temporary diversion channel No. 1 (earth lined) to daylight to the Klipfonteinspruit; and,
2. Construct temporary attenuation dam No. 1 (earth embankment) to feed channel No. 1.

   The northern branch of the ADF pipeline has now been de-watered of any upslope inflow from the eastern branch tributary (i.e. the Holfonteinspruit).
3. Construct temporary diversion channel No. 2 (earth lined) to tie into existing clean water cut-off drain; and,
4. Construct permanent inlet for attenuation dam No. 2 (clay core dam) to feed channel No. 2.

   The northern branch of the ADF pipeline has now been de-watered of any inflow from the western branch tributary (i.e. the western tributary of the Holfonteinspruit).

5. Construct stilling basin for the northern branch ADF pipeline, junction box (confluence of the western branch pipeline with the northern branch pipeline) and western branch ADF pipeline;
6. Construct permanent inlet attenuation dam No. 3 (clay core dam) and connect western branch ADF pipeline to dam's outlet chamber;
7. Construct temporary diversion channel No. 4 (earth lined channel) to daylight to attenuation dam No. 3; and,
8. Construct temporary attenuation dam No. 4 (earth embankment) to feed channel No. 4.

   The upper eastern pipeline branch has now been de-watered of any upslope inflow from the upstream eastern branch tributary (i.e. the upstream Holfonteinspruit).
9. Demolish temporary attenuation dam 1 and construct eastern branch ADF pipeline tying into main junction box of northern and western branches of the ADF pipeline.
10. Construct permanent inlet for attenuation dam No. 5 (clay core dam) and connect eastern branch ADF pipeline to dam's outlet chamber.

    Attenuation dam No. 4 can now be demolished.

    Temporary diversion channel No. 2 can be re-routed to feed to Permanent Inlet Attenuation Dam No. 3, as the channel will be filled in when that area of the Phase 1 of the ADF is developed.
11. During the construction of Phase 4 of the ADF:
    - 11A: Demolish permanent inlet for attenuation dam No. 5 and construct pipeline to permanent inlet headwall structure south-east of ADF footprint; and,
    - 11B: Demolish attenuation dam No. 3 and construct ADF pipeline to tie into outlet structure of attenuation dam No. 2.
12. During the construction of Phase 8 of the ADF: Demolish attenuation dam No. 2 and construct pipeline and permanent inlet headwall structure at the south of the ADF footprint.

Table 1: Attenuation Dam Information

Dam No.	Composition	Crest Lvl	Spillway Lvl	Dam Wall Height (m)	Crest Width (m)	Length (m)	Storage Volume (m3)	DWS Dam Safety Classification	Planned Construction Date	Estimated Service Lifespan (years)
1	Homogenous Earthfill	1465.3	N/A	4.3	5.0	167.7	23401	N/A	March 2025	2-3
2	Zoned Earthfill Clay Core	1489.3	1488.5	5.5	5.0	400.3	81778	Class II	April 2025	35
3	Zoned Earthfill Clay Core	1478.8	1478.0	7.8	5.0	270.0	100788	Class II	May 2025	15
4	Homogenous Earthfill	1480.0	N/A	6.4	5.0	179.3	75694	Class I	April 2027	2-3
5	Zoned Earthfill Clay Core	1476.8	1476.0	5.8	5.0	163.8	44098	N/A	May 2027	15

Figure 3: Layout and construction sequencing of the temporary attenuation dams and channels to be constructed for the ADF and associated infrastructure project (refer to design drawing 366-511846 in Appendix 3).

2.1.6.2 Attenuation Dam Composition and Construction

Earthfill Embankment Dams

Dams No. 1 and No. 4 consist of a homogenous earthfill body of clayey silty sand obtained from local excavations and compacted to 95% Mod AASHTO in layers of 150mm (Figure 4).

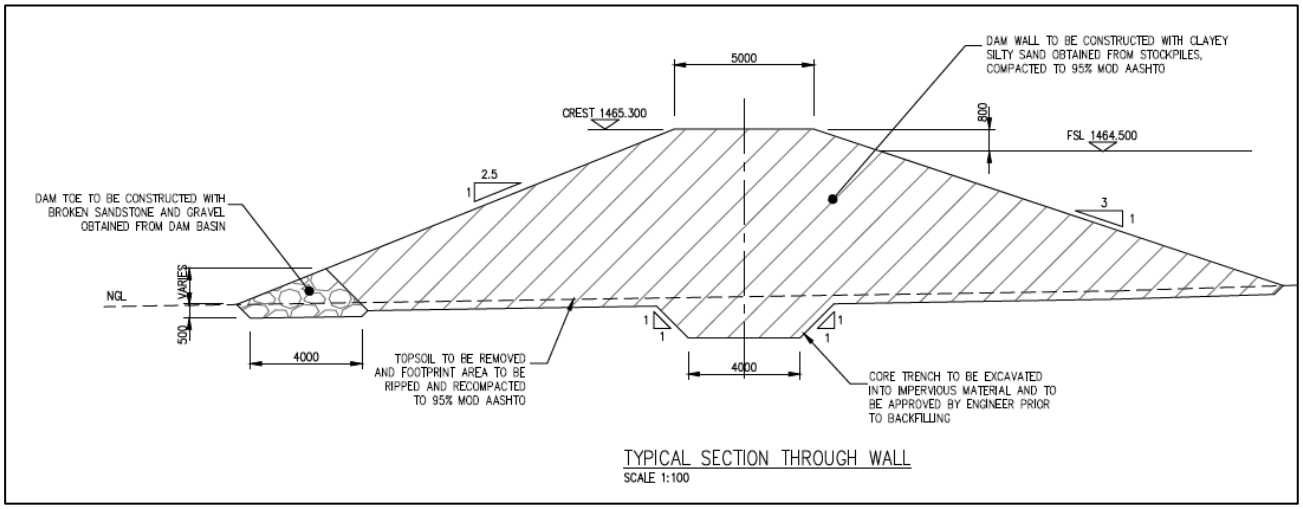

Figure 4: Homogenous Earth Fill Dam Typical Section

Dams shall consist of a 1:3 slope on the upstream face and a 1:2.5 slope on the downstream face. Dams shall be anchored into the natural ground by means of a 4.0m wide core trench approximately 2.0m deep (excavated into impervious material and to be approved by engineer). The dam shall consist of a downstream drainage toe constructed from broken sandstone and gravel obtained from local excavations. While attenuation dams No. 1 and No. 4 are of a short-term nature, the contractor is to ensure any erosion or excessive vegetation growth on the dam walls is managed during their lifespan.

Clay Core Embankment Dams

Dams No. 2, No. 3 and No. 5 comprise of a zoned earthen fill dam with clay core (Figure 5). The clay core shall consist of clayey silty sand obtained from clayey stockpile (from other local excavations) compacted to 95% Proctor Density at OMC of 0% to +2%. Clay core material to be approved by the Geotechnical Engineer on site during construction with permeability not exceeding 1x10-5cm/s.

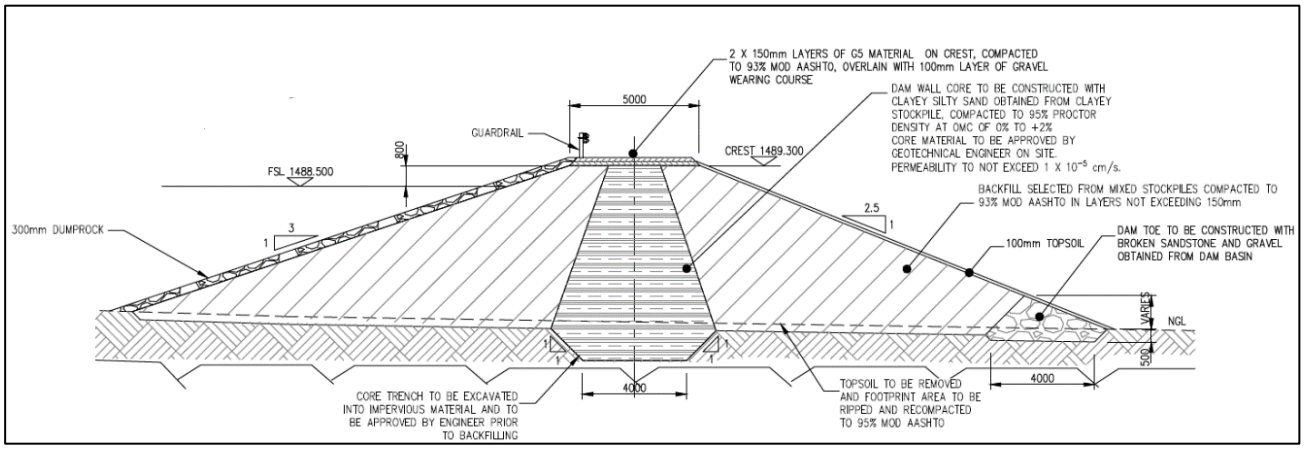

Figure 5: Zoned Clay Core Dam Typical Section

The outer zones of the dam shall be constructed of material from mixed stockpile from local excavations to 93% MOD AASHTO in layers not exceeding 150mm. This material is also to be selected and approved by the Geotechnical Engineer

on site during construction. Dams shall consist of a 1:3 slope on the upstream face and a 1:2.5 slope on the downstream face. Dams shall be anchored into the natural ground by means of a 4.0m wide core trench approximately 2.0m deep (excavated into impervious material and to be approved by engineer). The upstream face (attenuating face) of the dam shall be covered with 300mm of dump rock for erosion protection (from wave action) while the downstream face should be topsoiled (100mm) and hydroseeded. All long-term inlet attenuation dams shall have a 5.0m wide crest wearing course (2 x 150mm layers) of G5 material compacted to 93% MOD AASHTO. As dams No. 3 and No. 5 shall be used by vehicles to access the site across the drainage valley, guard rails have been positioned on both sides of the dam wall. Dam No. 2 which will not have vehicles using it during Phase 1 of the ADF will only have guard rails on the attenuated water side of the dam wall crest.

Spillways

The long-term inlet dams (No. 2, No. 3 and No. 5) shall comprise of a mesh reinforced spillway drift while short-term attenuation dams (No. 1 and No. 4) shall spill to their respective diversion channels at the full supply level of the dam/ invert of the diversion channel (refer to design drawing 366-513548 in Appendix 3).

Diversion Channels

Dams No. 1 and No. 4 shall have diversion channels constructed leading from their spillway full supply level draining to the natural river area and clean water channel, respectively. Diversion channels will be earth lined as shown in Figure 6 (refer to design drawing 366-511924 in Appendix 3).

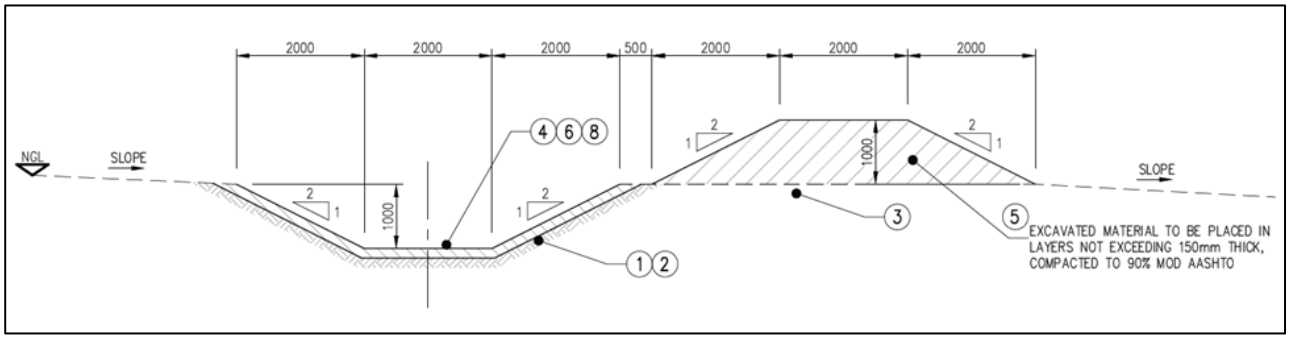

Figure 6: Diversion Earth Channel Typical Section

Inlet Chamber

The inlet chambers for the permanent attenuation dams shall consist of a reinforced concrete chamber to the height of the incoming pipe's top side. Inlet weirs/ openings shall be three (3) in total in size with flap gates fitted (Figure 7).

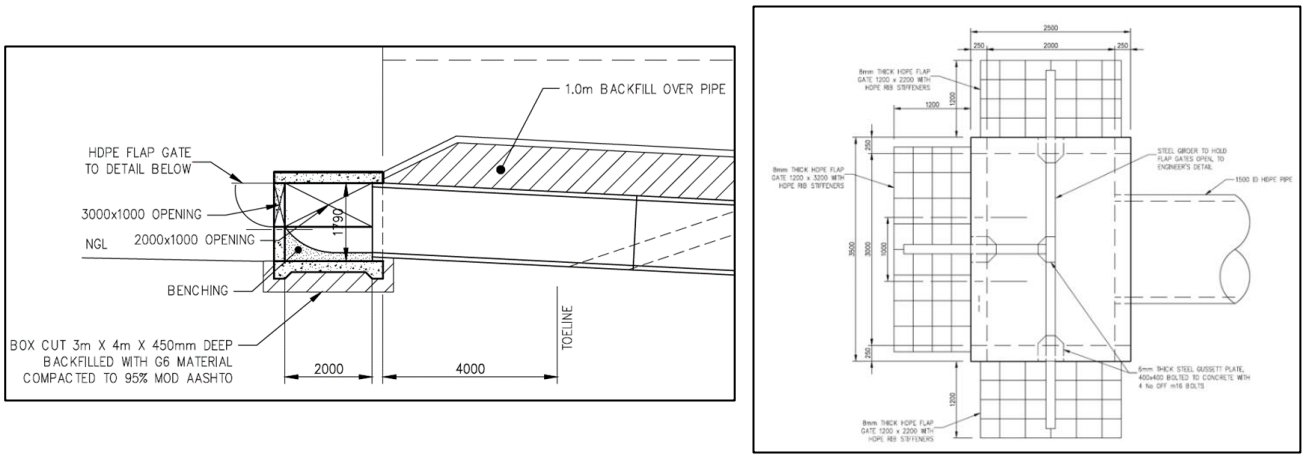

Figure 7: Inet Chamber Typical Section (left) and Inlet Chamber Plan View (right)

Isolation flap gates will allow for the isolation and sealing of the inlet chamber and downstream pipeline for maintenance, inspections and emergencies. Flap gates shall be constructed out of solid HDPE (capable of withstanding 200kPa pressure) similar to the figure to the left. As the invert of the flap gate opening will sit between 0.5m and 1.0m above the natural ground level, silt will settle here before spilling into the inlet chamber and through the ADF pipe. It is essential that the de-silting around the base of the inlet chamber occurs regularly to prevent excessive build up and silt entering into the ADF pipeline through the inlet weir spillways. In order to isolate the inlet chamber, flap gates are to be lowered by means of the winch and steel girder support system and closed. Once water builds up against the flap gate, hydrostatic pressure will seal the gates in position, thus isolating and sealing the inlet chamber.

Outlet Chamber

In order to access the pipeline during maintenance and regular inspections, personnel and/or cctv drone/rovers can access the ADF pipeline through the outlet stilling basin or the outlet chamber at the downstream face of the attenuation dams. The outlet chambers shall consist of a reinforced concrete chamber with a standard pre-cast concrete manhole ring and cover on the chamber slab (Figure 8). During isolation operations of the inlet chamber, access to the pipeline can be made through the outlet chamber to confirm the isolation and sealing of the inlet chamber and its flap gates.

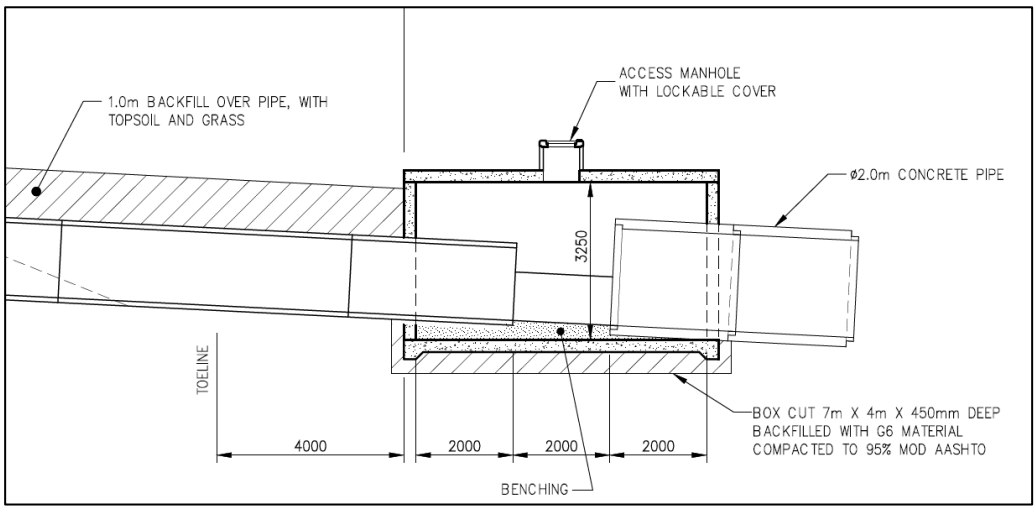

Figure 8: Outlet Chamber Typical Section

ADF Pipe in Dam Body

The pipe within the inlet of the long-term attenuation dam body shall consist of a 1.5m diameter HDPE class 16 pipe with 2.5m diameter, puddle flanges placed and welded to the pipe at the start of both outer embankments as well as either side of the clay centre core. The puddle flanges shall act as a wall to prevent water from flowing along the outer surface of the pipe from the attenuated upstream face to the outlet downstream face.

2.1.6.3 Attenuation Dam Stability

Stability analyses were carried out using GEO5 2024, a slope stability program which computes the stability of slopes and embankments with circular or polygonal slip surfaces. In terms of polygonal or non-circular slip surfaces, the programme can perform the Bishop, Spencer, Janbu, Morgenstern-Price and Fellenius/Petterson methods. Results from all methods were used for this analysis. The results of the stability analyses carried out on Attenuation Dam No. 3 (largest dam) are Morgenstern-Price, Bishop, Janbu and Spencer Methods = Factor of Safety (FoS) of 2.19; and, Fellenius/Petterson Method = FoS of 2.15. All FoS are greater than the minimum of 1.3 and are therefore acceptable. Visual representation of the stability output can be seen below in Figure 9.

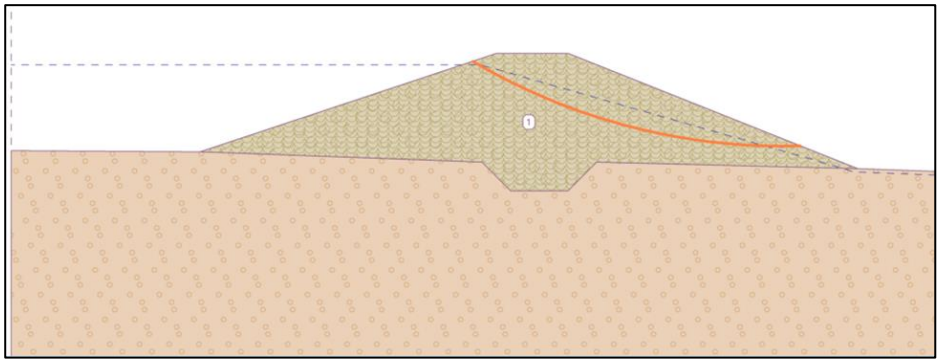

Figure 9: Attenuation Dam slope stability output

2.1.7 POLLUTION CONTROL DAMS

The stormwater management plan (SWMP) for the ADF and associated infrastructure is detailed within the EPCM Stormwater Management Plan – Basis of Design Report (appendix to Phase 1 ADF Full Design Report in Appendix 4). The rationale and operation for the PCDs (a critical component of the SWMP) are already authorised, it is only the development of dams with a dam wall height of 5m or more that is the subject of this EA application. Thus, the reader is reminded that the details focus on the development and assessment of the impacts associated with the development of the dams only (not on their purpose and operational aspects).

2.1.7.1 General Arrangement

The general slope of the ADF and associated infrastructure study area is to the north. It should be noted that Phase 1 of the ADF is located down-slope of all later phases, and therefore Phase 1's design, including the stream diversion pipelines, must allow for the required final-stage capacity of channels, pipelines, Clean Water Dams (CWDs) and Pollution Control Dams (PCDs). Phase 1 of the ADF operations is expected to last seven years and includes four PCDs (i.e. Road PCD, PCD 1A, PCD 1B and PCD2) and both CWDs. PCDs 3, 4, 5 and 6 are located north of Phases 2 and 3 of the ADF and will be constructed in future phases.

The Road PCD is located north of the Klipfonteinspruit, between the conveyors, receiving run-off from the conveyors and road crossing bridges. PCD 1A and 1B are located between the top and bottom extendible conveyors and service the contaminated water runoff that is generated on the western side slope of the proposed ADF. The catchment for PCD 2 is the northern face of the ADF and the dam will also receive overflow from future PCDs 3 to 6. The catchment for PCD 6 is the upper eastern face of the ADF. PCD 6, once full, will overflow into the downstream dam, PCD 5, which will in turn overflow into the downstream dam, PCD 4, which will in turn overflow into the downstream dam, PCD 3. PCD 3 will then overflow into PCD 2. A water transfer provision has been added to PCD 2 to enable transferring of water from PCD 2 to PCD 6. The provision ensures that PCD 2 does not spill whilst there is still capacity in dams PCD 3 to PCD 6. PCD 2 has an abstraction pipeline which is a suction pipeline to Pump Station No. 2. PCDs 3 to 6 have separate abstraction pipelines which feed the inlet to PCD 2 via open channels. These abstraction pipelines and channels are intended to be used only for maintenance purposes of the PCDs or to supply water to PCD 2 if there is no water in PCD 2 for dust suppression purposes.

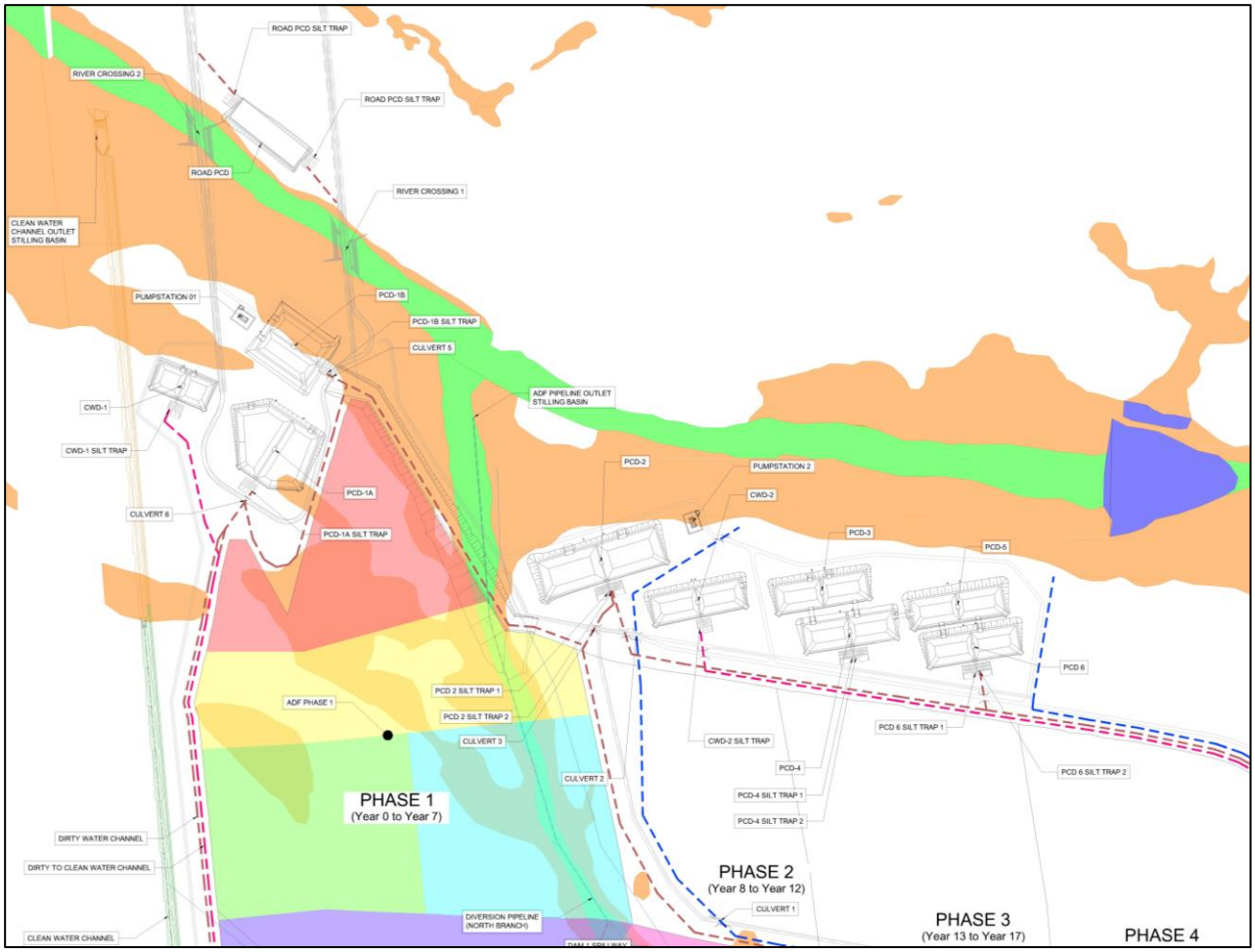

Figure 10: Location of the CWDs and PCDs relative to Phase 1 of the ADF and associated infrastructure project.

2.1.7.2 PCDs and CWDs Technical Design

The following constraints and geotechnical considerations were considered for the design of the PCDs and CWDs:

- Due to possible saturated nature of the sub-soil and the proximity of the water courses, precautions must be taken during excavation by shoring or benching the excavations/ box cuts.
- Permanent sub-surface drainage must be installed to make sure that all the water seepage will be diverted from below the dam basins, and to prevent possible uplift of the geomembrane liner and concrete protection/ ballast layer.
- Fin-drains 2,5-3m deep are to be installed upslope of the dams to divert as much up-slope groundwater as possible.
- The installation of the barrier system and sub-soil drains should preferably take place in mid-to-late dry season.
- The management of silt, generally ash, is a considerable problem at the existing co-disposal facility. Silt traps are to be installed at each dam. The maintenance of silt traps, and clearing of channels as well, should be prioritised during operations. To facilitate silt removal from the dams themselves, a ramp is placed in the corner of each compartment for a small dozer or TLB. A concrete protection layer is to be installed over the base and sides of the dam.
- The in-situ material does not qualify as suitable fill material for the dams' berms (walls). Imported fill material of minimum G6 grade will be required.

Each PCD and CWD is divided into two compartments (refer to design drawing 366-511848 in Appendix 3). This allows the dam to remain functional when one half is out of service, for example: for repair or maintenance. Each compartment of the PCDs has a dedicated silt trap, i.e. two silt traps per PCD. The CWDs only require one silt trap each that would serve both compartments of the dam.

PCD and CWD sizing

Calculations were carried out using the computer programme Storm and Sanitary Analysis (SSA), which is an Autodesk product and compatible with Civil3D design and drafting software. Catchments reporting to each channel were analysed by the Rational method. A 1:50-year storm of 24-hour duration was considered in the sizing of the dam. Operational requirements (such as desilting or repairs) also influenced the dam sizing. Water levels will be managed between dams via the pump-stations and piped connections.

PCD Embankments

Imported fill of G5 quality or above will have to be imported for the wall embankments, to achieve a compaction of 98% Mod AASHTO. It is proposed that the walls on the lower (downslope) sides of the dams, will have a keyed-in trench backfilled with the same material used for the berms, where berm heights exceed 5m. Fill material is to be placed in layers not exceeding 150mm thick and compacted. Walls are to be constructed at 1:3 (vertical: horizontal) side slopes both internally and externally.

PCD Slope Stability Analysis

A stable slope is anticipated as the FoS calculated for overall failure is greater than 1.3 for the given conditions. However, the following is required to confirm parameters and site conditions more accurately.

- Strength tests of the embankment fill must be confirmed during construction stage based on the imported materials finally used in the embankment.
- The phreatic level within the PCD embankment wall must be monitored closely with the performance of the under drains and the integrity of the liner system.
- Construction of the embankment must be carried out to the design specifications.
- The slope geometry must be confirmed following the construction phase.
- The analyses should be repeated with refined data.
- Actual leakage rates of the dams can have an effect on the embankment stability and should be monitored continuously.

Ongoing monitoring and surveillance must be maintained with the above data taking into consideration of all the relevant operational data. The perimeter berm height above ground varies, but will rise at least 1m high, to prevent outside surface water and silt flowing over the crest on the upstream side of the dams. The maximum slope of the dam's outer slopes will be 1 vertical: 3 horizontal. The outer berm on the northern side of PCD 1B may be covered by riprap rock to provide scour protection from possible water in the wetland area (due to its close proximity to the river). The exact extent of cover will be determined by the Engineer on site. The internal slopes will be 1 vertical : 3 horizontal with the perimeter wall crest will be 4m wide. An anchor trench for the dam lining components will be excavated into the crest and backfilled once the lining layers have been installed.

PCD and CWD Inlets

Both PCDs and CWDs inlets will be from a silt trap. A system of sluice gates at the silt trap outlets will dictate to which dam compartment the water will flow.

PCD and CWD outlets

All dams will have an emergency overflow spillway, and a freeboard of 800mm above full supply level. An internal spillway between dam compartments will be lower than the external spillways. At a height of 1m off the dam floor will be a HDPE outlet pipe of 600mm diameter, with a valve on the outside of the dam, usually on the northern (downslope) side. Each compartment will have a spillway and outlet pipe.

Battery Limit

The battery limit for the civil and lining contractor will be the downstream flange of the outlet valve. The lining contractor will install a HDPE pipe boot sleeve to house the penetration through dam wall, which will be welded to the dam geomembrane liner (refer to design drawing 366-511878 in Appendix 3).

Table 2: Summary of dam properties for the PCDs for Phase 1 of the ADF

Dams	Water Level (msl)		Depth (m)	Dam Wall Height (m)	Surface Area (m^2)	Volume (m^3)
	Min	Max				
ADF Phase 1						
PCD 1A	1 452.14	1 457.70	5.56	4.48	32 066	102 285
PCD 1B	1 447.02	1 451.50	4.48	1.15	18 307	42 875
PCD 2	1 452.85	1 460.20	7.35	7.32	30 039	113 471
Road PCD	1 439.50	1 444.50	5.00	5.30	11 065	24 000
ADF Phases 2 – 10						
PCD 3	1 462.37	1 468.40	6.03	5.33	17 250	48 657
PCD 4	1 467.27	1 473.30	6.03	4.70	17 237	48 734
PCD 5	1 467.97	1 474.60	6.63	6.47	17 220	48 706
PCD 6	1 472.17	1 478.20	6.03	5.38	17 223	48 790

2.1.8 WATER BALANCE

An integrated water balance model has been developed in the concept phase and was used to size the dams required for storm water management. There are four main pollution control dams, PCD 1A, PCD 1B, Road PCD and PCD 2 for Phase 1 of the ADF, which by regulation are not allowed to spill to the environment more than once in a 50-year period. The rest of the dams are designed to overflow to the other dams within the system. The results of the water balance simulation indicate no spillages over the simulated period if transfer systems between all dams are incorporated under the conditions as defined in the Phase 1 ADF Full Design Report (Appendix 4).

The system is, however, dependent on operational conditions in the form of water abstraction parameters, dam operating levels, water transfer capacity, etc. These parameters have been taken into consideration in the design process and they will be clearly defined in the Operations and Maintenance manual. An updated water balance has been prepared based on final design elements and is included in Phase 1 ADF Full Design Report (Appendix 4).

2.1.9 CONSTRUCTION CONSIDERATIONS

The total estimated maximum depth of excavation for the construction of the ADF and associated facilities is approximately 6.2m below ground level (bgl). Considering such depth of excavation, it is probable that excavations intersect groundwater seepage at 1.9m bgl. This implies that limited groundwater dewatering will take place during construction. Subsoil curtain drains, to be installed prior to construction, are to be provided at the following locations to mitigate and reduce the subsurface seepage into the construction footprint.

- Between ADF and PCD1A and CWD1; and,
- Between ADF and PCD2 and CWD2.

The drains will be installed in a trench of 2.9m depth and will comprise of a 160mm diameter HDPE double-walled perforated pipe, pre-assembled within a 1.8m high geogrid and wrapped in 200g/m^2 separation geotextile. Grouted stone pitching will be placed at the outlet of the fin drain, with a width of 2.0m, extending 5m beyond the exit point. In addition to the subsoil curtain drains (as mentioned earlier, refer to Section 2.3.3.1) the construction of the attenuation dams No. 1 and 2 are critical in dewatering of the river valley system in order to construct the ADF stream diversion pipeline. The stream diversion pipeline should be constructed during dry seasons.

2.1.9.1 Attenuation Dams

Key considerations for all dams is the construction of the key/core trench. The core trench will act as an anchor for the entire dam body to prevent sliding movement down the valley. It is essential that the core trench extends to an impermeable layer within the natural soil profiles beneath it. The depth of founding and acceptance of the core trench will have to be confirmed on site by the responsible construction and geotechnical engineers. Each dam will be constructed with a stone drainage toe, which will allow seepage through the dump rock toe. This will pull the phreatic line down and aid in the stability of the earth fill dams. Long-term attenuation dams will require the clayey material from other excavations on site. Standby pumps will have to be provided to enable dewatering of the attenuation dams during their construction. Clean water will be pumped to the associated clean water channel system.

2.1.9.2 PCDs

The PCDs (and CWDs) will mostly be constructed in cut, with a crest level above natural ground and fill embankments along the lower, northern flanks. During excavation of the dam basins all clayey materials are to be stockpiled separate of other generally mixed material. These clayey materials are to be used for the attenuation dam walls. The appointed contractor will be responsible for dewatering the works during construction, which will include the use of pumps and temporary piping. The discharge must be controlled to prevent contamination of the adjoining streams and wetlands. This may have to include silt traps or use of hay bales to intercept any silt loads. All dams have been designed with sub-soil drainage systems beneath them. This is critical to enable tests for leakage within the collection herringbone system beneath the dams and to dewater the base. De-watering is a specific requirement of DWS to prevent the uplift of the dam base due to groundwater pressures beneath the lining system. The sub-soil water drains to self-contained HDPE manholes with a pump inside them. The water will be tested (in accordance with water quality monitoring standards) for contamination and if clean, released to the natural surroundings, or if contaminated pumped into the PCD compartment.

The Road PCD is located within an area with predominant shale hard rock. Excavation of the dam basal area will most probably require a large amount of blasting. Blasting should be done to 500mm beneath the dam/tank base. Dump rock from the blasting process should be screened and stockpiled for use in gabions, reno mattresses and drainage toes of the attenuation dams.

2.1.10 MONITORING PROGRAM

2.1.10.1 Attenuation Dams

The condition of the dam walls, spillways and by-pass drains is to be monitored and recorded. Dam 3 is to be inspected by an APP (Approved Professional Person), as required. Downstream toe seepage and erosion should be monitored and repaired, where necessary.

2.1.10.2 PCDs and CWDs

- Dam levels and in flows should be recorded daily, as well as rainfall figures, and draw-offs. Any discharge events over spillways should be recorded. Water quality should be monitored as per requirements and as per stipulated frequency. PCD 1A, PCD 1B and PCD 2 are to be inspected by an APP, as required
- Visual inspections should take place daily for signs of seepage on outer walls and toe, for damage to lined surfaces and for erosion of walls.
- Silt build-up in dams should be monitored. The silt traps should also be inspected daily, so that de-silting can be planned pro-actively.
- The sub-soil monitoring manholes are to be monitored daily and regularly sampled to monitor water quality. If clean, this water is to be pumped to the environment. If contaminated, the source of contamination is to be sought since this could be indicative of a liner leakage.

2.1.11 CLOSURE

2.1.11.1 Attenuations Dams

All of the attenuation dams are temporary, and as the ADF is developed in subsequent phases, the dams will be demolished to make way for ash deposition. Thus, all attenuation dams would have been removed by the time of final closure.

2.1.11.2 PCDs and CWDs

The PCDs will be monitored post closure until such time that all water from the channels is of good enough quality to be diverted to a CWD. The PCDs would be removed, and the barrier materials disposed of at a suitable, licenced landfill. A CWD on the east and a CWD on the west should remain, to allow for monitoring prior to water being discharged to the environment. The dams should remain securely fenced, with warning signage for “no entry” and “no swimming”.

3 NEED AND DESIRABILITY

The need and desirability for this EIA pertains to the need and desirability of dams with a dam wall height greater than 5m, and not to the need and desirability of the greater ADF and associated infrastructure project. The dams with dam wall heights in excess of 5m trigger a listed activity in Listing Notice 2 of the 2014 EIA Regulations, as amended and therefore this S&EIR application is underway in order to authorise the development of these dams (attenuation dams and PCDs), as they are required as part of the greater ADF and associated infrastructure based on the updated 2024 designs. However, in order to contextualise the need for larger dams a brief summary of the key amendments due to the engineering review of the 2018 approved designs is provided prior to motivating the need for larger dams.

3.1.1 AMENDMENT OF THE ADF AND ASSOCIATED INFRASTRUCTURE PROJECT DESIGNS

As mentioned previously, the ADF and associated infrastructure project at Kusile Power Station is an authorised project in terms of NEMA, NEMWA and the NWA. Eskom initiated an engineering review of the 2018 designs in preparation for the commencement of construction of the ADF and associated infrastructure, based on the conditions of approval stipulated by DFFE (and DWS) in their approval of the 2018 designs. This design review included the reassessment of the original modelling assumptions and input values and additional geotechnical investigations. A key finding of the review was that the ADF footprint could be significantly reduced which allowed for the entire ADF footprint to be shifted approximately 500m southwards, thus avoiding the diversion of the Klipfonteinspruit (approved within the current IEA and WUL). This finding significantly reduces the environmental impact associated with the authorised layout and design of the facility.

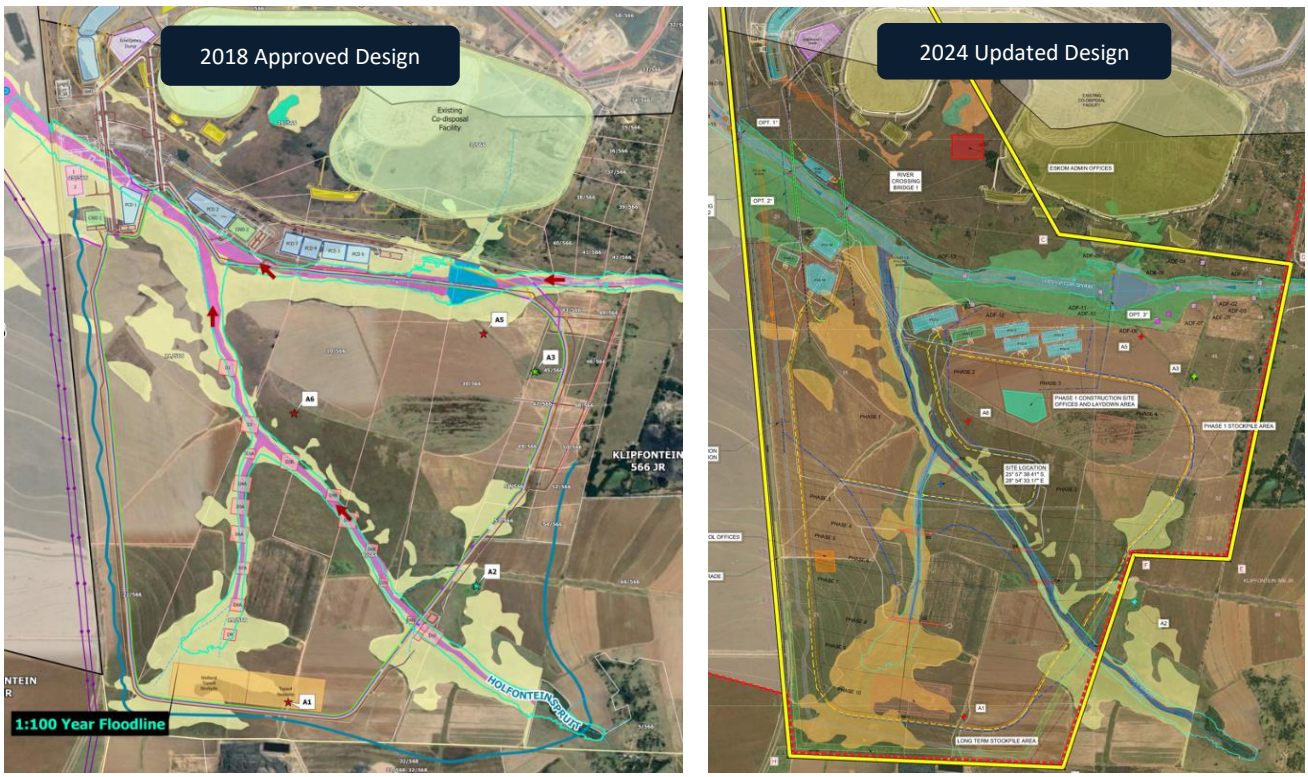

Figure 11: Layout of the ADF and associated infrastructure as approved (2018 designs, left) and amended due to the engineering review (2024 designs, right)

3.1.2 ATTENUATION DAMS

The 2018 detailed designs included 15 small (dam wall height of 3m) attenuation dams, while the amended and updated design proposes the use of only 5 larger dams (with 4 of the 5 dams having dam wall heights in excess of 5m) (Figure 12).

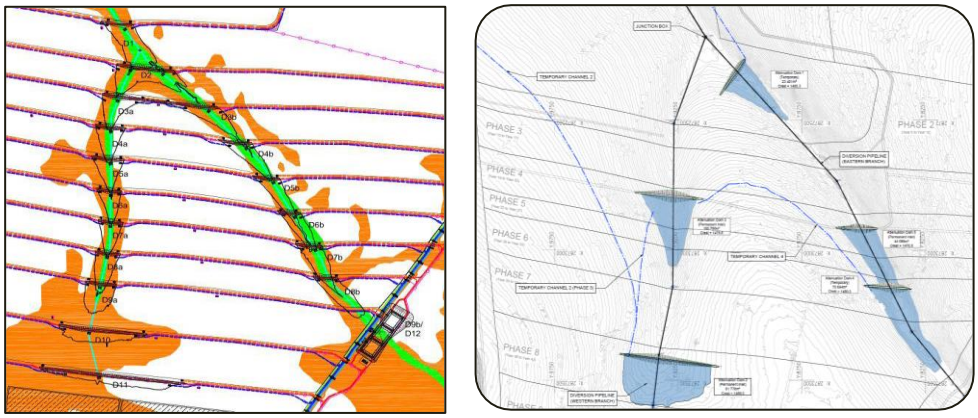

Figure 12: Number and layout of the attenuation dams. 2018 design (left) versus the updated 2024 design (right)

It has been proposed to construct larger temporary attenuation dams higher up the valleys at the start of the construction phase. This elevation allows for diversion of the streams, from the initial dams, into by-pass drains around the ADF Phase 1 footprint (refer to the sequencing of the attenuation dams in Section 2.3.3.1 above). The initial rationale for fewer larger dams was based on multiple risk assessments on the ADF pipeline beneath the ash dump, and concerns regarding the pipeline blocking and failing, that it was decided to size the pipeline and associated attenuation dams for a 1:200-year flood (the 2018 designs were based on 1:100yr flood). Thus, larger attenuation dams are required to attenuate sufficient volumes in order to facilitate maintenance of the ADF pipeline below the ADF should a portion need to be isolated. In addition, the need to construct a number of smaller dams and then the required demolition of these dams as the ADF develops, as proposed within the 2018 design, posed a risk to the integrity and safety of the underlying ADF diversion pipeline. The lengthy construction timeframes associated with the construction of many dams, with the associated prolonged impact on the receiving environment, incurs a higher financial cost/ burden. By reducing the number of dams, albeit that they are larger, reduces the overall construction timeframe and cost associated with the development of the ADF.

3.1.3 POLLUTION CONTROL DAMS

The original EIA did not mention the dam wall heights of the PCDs, as detailed designs are not a prerequisite for EA in terms of NEMA. The 2018 detailed designs for Phase 1 of the ADF stipulated the design of the PCDs, where almost all of them had dam wall heights of greater than 5m. With the updated 2024 design, the sizes of many of the PCDs were reduced, although many still have a dam wall height of more than 5m (Figure 13).

Figure 13: PCD wall heights as per the 2018 (left) and 2024 (right) designs for the ADF and associated infrastructure.

4 INSTITUTIONAL AND LEGAL FRAMEWORK, GUIDELINES AND INTERNATIONAL LENDER REQUIREMENTS

4.1.1 OVERVIEW OF ENVIRONMENTAL LEGISLATION IN SOUTH AFRICA

Section 24 of the Constitution of the Republic of South Africa of 1996 guarantees everyone has a right to an environment that is not harmful to their health and well-being and to have the environment protected for the benefit of present and future generations. In order to give effect to this right, the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) was promulgated.

NEMA is the overarching environmental legislation in the country. Chapter 1 of NEMA lists the national environmental management principles (NEMA Principles) that should be the point of departure for environmental management within the country. The following two principles reflect the core of NEMA:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- Development must be socially, environmentally and economically sustainable.

Several sector Specific Environmental Management Acts (SEMAs) have been promulgated and all fall under the umbrella of NEMA, these are:

- Environment Conservation Act, 1989 (Act No.73 of 1989);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004);
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008); and
- National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008).

4.1.2 NEMA & EIA REGULATIONS

The Environmental Impact Assessment (EIA) Regulations (Government Gazette Notice (GN) No. R. 326, 327, 325 and 324 of 07 April 2017) promulgated in terms of NEMA regulate the "*procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto*."

The ADF and associated infrastructure project is already authorised in terms of NEMA (IEA Reference Number: 12/12/20/2412). The following table highlights the ***additional*** listed activity that will be triggered by the 2024 amended design of the ADF and associated infrastructure project, thus requiring Environmental Authorisation (EA), by way of a Scoping and Environmental Impact Reporting (S&EIR) application process, from the Competent Authority (in this instance: the National Department of Environment, Forestry & Fisheries (DFFE)).

Table 3: NEMA Listed activity

GOVERNMENT GAZETTE NO.	LISTED ACTIVITY NO.	DESCRIPTION OF THE LISTED ACTIVITY
GN. No. R. 325 – Listing Notice	16	The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more.

4.1.2.1 Integrated Environmental Management (IEM)

"*IEM provides a holistic framework that can be embraced by all sectors of society for the assessment and management of environmental impacts and aspects associated with an activity for each stage of the activity life cycle, taking into consideration a broad definition of environment and with the overall aim of promoting sustainable development*".[1]

The general objective of IEM, according to NEMA Chapter 5, is to -

- Promote the integration of the principles of environmental management set out in Section 2 into the making of all decisions which may have a significant effect on the environment;
- Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in Section 2;
- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;
- Ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;
- Ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and
- Identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in Section 2.

The Department of Environmental Affairs (DEA) Integrated Environmental Management Information Series guidelines were also consulted during this S&EIR application process.

4.1.2.2 EIA Regulations – Guidelines

Various guidelines documents have been developed and published over the years to provide clarity on aspects of the EIA Regulations. All applicable and relevant guidelines have been used during this S&EIR application process.

4.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT NO. 59 OF 2008), AS AMENDED [NEMWA]

NEMWA aims to *inter alia* protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development, to provide for specific waste management measures, to provide for the licensing and control of waste management activities, to provide for the remediation of contaminated land, and to provide for compliance and enforcement.

In terms of Section 19(1) of the Act, the Minister published a list of waste management activities which have, or are likely to have a detrimental effect on the environment on 03 July 2009 (GN No. R 718 of July 2009). As such no person may commence, undertake or conduct a waste management activity, except in accordance with the requirements or standards determined in terms of Section 19(3) for that activity or a Waste Management License (WML) issued in respect of that activity, if a license is required (Section 20 of NEMWA).

The ADF and associated infrastructure project is already authorised in terms of NEMWA (IEA Reference Number: 12/12/20/2412).

[1] DEAT (2004) Overview of Integrated Environmental Management, Integrated Environmental Management, Information Series 0, Department of Environmental Affairs and Tourism (DEAT), Pretoria.

4.1.4 NATIONAL WATER ACT, 1996 (ACT NO. 36 OF 1996) (NWA)

The NWA recognises that water is a scarce and unevenly distributed national resource and that while water is a natural resource that belongs to all people, the discriminatory laws and practices of the past have prevented equal access to water, and use of water resources. The NWA gives expression to National Government's overall responsibility for and authority over the nation's water resources and their use, including the equitable allocation of water. The ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability in the interests of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways.

In terms of Section 21 of the NWA, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. The following water uses are listed in Section 21:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a watercourse;
d) Engaging in a stream flow reduction activity contemplated in section 36;
e) Engaging in a controlled activity identified as such in section 37 (1) or declared under section 38 (1);
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) Using water for recreational purposes.

The ADF and associated infrastructure project is already authorised in terms of Section 21 of the NWA for the following water uses: Section 21 (b), (c), (g) and (i). The existing WUL (License No.: 06/B20F/CIBG/10792) will require amendment by way of a separate amendment application process. A new Water Use License Application (WULA) will also be required for the Section 21 (j) water use (as this was not included within the original WULA).

4.1.5 REGULATIONS REGARDING THE SAFETY OF DAMS IN TERMS OF SECTION 123(1) OF NWA (GN R. 139 OF FEBRUARY 2012)

Only dams with a safety risk (that is dams with a maximum wall height exceeding 5,0 m **and** with a storage capacity exceeding 50 000 m^3, or any other dam declared by the Minister as a dam with a safety risk) are subject to these Regulations. Thus, only PCD 2 and Attenuation Dams 2, 3 and 4 are categorised as dams with a safety risk. These Regulations are administered by the Dam Safety Office within the DWS. Every dam with a safety risk must be classified in accordance with Regulation 2 and the tables for the classification of dams with a safety risk (Figure 14) on the basis of its size and hazard potential to determine the level of control over the safety of the structure. Based on Regulation 4, "no person who intends to construct a dam with a safety risk, or enlarge, alter or repair an existing dam with a safety risk, may begin any construction work, including- (a) any preparation of the foundations; (b) storage of construction materials, including aggregate, earth and rock; (c) development of quarries or borrow areas; (d) diversion of the watercourse concerned or any works incidental thereto; and (e) in the case of the enlargement, alteration or repair of an existing dam, steps to change the existing structure or equipment, before he or she is in possession of a licence to construct, enlarge, alter or repair, issued by the Director-General."

Tables for the classification of dams with a safety risk

Table 1: Size classification

Size class	Maximum wall height in metres (m)
Small	Less than 12m
Medium	Equal to or more than 12m but less than 30m
Large	Equal to or more than 30 m.

Table 1 must be read together with subregulation 2(2).

Table 2: Hazard potential classification

Hazard potential rating	Potential loss of life	Potential economic loss	Potential adverse impact on resource quality
Low	None	Minimal	Low
Significant	Not more than ten	Significant	Significant
High	More than ten	Great	Severe

Table 2 must be read together with subregulation 2(3).

Table 3: Category classification of dams with a safety risk

Size class	Hazard potential rating		
	Low	Significant	High
Small	Category I	Category II	Category II .....
Medium	Category II	Category II	Category III
Large	Category III	Category III	Category III

Table 3 must be read together with subregulation 2(4).

Figure 14: Dam Classification tables as per the Dam Safety Regulations (GN R. 139 of February 2012)

The size and capacity classification of PCD 2 is therefore as a "small" dam. Taking the potentially contaminated nature of the PCD water, and the potentially significant economic loss to infrastructure should the dams fail, the hazard potential is considered "significant". Thus, the overall classification of the PCD is Category II. The size classification of Attenuation Dams are therefore as "small" dams. Taking the potentially significant economic loss to infrastructure should the dams fail (this specifically relates to Dam No. 2 and 3), the hazard potential is considered "significant"; while the hazard potential for Dam 4 is considered "low" due to the short-term lifespan (2–3-year operational phase, during the construction of Phase 1 of the ADF). Thus, the classification of Attenuation Dams 2 and 3 are as Category II dams, with Dams 4 as a Category I dam.

According to Regulation 10, Eskom must acquire the services of an APP to design the proposed project and to draw up plans and specifications for it; and apply for a licence to construct by submitting to the Director-General of DWS a proposed design complying with acceptable dam engineering practices and criteria.

4.1.6 OTHER RELEVANT NATIONAL LEGISLATION

4.1.7 INFRASTRUCTURE DEVELOPMENT ACT, 2014 (ACT NO. 23 OF 2014) [IDA] AND THE STRATEGIC INTEGRATED PROJECTS (SIPS)

In terms of the IDA, as amended, the Presidential Infrastructure Coordinating Commission (PICC) designated 36 Strategic Integrated Projects (SIPs), some of which have many sub-projects. Projects designated as SIPs need to: be of significant economic or social importance to the Republic; contribute substantially to any national strategy or policy relating to infrastructure development; or be above a certain monetary value determined by the PICC. The Kusile Power Station

and, specifically, the ADF and associated infrastructure project falls within the ambit of SIP 9: Electricity generation to support socio-economic development.

4.1.8 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004 (ACT NO. 39 OF 2004) [NEMAQA]

The objectives of the Act are to:

- Protect the environment by providing reasonable measures for:
  - The protection and enhancement of the quality of air in the Republic;
  - The prevention of air pollution and ecological degradation; and
  - Securing ecologically sustainable development while promoting justifiable economic and social development; and
- Generally to give effect to the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

In terms of Section 21(1)(a) and 21(3)(a) and (b) of the Act, the Minister published a list of activities and associated minimum emission standards in March 2010 (GN No. R 248 of March 2010). As such, no person may without a provisional atmospheric emission license, or an Atmospheric Emission License (AEL) conduct an activity listed on the national list anywhere in the Republic or listed on the list applicable to a province anywhere in that province (Section 22 of NEMAQA).

Kusile operates with an Atmospheric Emissions License (AEL), which will be updated to include the ADF and associated infrastructure once the facility is due to start receiving ash.

4.1.9 DECLARATION OF THE HIGHVELD AS PRIORITY AREA IN TERMS OF SECTION 18(1) OF NEMAQA (NOVEMBER 2007) AND THE 2011 HIGHVELD PRIORITY AREA (HPA) AIR QUALITY MANAGEMENT PLAN (AQMP)

The Highveld area in South Africa is associated with poor air quality, and elevated concentrations of criteria pollutants occur due to the concentration of industrial and non-industrial sources. As the area overlaps provincial boundaries, the DFFE functions as the lead agent in the management of the priority area. Industrial sources in total are by far the largest contributor of emissions in the HPA, accounting for 89% of PM_{10}, 90% of NO_x and 99% of SO_2. Major industrial source contributors were grouped into the following categories:

- Power Generation
- Coal Mining
- Primary Metallurgical Operations
- Secondary Metallurgical Operations
- Brick Manufacturers
- Petrochemical Industry
- Ekurhuleni Industrial Sources (excluding the above)
- Mpumalanga Industrial Sources (excluding the above)

Most of the HPA experiences relatively good air quality, but ambient air quality standards for PM_{10} concentrations are exceeded in nine extensive areas. These “hot spots” are illustrated in Figure 15 by the number of modelled exceedances of the 24-hour PM_{10} standard and are confirmed by ambient monitoring data. The air quality hot spots result mostly from a combination of emissions from the different industrial sectors and residential fuel burning, with motor vehicle emissions, mining and cross-boundary transport of pollutants into the HPA adding to the base loading.

The HPA AQMP has seven (7) overarching goals, namely:

1) By 2015, organisational capacity in government is optimised to efficiently and effectively maintain, monitor and enforce compliance with ambient air quality standards.

2) By 2020, industrial emissions are equitably reduced to achieve compliance with ambient air quality standards and dust fallout limit values.
3) By 2020, air quality in all low-income settlements is in full compliance with ambient air quality standards.
4) By 2020, all vehicles comply with the requirements of the National Vehicle Emission Strategy.
5) By 2020, a measurable increase in awareness and knowledge of air quality exists.
6) By 2020, biomass burning, and agricultural emissions will be 30% less than current.
7) By 2020, emissions from waste management are 40% less than current.

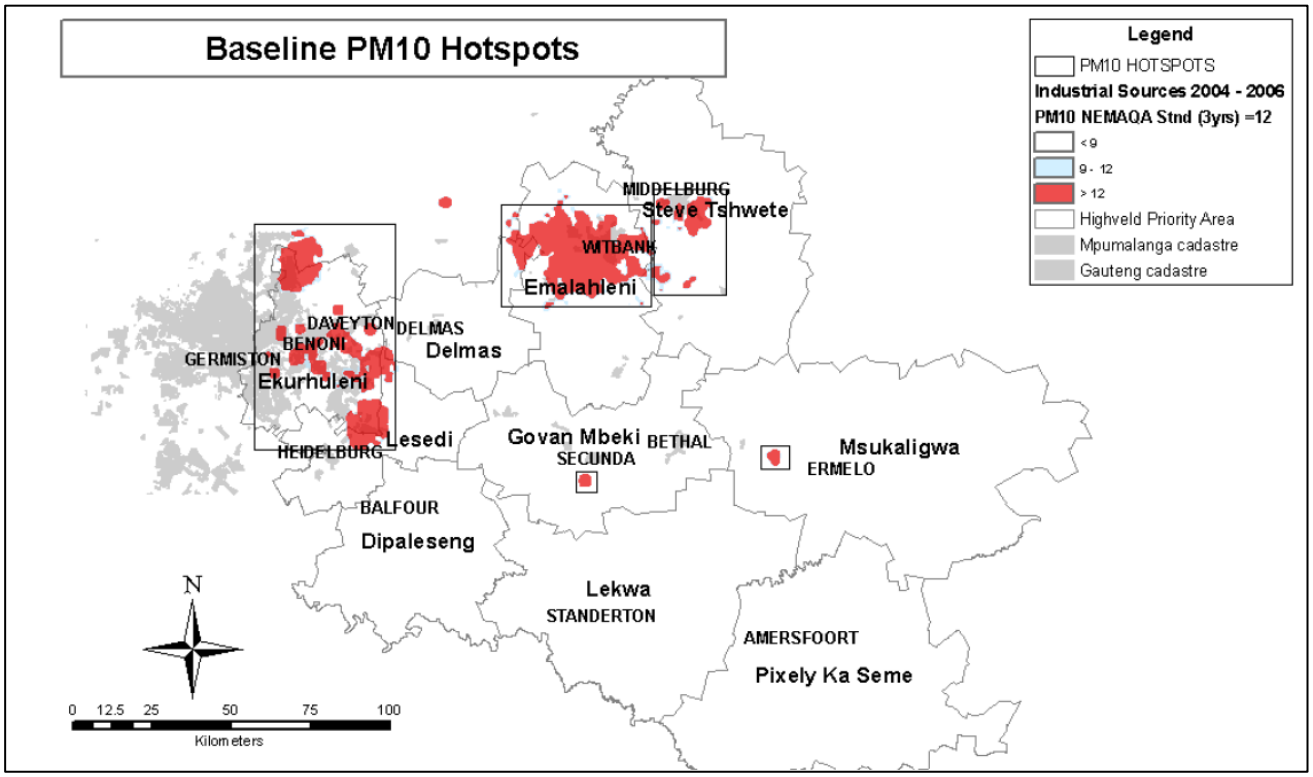

Figure 15: Modelled frequency of exceedance of 24-hour ambient PM_{10} standards in the HPA, indicating the modelled air quality Hot Spot areas (AQMP, 2011)

Kusile falls within the Witbank and Emalahleni hot spot for PM_{10} sources. Thus, management of emissions from dust-generating activities (such as the construction activities associated with the dams) must be reduced in order to contribute to Goal 2 of the HPA AQMP.

4.1.10 NATIONAL DUST CONTROL REGULATIONS (2013)

The 2013 National Dust Control Regulations provide a dust fallout standard that may not be exceeded. Should the standard be exceeded, then a dust fallout monitoring programme must be implemented and reported on. Acceptable dust fallout rates as measured using the American Society of Testing and Materials D1739:1970 or equivalent method at and beyond the boundary of the premises where dust originates are given in Table 4. It is important to note that dust fallout is assessed for nuisance impact and not inhalation health impact.

Table 4: South African National Dust Control Regulations.

Restriction Area	Dust fallout Rate (mg/m^2-day)	Permitted Frequency of Exceedance
Residential area	Less than 600	Two within a year, not sequential months
Non-residential area	600 to 1 200	Two within a year, not sequential months

Kusile has existing operating procedures to monitor and manage dust generation on site (refer to Section 5.1.13), in addition to complying with their AEL. Thus, no additional assessments are required, as the construction of the greater ADF and associated infrastructure project has already been assessed and authorised.

4.1.11 ENVIRONMENTAL CONSERVATION ACT, 1989 (ACT NO. 73 OF 1989) [ECA] & NATIONAL NOISE CONTROL REGULATIONS (GN NO. R154 OF 1992)

ECA allows for the regulation of noise. The National Noise Control Regulations (GN R 154 of 1992), as amended were promulgated in terms of Section 25 of ECA. The legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities; however, noise control regulations do not exist for Mpumalanga Province. Thus, the National Noise Control Regulations are applicable. The regulations define "disturbing noise" as: "*noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA5 or more*." In terms of Regulation 4, "*No person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof*".

Due to the likelihood of blasting associated with the construction phase of (at least) the Road PCD, a noise impact assessment will be undertaken and reported on in the EIA phase to determine the potential impact of blasting on the surrounding communities and what mitigation should be implemented to reduce any potentially significant impacts.

4.1.12 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) [NEMBA]

The objectives of the Act are:

- To provide for:
  - The management and conservation of biological diversity within the Republic and of the components of such biological diversity;
  - The use of indigenous biological resources in a sustainable manner; and
  - The fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;
- To give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
- To provide for co-operative governance in biodiversity management and conservation; and,
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of the Act.

The ADF and associated infrastructure project is located within the Grassland Biome, and specifically within the Rand Highveld and Eastern Highveld Grassland vegetation types, both listed as Vulnerable according to the 2022 revised national list of threatened ecosystems (GN No. R. 2747 of 18 November 2022). In addition, the following animal species are protected in terms of the NEMBA List of critically endangered, endangered, vulnerable and protected species:

- Cape Clawless Otter; and,
- Giant Bullfrog.

Should these species be identified on site and/or during construction activities, Eskom will have to obtain the necessary permits prior to impacting on these species and their habitats.

4.1.13 NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT NO. 25 OF 1999) [NHRA]

A few of the objectives of the Act are to introduce an integrated and interactive system for the management of the national heritage resources and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations. The Act further lays down general principles for governing heritage resources management throughout the Republic; enables the provinces to establish heritage authorities which must adopt powers

to protect and manage certain categories of heritage resources; and provides for the protection and management of conservation-worthy places and areas by local authorities.

The NHRA states in Section 38 that the relevant heritage resources authority must be notified of the proposed development/ activities where such activities trigger either of the following:

- The construction of a linear development (e.g. road, wall, etc.) or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or activity which will change the character of a site:
    - Exceeding 5 000m^2 (½ha) in extent; or
    - Involving 3 or more existing erven or subdivision thereof; or
    - Involving 3 or more existing erven or subdivision thereof which have been consolidated within the past 5 years; or
- The rezoning of a site exceeding 10 000m^2 (1ha) in extent.

Section 5.2.4 below describes the findings of the Heritage Impact Assessment and Palaeontological Assessments undertaken in 2013/2014. Eskom will have to secure various permits for the relocation of cemeteries identified within the ADF study area, prior to the commencement of activities in close proximity to these grave yards.

4.1.14 RELEVANT PROVINCIAL AND MUNICIPAL LEGISLATION

4.1.15 MPUMALANGA NATURE CONSERVATION ACT, 1998 (ACT NO. 10 OF 1998) [MNCA]

The objective of the Act is to consolidate and amend the laws relating to nature conservation within the Province and to provide for matters connected therewith. The Act provides four (4) schedules listing specifically protected game; protected game; ordinary game; and protected wild animals. The identified Aardvark, Cape clawless otter and Giant Bullfrog fall within Schedule II of protected game. Permits will have to be obtained should these animals be encountered on site and need to be removed.

4.1.16 RELEVANT SOUTH AFRICAN POLICIES, PROGRAMMES, PLANS AND GUIDELINES

4.1.17 MPUMALANGA SPATIAL DEVELOPMENT FRAMEWORK (MSDF) 2019

Mpumalanga means “a place where the sun rises”. It is the second-smallest province in South Africa and located in the north-eastern part of the country, bordering Swaziland and Mozambique. The province is rich in coal reserves and home to South Africa’s major coal-fired power stations (eMalahleni is the biggest coal producer in Africa).

The following spatial vision was formulated and adopted for Mpumalanga: “*A sustainable, vibrant and inclusive economy, Mpumalanga*.” The MSDF has five (5) key objectives, namely:

1. Connectivity and corridor functionality;
2. Sustainable concentration and agglomeration;
3. Conservation and resource protection;
4. Liveability and sense of place; and,
5. Rural diversity and transformation.

Eskom’s Kusile Power Station is located within the province’s “Investment Incentive Zone” (Figure 16).

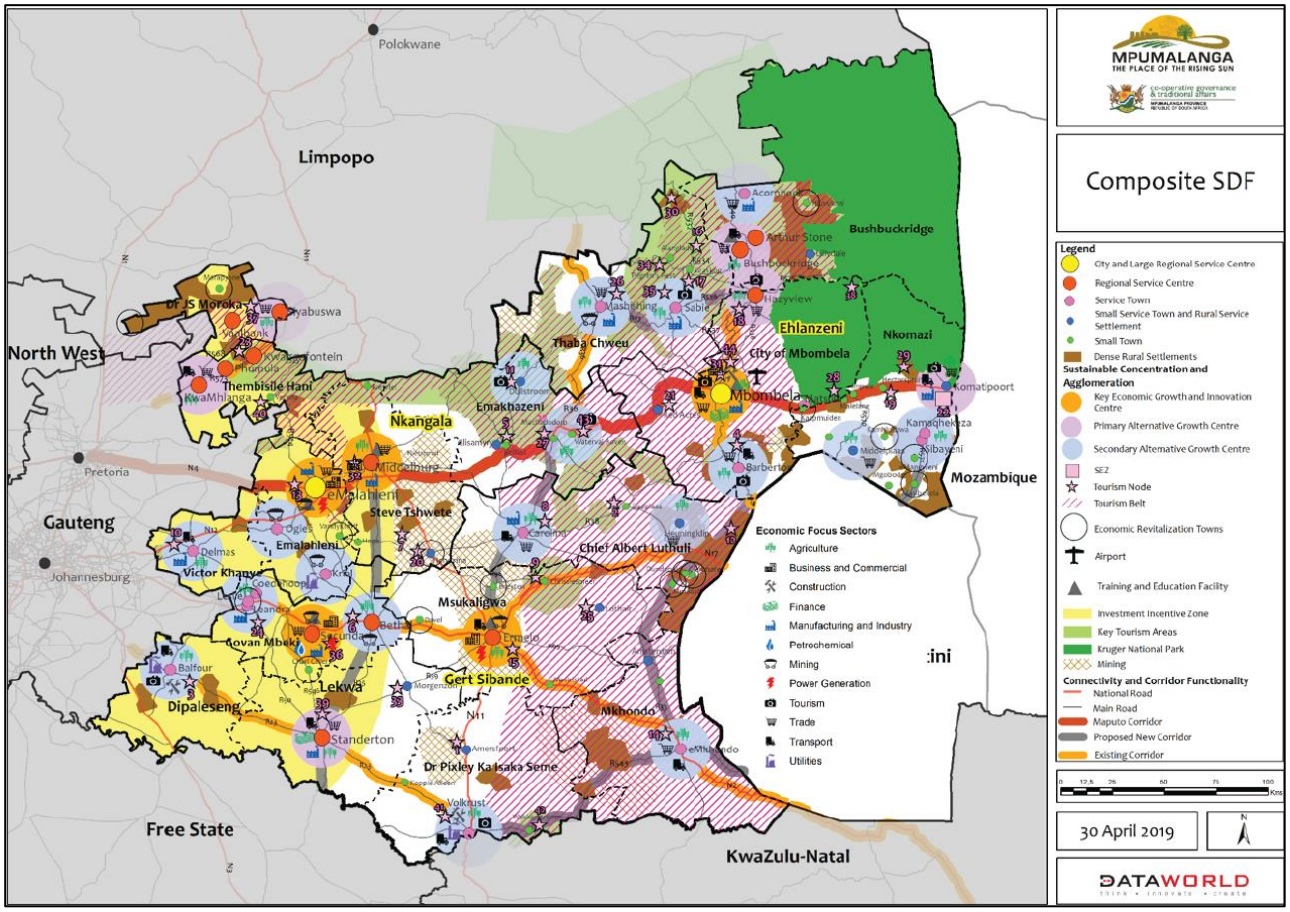

Figure 16: Composite Spatial Development Framework for Mpumalanga Province (MSDF, 2019)

The redesign of the ADF and associated infrastructure footprint and layout that now no longer requires the diversion of the Klipfonteinspruit contributes significantly to the MSDF's Strategic Objective 2: Ensure Conservation of all Water Resources and Catchment Areas. The environmental impacts associated with the diversion of the Klipfonteinspruit will be significantly reduced and therefore reduce the overall impact on the downstream Wilge River, a significant perennial reiver within the Olifants Catchment.

4.1.18 NKANGALA DISTRICT MUNICIPALITY DRAFT INTEGRATED DEVELOPMENT PLAN (2023/2024 1ST REVIEW OF 2022/27)

The Nkangala District Municipality's (NDM) IDP's Vision is "*NDM is committed to the improvement of the physical, socio-economic and institutional environment in order to address social and economic infrastructure challenges through sustainable development and service excellence, with emphasis on being a renewable energy hub*". A number of key Local Economic Development (LED) anchor projects have been identified in the NDM's IDP, one of which is the development of the Kusile Power Station. The development of the power station and supporting infrastructure (such as the ADF) are crucial in the long-term provision of electricity, not only to the KDM, but the Country as a whole.

4.1.19 VICTOR KHANYE LOCAL MUNICIPALITY FINAL INTEGRATED DEVELOPMENT PLAN (IDP) (2024/25 REVIEW) AND 2014 SPATIAL DEVELOPMENT FRAMEWORK (SDF)

The following is VKLM's vision statement: "*Repositioned municipality for a better and sustainable service delivery for all*". The local municipality's IDP and SDF have also flagged the development of Kusile as "LED anchor projects".

4.1.20 ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE OLIFANTS AND LETABA RIVERS CATCHMENT AREAS – DECEMBER 2009

The Environmental Management Framework (EMF) was developed in order to manage future development to be sustainable as well as monitor and control the cumulative impacts of human activity on the natural environment. The EMF is meant to be a guideline to assist the decision-making process. Based on the information gathered in the status quo process, the EMF area was divided up into 8 management zones as indicated in table 1 below and Figure 31 in the report. The following the key issues were identified within the greater EMF area:

- Water in the EMF area is already over-allocated and further allocations must come from reallocation of existing rights;
- Impoundments of rivers have huge environmental impacts;
- Pollution of water has a negative effect on the user value of water;
- Erosion, turbidity and sediment deposition diminish the potential of the hydrological system;
- Mining activities have a huge negative impact on the scenic quality of the environment;
- Extreme levels of air pollution on the Highveld pose health risks to people;
- Poverty is a major problem over large parts of the EMF area;
- Inadequate services and infrastructure remains a significant problem in certain areas;
- The use of indigenous trees for firewood is not sustainable;
- Medicinal plant harvesting is causing severe damage in certain vegetation types; and,
- The uncertain future impacts of climate change make planning for contingencies difficult.

Kusile falls within Management Zone A – Highveld Energy Hub/Area (Figure 17). The zone represents the current powerhouse of South Africa with extensive coal fields that cover almost all of the area, numerous large coal mines, 6 coal fired power stations (soon to be 7), several major industries and towns that are located in the area. It is also the area where the sensitive headwaters of the Olifants River catchment occur and water quality impacts that originate in the areas have significant implications for downstream areas. The natural vegetation of the areas has been almost completely destroyed and the remaining pans and wetlands are important refuges for natural life.

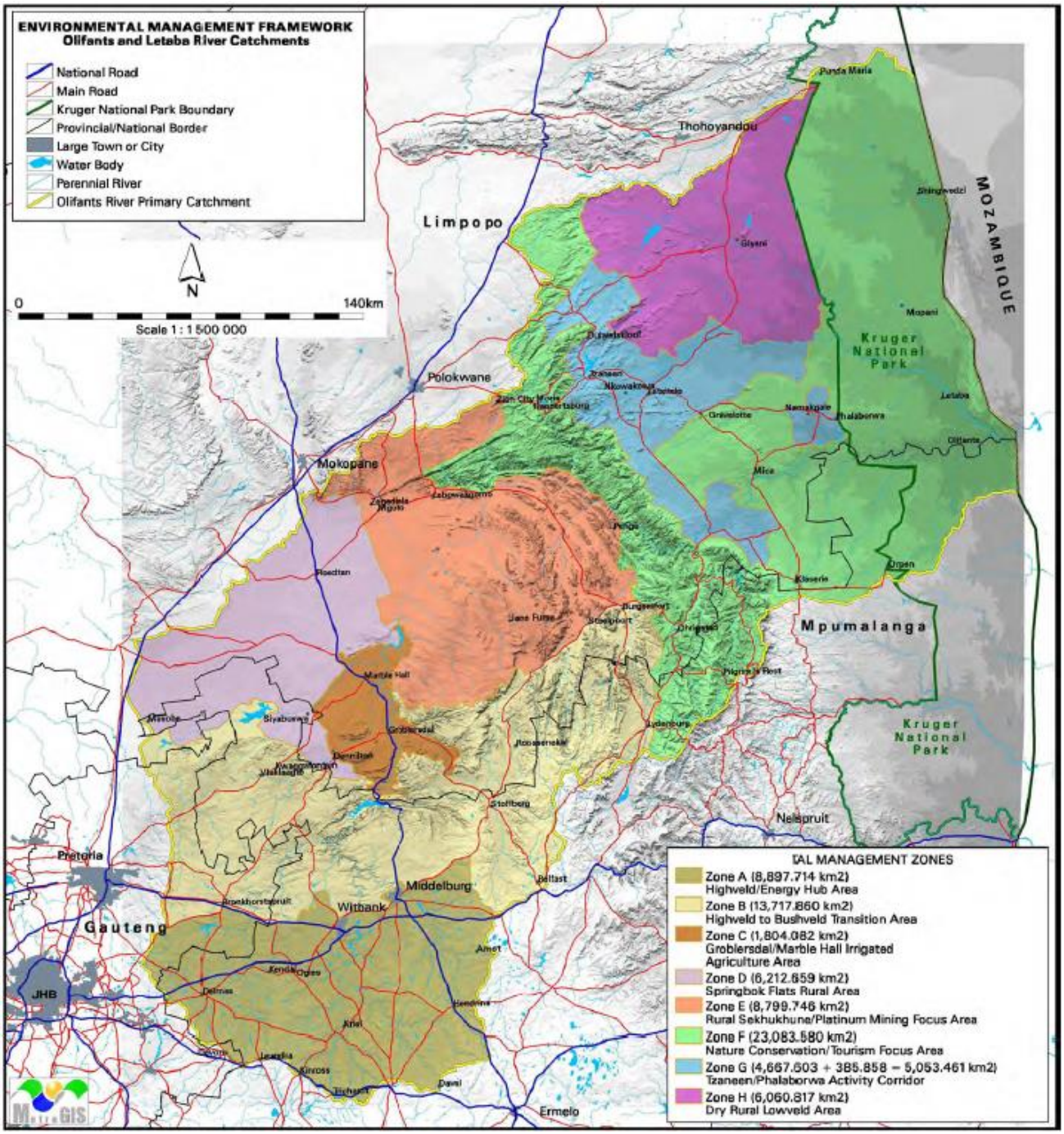

Figure 17: Environmental Management Zones for the EMF for the Olifants and Letaba Catchments.

The major constraints identified within this zone are over-allocation of water; limited scenic value; and very little remaining natural habitat. The major opportunities in this zone are strong income base from coal mining and associated activities, and high agricultural potential. Figure 18 highlights the management guidelines applicable to Zone A.

6.1 MANAGEMENT GUIDELINES

6.3.1 Introduction

The purpose of these guidelines is to assist in attaining the desired state as described in section 5 of the EMF report. It is therefore done for each management zone. Repetition of certain aspect is done on purpose to facilitate a link between the report and the GIS that will give the complete guideline in each instance. The guideline is also done in a point format to make integration with the GIS viewer easier.

6.3.2 Zone A: The Highveld/energy hub area

Guidelines	Responsibility
Water allocation:	
▪ Water allocation in this zone may not have a further negative impact on the ecological reserve of any part of the river system in the EMF area.	DWA
▪ Water allocation to meet the needs of municipalities must in all instances take prevalence over the allocation to other users.	DWA
▪ Additional water allocations for the agricultural, mining and industrial sectors must come from savings from existing allocations that are reallocated. The methods of achieving the savings and facilitating the transfers must be negotiated until DWA develop a policy in this regard.	DWA and water users
▪ Illegal use of water must be investigated, followed up and the perpetrators should be prosecuted.	DWA
Water quality:	
▪ Water users must ensure that water that is released back into the system from their activities must comply with the relevant quality standards. It is their responsibility to find out what standards are applicable to them.	Water use licence holders
▪ Water release quality standards must be applied strictly and transgressors should be prosecuted.	DWA
▪ Municipalities should be capacitated (personnel and funding) to upgrade and manage sewage works to acceptable standards.	DWA
▪ Municipalities that fail to manage sewage work effectively should be prosecuted.	DWA
Conservation:	
▪ All natural wetlands, riparian areas and river systems that occur in the zone as depicted on Spot 5 satellite images dated on or before 30 November 2009 must be maintained in at least the area and condition as at 30 November 2009.	Land owners and users
▪ Whenever possible wetlands should be established as part of the rehabilitation and closure of mines.	DM
Mining	
• A strategic mining plan should be developed for this zone that limits the unrehabilitated surface area of mines to the minimum possible.	DM
Air pollution:	
▪ The Air Quality Management Plan (AQMP) (currently being compiled) that will apply to the zone should be implemented.	Local authorities
▪ The implementation of the AQMP should be monitored and where it fails corrective action must be taken.	DEA
Cooperative government:	
▪ Government instructions at all levels should coordinate their activities in such a way that authorisations, licences and permits issued does not conflict with one another.	All government institutions
▪ Government should focus on implementation of legislation and policies especially in respect to compliance monitoring and enforcement.	All government institutions
EMF principles:	
▪ The EMF principles should be used as guiding norms in the evaluation and decision-making processes of activities that requires an authorisation, licence or permit from government.	All government institutions

Figure 18: Management guidelines for Zone A of the EMF for the Olifants and Letaba Catchments.

The ADF and associated infrastructure project will be developed in compliance with the WUL issued to Eskom. Water quality during the construction and operational phases will be monitored to ensure that no contaminated water is released into the receiving environment.

5 ENVIRONMENTAL, SOCIAL AND ECONOMIC CONTEXT

This section provides a brief overview of the existing environment within the area of influence of the ADF and associated infrastructure. It is important to understand the receiving environment, as this will determine how possible impacts will manifest.

5.1.1 BIOPHYSICAL ENVIRONMENT

5.1.2 CLIMATE[2]

The region falls withing the Highveld sub-tropical climate zone. The summers are characterised by hot, humid and wet conditions whilst the winters are characterised by lower temperatures and monthly precipitation levels are highest in January at approximately 124mm, whilst June is the driest month with about 7mm average precipitation (the mean annual precipitation for the area is 697mm). The region experiences frequent frosts in winter, and the area does receive hailstorms, usually in summer. The evaporation far exceeds precipitation and is expected to be around 1500 mm per annum (Figure 19). The prevailing wind direction is north-westerly in summer and easterly in winter. Winds are usually light to moderate.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
RAIN (mm)	127,8	98,8	88,3	41,7	17,7	7,5	8,0	9,1	18,5	69,5	110,9	114,7	697
S-Pan Evaporation	166,1	143,5	135,4	105	85,3	67,4	74,6	102,4	139,5	163,1	160,3	174,9	1524

Figure 19: Monthly rainfall and evaporation for the greater surrounding area (data from DWS station B2E001)

5.1.3 TERRESTRIAL ECOLOGY

The majority of the information presented is taken from the SANBI BGIS website of existing environmental spatial datasets (accessed 12 September 2024).

5.1.3.1 Regional Context

The study area falls within the Grassland Biome, and specifically within the Rand Highveld and Eastern Highveld Grassland vegetation types (Figure 20). Both vegetation types are listed as Vulnerable according to the 2022 revised national list of threatened ecosystems.

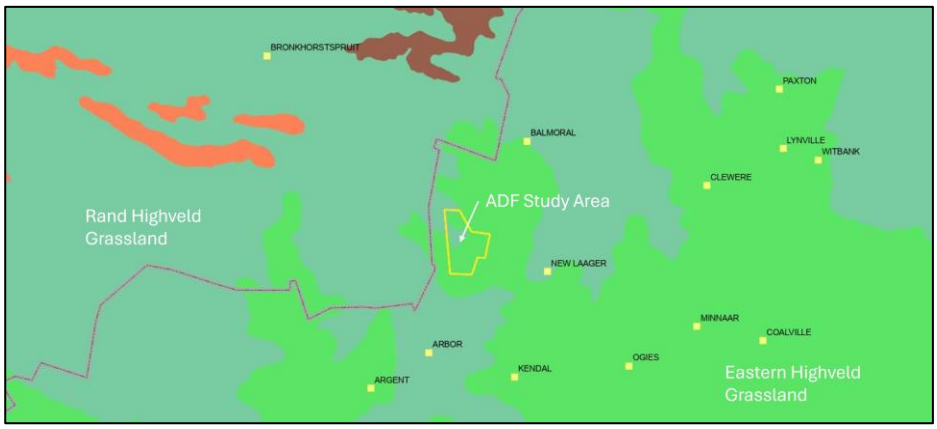

Figure 20: 2018 National Vegetation Map highlighting the relevant vegetation types within the ADF study area (SANBI BGIS, accessed September 2024)

[2] EPCM Phase 1 ADF Full Design Report, February 2024 (Appendix 4)

Based on the 2014 Mpumalanga Biodiversity Sector Plan's (MBSP) Terrestrial Critical Biodiversity Areas (CBAs) data, the majority of the study area is regarded as heavily modified (i.e. cultivated lands based on the landcover layer), moderately modified – old lands with some other natural areas associated with the wetland/ non-perennial streams on site (Figure 21, as well as the Ecological Survey, Search and Rescue of Plant Species and Avifaunal Assessment Report in Appendix 5). The MBSP provides the following category descriptions:

- Modified: Areas that have undergone a significant and often irreparable degree of transformation that has led to a near-complete loss of biodiversity and ecological functioning. Common agents of modification include mining, arable agriculture and infrastructure development.
- Modified - Old Lands: Areas that have been altered by cultivation and other activities within the last 80 years and subsequently abandoned. The biodiversity and ecological functioning in such areas is compromised but may still play a role in the provision of ecosystem services.
- Other Natural Areas: Areas that have not been selected to meet biodiversity conservation targets, yet they are likely to provide habitat for flora and fauna species and a range of ecosystem services.

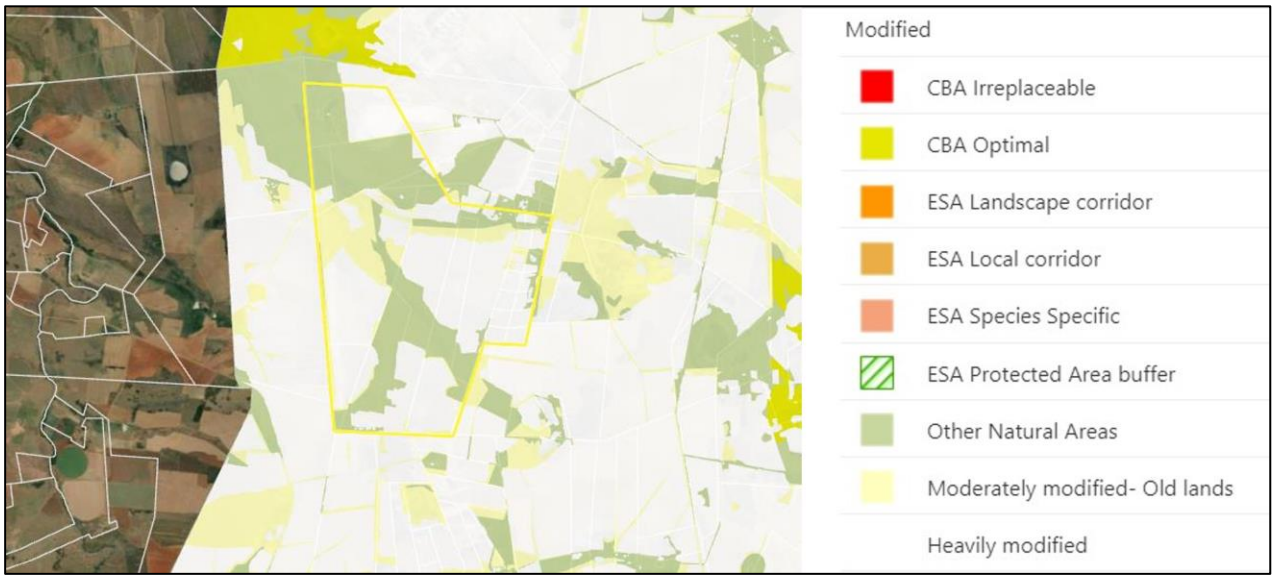

Figure 21: 2014 Mpumalanga Biodiversity Sector Plan Terrestrial Critical Biodiversity Areas (CBAs) layer (SANBI BGIS accessed September 2024).

5.1.3.2 Local context applicable to the study area for the ADF and associated infrastructure[3]

Golder Associates, May 2014: Terrestrial Ecosystems Assessment (Appendix 5)

Field surveys were conducted in 2013, and the following results pertaining to the study area are applicable (refer to Figure 22) :

- No endemic, Red Data or protected species were recorded in the cultivated lands and the probability of such species occurring in this vegetation community is considered low.
- Although many areas comprising Dry mixed Grassland are negatively impacted by overgrazing, within the context of the broader landscape matrix, this vegetation community provides valuable and important natural grassland habitat. The ecological integrity of this vegetation community ranges from medium in disturbed areas (dominated by *Hyparrhenia hirta*) to high in less disturbed areas. Two protected flora species (*Boophane disticha* and *Hypoxis* species) were recorded in the Dry mixed grassland and the suitability of this vegetation community as habitat for other Red Data and/or protected species is considered high. Accordingly, the conservation importance of areas of this vegetation community is also high.

[3] Information gleaned from the Ecological Survey, Search and Rescue of Plant Species and Avifaunal Assessment Report by Kimopax (Jan 2023) in Appendix 5.

- Areas characterised by the moist grass and sedge vegetation community play a critical ecological role in the purification and supply of water and are thus highly valuable hydrological features. Moreover, they also provide important breeding, feeding and dispersal habitat for a variety of fauna, some of which may be Red Data and protected fauna, as well as a threatened flora species such as inter alia *Eucomis autumnalis* and members of the genus *Gladiolus*, all potentially occur in this vegetation community. The ecological integrity of this vegetation community is therefore considered high and accordingly, the conservation importance of these areas is considered high.
- Twenty-five Red Data and/or protected plant species have historically been recorded in the general vicinity in which the study area is located according to the SANBI SIBIS database and data received from the Mpumalanga Tourism and Parks Agency. These are primarily from the families MESEMBRYANTHEMACEAE (5 species), IRIDACEAE (4 species), ORCHIDACEAE (4 species). All have a high probability of occurring in the study area. Plant species of conservation importance recorded in the study area include *Boophane disticha*, *Crinum bulbispermum*, *Hypoxis* sp. and *Gladiolus* sp.

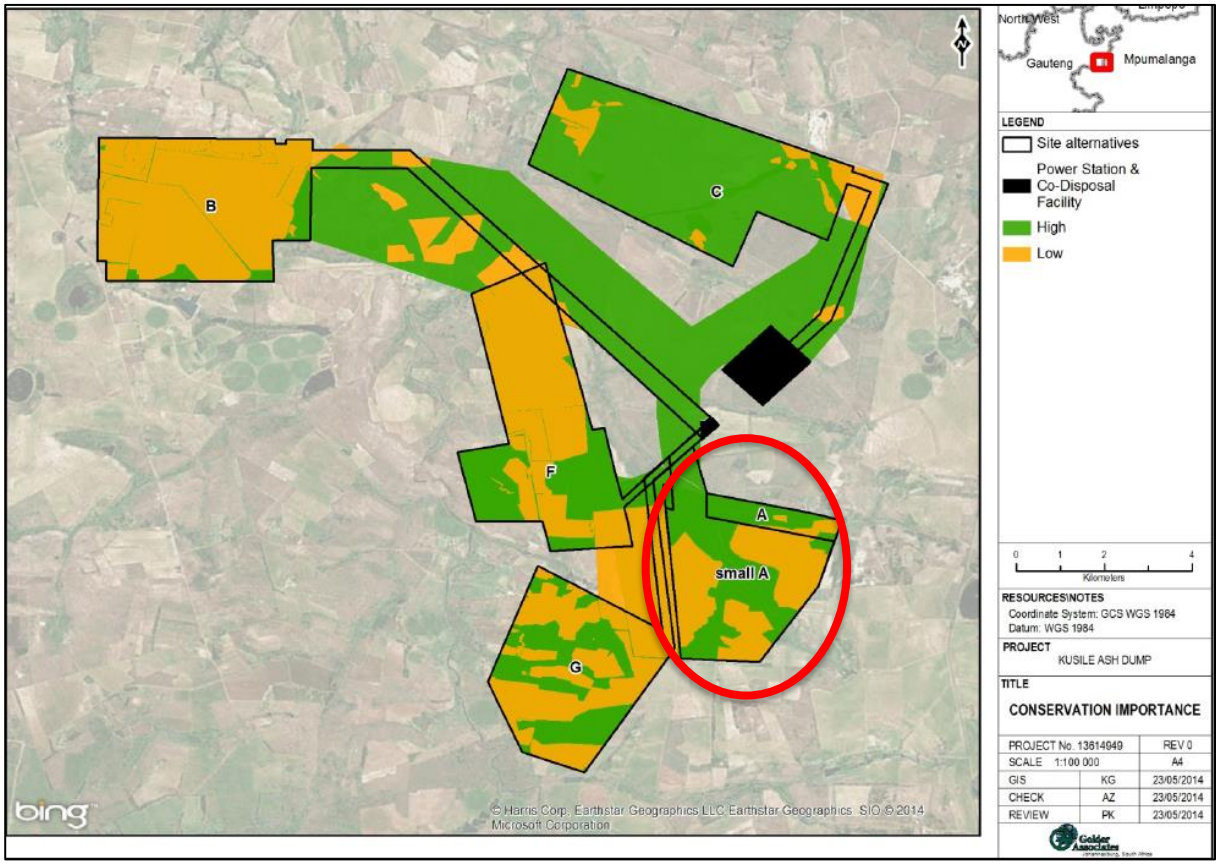

Figure 22: Conservation importance of the vegetation communities (Golder Associates, 2014). The red circle highlights the applicable study area for the ADF and associated infrastructure project, as approved.

- Red Data and protected mammals:
  - Two Red Data/protected mammal species, namely the Aardvark and Cape clawless otter have been recorded in the study area. The Aardvark and Cape clawless Otter are Protected in terms of Schedule 2 of the Mpumalanga Nature Conservation Act, 1997 (Act No. 10 of 1997) [MNCA].
  - Twenty-one Red Data and/or protected mammal species potentially occur in the study area.
- Birds:
  - All of the birds identified are common and widespread species, typically associated with grassland and wetland habitats on the Highveld.
  - An additional 15 Red data/protected species may occur in the study area.

- Herpetofauna
    - All recorded reptile and amphibian species are common and not restricted in terms range or habitat.
    - According to Schedule 2 of the MNCA, all species of reptile excluding both monitor species and all snakes, are listed as Protected. This notwithstanding, the Spotted Harlequin snake (*Homoroselaps lacteus*) which may potentially occur in the study area, has been categorized by provincial authorities as Near-threatened, while two other species which may also occur in the study area, the Breyer's long-tailed seps (*Tetradactylus breyeri*) and the Striped Harlequin snake (*Homoroselaps dorsalis*), are listed by the IUCN as Vulnerable and Near Threatened, respectively. The probability that these species occur in the study area is considered moderate.
    - In terms of amphibians, the Giant bullfrog (*Pyxicephalus adspersus*) is the only listed amphibian that may potentially occur in the study area. According to Schedule 2 of the MNCA this species is Protected, while the NEMBA TOPS List (2007) and IUCN categorise it as Near Threatened. The probability of Giant bullfrog (*Pyxicephalus adspersus*) occurring in the Moist grass and sedge vegetation community in the study area is considered high.
- Arthropoda
    - All taxa recorded were common and widespread species.
    - The Marsh sylph (*Metisella meninx*) has a high probability of occurring in the study area. This species is listed as Vulnerable according to Henning *et al.* (2009) and favours wetland and marsh habitats on the Highveld. Within the study area this species potentially occurs in undisturbed sites comprising the Moist grass and sedge vegetation community.
    - Other arthropods of conservation importance that potentially occur in the study area include members of the CTENIZIDAE (trapdoor spiders) and THERAPHOSIDAE families (Baboon spiders). These spiders usually live in burrows or silk-lined retreats, none of which were observed in the study area. That said, on-site habitat is suitable for these species and the probability that they are present is considered moderate.
    - Scorpions of conservation importance: *Opistacanthus Validus* and *Opistophthalmus glabrifrons* were not recorded in the study area, the probability that they are present is also considered high, particularly in areas of Rocky scarp.

Kimopax, January 2023: Ecological Survey, Search and Rescue of Plant Species and Avifaunal Assessment (Appendix 5)
A single early wet season survey only which was conducted in September 2022; however, in-field conditions represented dry season conditions and much of the vegetation was not in flower, therefore species identification was limited. The following results are applicable:

- The vegetation within the area had been largely disturbed by previous land uses for agricultural practices, thus the areas of grassland within the project area have been altered from the natural state and are dominated by *Themeda triandra*, *Eragrostis curvula* and *Sporobolus africanus*.
- Species of *Helichrysum* and *Hypoxis hemerocallidea* were identified throughout the project area.
- Species of *Cyperus esculentus* and *Juncus effusus* were identified within the moist areas associated with the non-perennial streams and wetlands.
- The overall plant diversity within the project area was considered low.
- No Red Data plant species were recorded within the project area.
- *Hypoxis hemerocallidea* (African Potato) with medicinal value was the only plant species of conservation concern identified and listed as Declining.
- Avifauna: No threatened species (Red Data species) were recorded within the project area during the survey.
- The ecological sensitivity of the study area was rated as Low.
- Assessment of impacts associated with the loss of floral and faunal habitat and ecological structure, and the direct loss of fauna, was rated as Low negative significance.
- The impact of the spread of alien invasive plant species was rated as Low negative significance.

5.1.4 HYDROLOGY – SURFACE WATER

5.1.4.1 Regional Context

The Kusile Power Station and ADF fall within the Olifants Water Management Area, within the B20F quaternary catchment (Figure 23). The Klipfonteinspruit passes between the Power Station and the ADF, flowing in a westerly direction, ultimately joining the Wilge River system (Figure 1). The Holfonteinspruit and its western tributary flow northwards to join the Klipfonteinspruit. The ADF will be positioned over the Holfonteinspruit and its tributary, as shown in the block plan and master plan layout in Appendix 2.

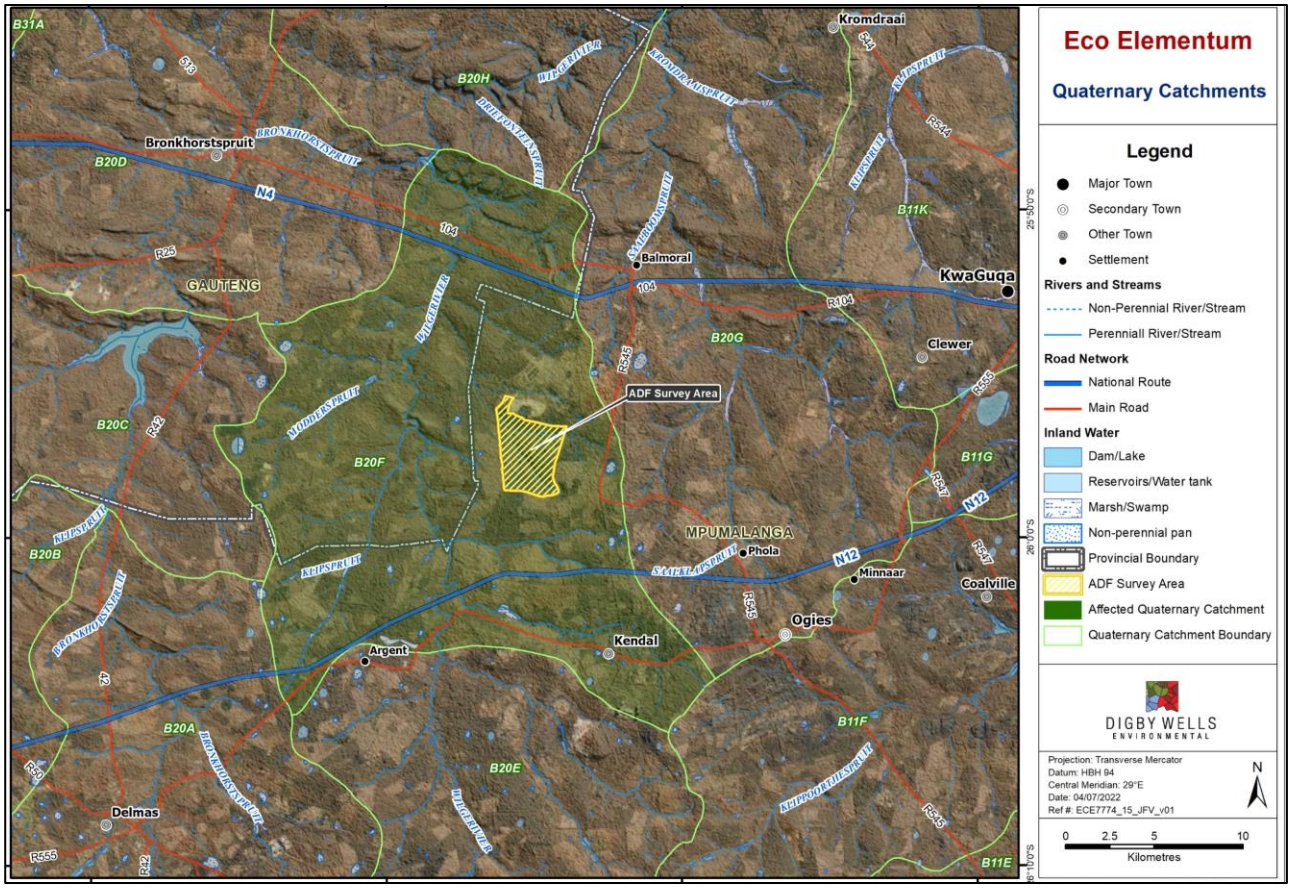

Figure 23: Quaternary Catchment Map (Digby Wells, July 2022)

The Wilge River (approximately 3.2km downstream of the Klipfonteinspruit tributary) has been classified as a Class II (indicating moderate protection and moderate utilization) water resource with a Recommended Ecological Category (REC) to be maintained as a "B Category" system, according to the Classes and Resource Quality Objectives of Water Resources for the Olifants Catchment (Government Gazette Notice R. 466 of April 2016).

5.1.5 WETLAND ECOLOGY

5.1.5.1 Local Context[4]

Based on a detailed literature review (including desktop assessment) and site visits conducted in 2022, Digby Wells Environmental delineated the wetland environments found within the ADF study area (Figure 24). The CVB wetlands were determined to have higher modification scores than that the hillslope seeps. This is attributed to existing crossings and impeding structures which affect the natural hydrology of the wetlands. The hillslope seeps are characterised by higher vegetation modifications, due to the ingress of Alien Invasive Plants (AIP). Other impacts include: informal wetland

[4] Information taken from Digby Wells Environmental: Wetland Environmental Impact Assessment & Offset Strategy Update Report of July 2022.

crossings and culvert structures; dams; alien invasive trees; bare cultivated lands encroaching on the wetlands; drainage gullies; and erosion.

Table 5: Wetland Ecological Health Assessment Scores (2022) for wetlands on site

HGM Unit	Hydrological Health	Geomorphological Health	Vegetation Health	Final PES	PES Category
HGM 1 - CVB	6.5	3.6	5.8	5.5	D
HGM 2 - CVB	5	2.8	5.7	4.5	D
HGM 3 - CVB	9	5.4	7.4	7.5	E
HGM 4 - Seep	3	1.3	4.6	2.9	C
HGM 5 - Seep	3	1.6	7.8	3.9	C
HGM 6 - Seep	3	1.6	7.1	3.8	C
HGM 7 - Seep	7.5	3.3	4.6	5.3	D

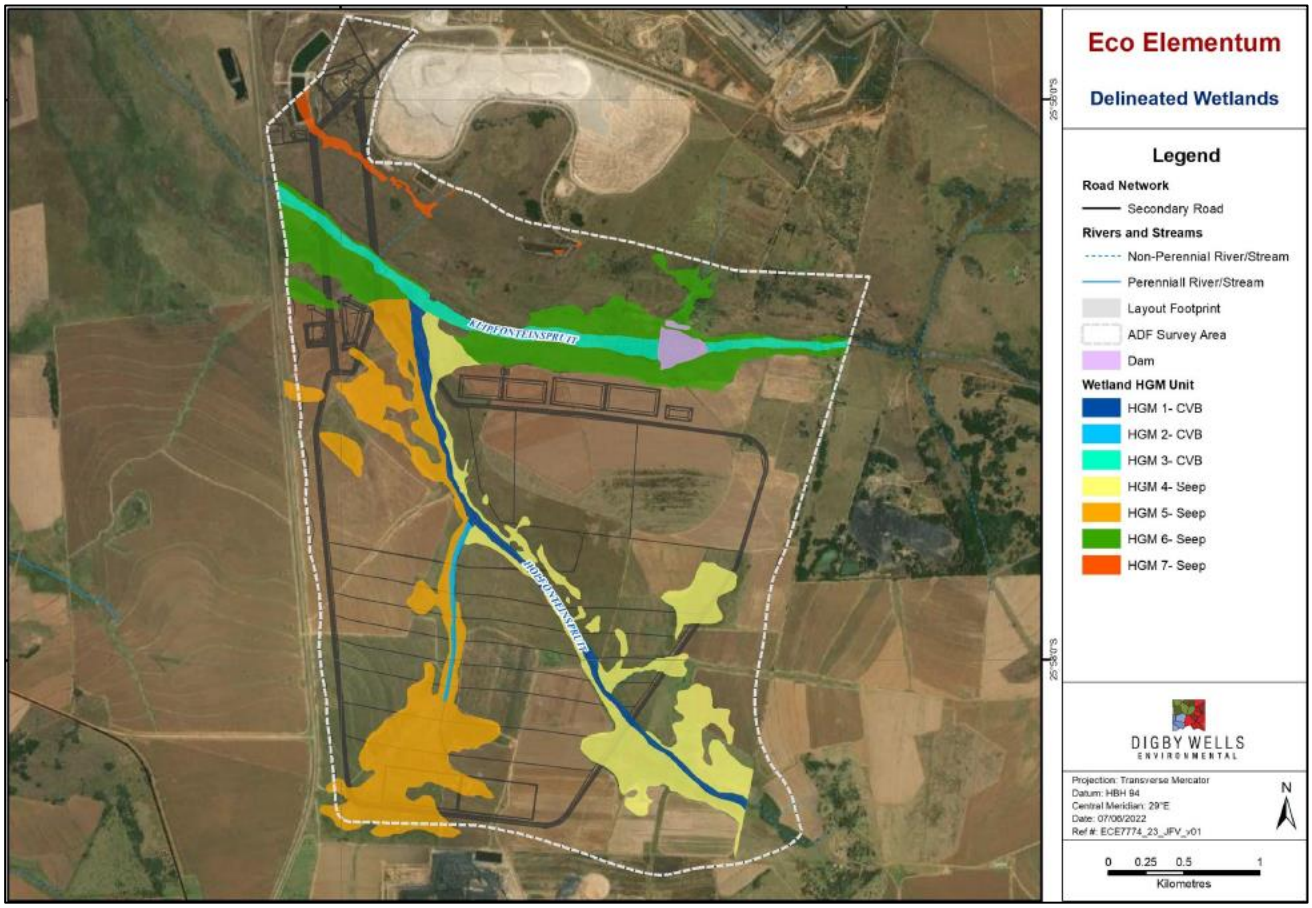

Figure 24: Delineated wetlands highlighting CVB and Seep wetlands within the ADF study area (Digby Wells, 2022).

The Ecological Importance and Sensitivity (EIS) categories for the wetlands within the ADF Project Area were rated as moderate for CVBs and Low for Hillslope Seeps. The main reason for the difference in EIS scores can be explained by the fact that the hillslope seeps aren't nationally protected as part of the NFEPA or NBA wetland data set series. Additionally, the vegetation type is characterised as being endangered, which contributes to the calculated scores.

The following Recommended Ecological Class (REC) ratings were determined for each of the wetlands to be conserved within the Project Area *(i.e. those associated with the Klipfonteinspruit which no longer requires diversion*) based on the current PES and the current EIS ratings. The REC for HGM 3A, has been determined to be a class D due to the current PES and the EIS which have been calculated to be "E" and "B" respectively. Improving the health of the wetland past D is considered impractical considering the extent of impacts within the system. As for HGM 6, it is considered impractical to

improve this system past a "C" condition, predominantly due to the unlikely control of AIPs within this system. The improvement of HGM 7 too will be unfeasible, considering the existing impedance of infrastructure in these wetland systems.

Table 6: Recommended Ecological Class (REC) calculated from Current PES and EIS

	HGM 3 - CVB	HGM 6 - Seep	HGM 7 - Seep
PES	E	C	D
EIS	B	B	C
Practical to Improve PES Rating? (Y/N)	N/A	N	N
REC	**D**	**C**	**D**

The water stored within the wetlands on site is the dominant wetland flow driver at 68%, with surface flows contributing 20% and groundwater flows 12% (Refer to Appendix 5 for the hydro-pedologic study of 2022).

5.1.6 GEOLOGY AND SOILS

Information for this component of the receiving environment is sourced from the Phase 1 ADF Full Design Report (refer to Appendix 4).

5.1.6.1 Regional Context

According to the 1:250 000 geological map 2528 Pretoria the regional lithostratigraphy of the site comprises of the Ecca and Dwyka Groups of the Karoo Supergroup. The constituents of these sedimentary formations are predominantly the tillites and shales of Permian age. The site is underlain by shale, shale sandstone, grit sandstone, conglomerate with coal in places near the base and top from the Ecca Group with tillite and shale from the Dwyka Group of the Karoo Super Group, with diabase intrusions that is of Vaalian and post-Mogolian age. Underlying these formations is the Silverton Formation shale's that are carbonaceous in places with hornfels and chert from the Pretoria Group. The region is not underlain by dolomite.

5.1.6.2 Site Context

An area-specific description of the geology is given below. This is a generalised summary due to the variability of the tillite composition. The Geotechnical Summary Report is attached in Appendix B to the Phase 1 ADF Design Report in Appendix 4 of this DSR).

- Stream bed where the ADF pipeline is to be laid:
  - 0.8 – 2.4m Clayey Silty Sand - Colluvium & Alluvium
  - – 4.9m Silty Clayey Sandy Gravel but varies - Residual Tillite/Shale
  - Groundwater seepage between 0.7 to 3.4m below NGL.
  - Excavatability – Soft to Intermediate
- The PCDs/ CWDs area close to the Klipfonteinspruit:
  - 0.5 – 1.6m Sandy Gravel - Colluvium & Alluvium
  - – 4.9m Silty Clayey Sandy Gravel but varies - Residual Tillite/Shale
  - Groundwater seepage between 0.7 to 3.4m below NGL.
  - Excavatability – Soft to Intermediate
- The ADF Phase 1 area:
  - 0.8 – 3.0m Clayey Silty Sand - Colluvium & Alluvium
  - 2.0 – 5.2m Clayey Sandy gravelly Silt but varies - Residual Tillite/Shale
  - Seepage is evident in the form of springs in places.
  - Excavatability – Soft to Intermediate

5.1.7 HYDROLOGY - GROUNDWATER

5.1.7.1 Regional Context[5]

The study area is located on top of a semiconfined to unconfined shallow, secondary (weathered and fractured) aquifer. Aqua Earth Consulting's field investigations suggest that the groundwater bearing features are located at depth between 4m and 24m below ground level (bgl), with an average of 15m bgl. At such depths, the groundwater is predominantly flowing through weathered shale (upper), the contact between the upper shale and underlining sandstone, fractures and joints developed locally along the fresh shale bedding planes. However, the groundwater flow may also be occurring through the shale brecciated joints, and in the contact zones between different lithologies (sandstone, shale, silstone and rhyolite). The depths to the static groundwater levels range between 2m to 14m bgl, with an average of 6m bgl. Groundwater is expected to drain from the east of the catchment (B20F) boundary, towards the west at the Wilge River, and toward the north-west at the Klipfonteinspruit. The upstream boundary of the study area coincides with the New Largo coal mining (underground and opencast) area where the underlying in aquifer is in contact with the artificial underground mining related aquifer. Groundwater elevations surrounding the site range from 1440 to 1540m above mean sea level. The saturated thickness of the aquifer varies spatially to an average of approximately 30m. No preferential flow was identified in the area during investigation. The potential rainfall recharge in the area was calculated to average 31% of the mean annual rainfall. This results in an annual rainfall recharge to the shallow aquifer, of 196.85mm.

Groundwater in the area is generally unpolluted water qualities which generally falls into the SANS-2006 recommended operational limit for all the constituents measured. Slightly alkaline water was measured at the South-East of the study area. This alkaline water could be associated to polluted groundwater. As result of pollution, fluoride and iron concentrations are above the SANS class 2 maximum allowable limit. The source of pollution may be related to the historical underground coal mine activities in the New Largo but was not proved by the investigations.

The water supply potential (yield), quality, and local importance of the aquifer system for the study area, were considered for the aquifer classification. The Parson's classification scheme (1995) and the revised one (1998) were used for the classification. Based on these South African classification schemes, the aquifer systems associated with the study area is considered to be a "minor aquifer systems" (Management classification point 2), and its vulnerability is classified as medium (Vulnerability classification point 2). This classification resulted in a Groundwater Quality Management Index of "6", indicating a Medium level of groundwater protection is required for the aquifers present at the ADF study area.

5.1.7.2 Site Context[6]

The water table on-site is relatively shallow and saturated conditions can be expected in low-lying areas. Groundwater seepage was recorded in various test pits over the site, at depths varying from 0,7m to about 3,5m, which is generally the depth of weathered rock upper surface. The presence of ferruginisation in portions of the site is indicative of seasonal fluctuations in ground water seepage levels. The seasonal flow in the water courses varies, but even in winter 2023 at a site inspection, there was water flowing at a depth ranging from 0,5m to 1m. Groundwater flow is found to generally follow surface topography.

5.1.8 SOCIO-ECONOMIC ENVIRONMENT

The majority of information contained within this section is taken from the VKLM Final IDP 2024/25 Review, based on Stats SA 2011 and 2022 census data.

[5] Information taken from the Aqua Earth Consulting's PROPOSED KUSILE ASH DISPOSAL FACILITY Bio-physical study: Groundwater Assessment of February 2014 (refer to Appendix 5).

[6] EPCM Phase 1 ADF Full Design Report, February 2024 (refer to Appendix 4).

5.1.9 DEMOGRAPHICS

5.1.9.1 Population

Data from the 2011 and 2022 National Census states that the population within the VKLM grew by 3.3% from 75 452 to 106 149 persons. 50.8% of the population is male, with 49.2% female (StatsSA, 2022). Table 7 shows the breakdown of the population by age group, with the largest group being that of the Youth, which grew by 44.5% from 2011 to 2022.

Table 7: Breakdown of the population by age group

	2011	2022	% total Population (2022)
Children: 0-14	21285	26992	25.4%
Youth: 15-34	28245	40815	38.5%
Adults: 35-59	20217	31067	29.3%
Older Persons: 60+	5706	7275	0.07%

5.1.9.2 Education

The graphic below (Figure 25) highlights the educational profile of the VKLM and differences between the 2011 and 2022 StatsSA census data. While the number of persons within the categories of "no schooling", "some primary", "complete primary" and "higher education" showed a decreasing trend between 2011 and 2022, the categories of "some secondary" and "Grade 12/STD 10" showed improvement.

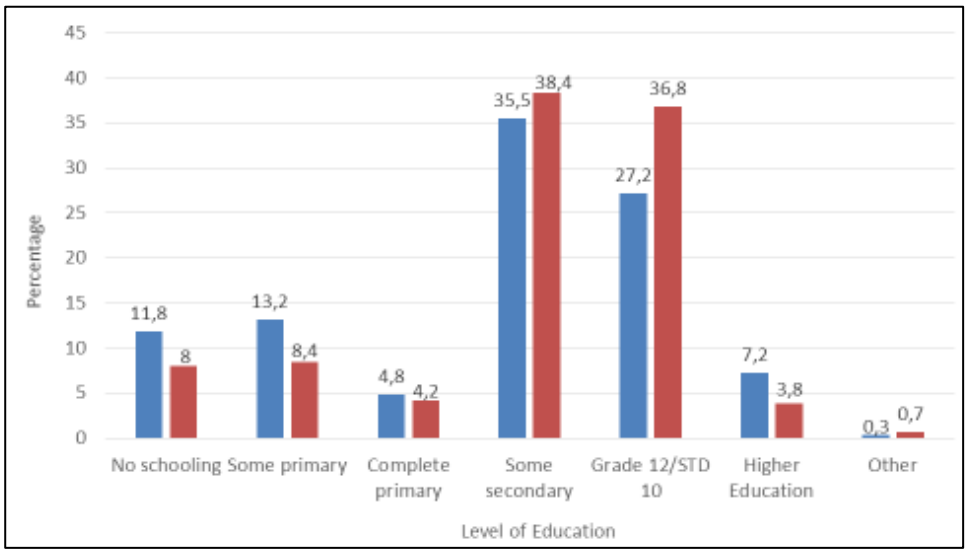

Figure 25: Levels of education of individuals aged 20+ years within the VKLM (Source: StatsSA Censuses 2011 & 2022)

5.1.10 ECONOMIC INDICATORS

5.1.10.1 Household Income Profile

Almost a quarter (24.5%) of the households surveyed during the 2019 IHS and SERO study, had a combined household income of below R42 000.00, which means they qualify to be registered as indigent households. 41.6% of households fall below the poverty line.

5.1.10.2 Unemployment

Unemployment levels are an important indicator of socio-economic well-being as formal employment indicates access to an income and the ability to provide for basic needs. There has been an increasing trend in the levels of unemployment within the VKLM, with more females than males being unemployed (Figure 26). Based on the IHS Global Insight's 2019 Report, it was estimated that 31% of the economically active population of the VKLM were unemployed.

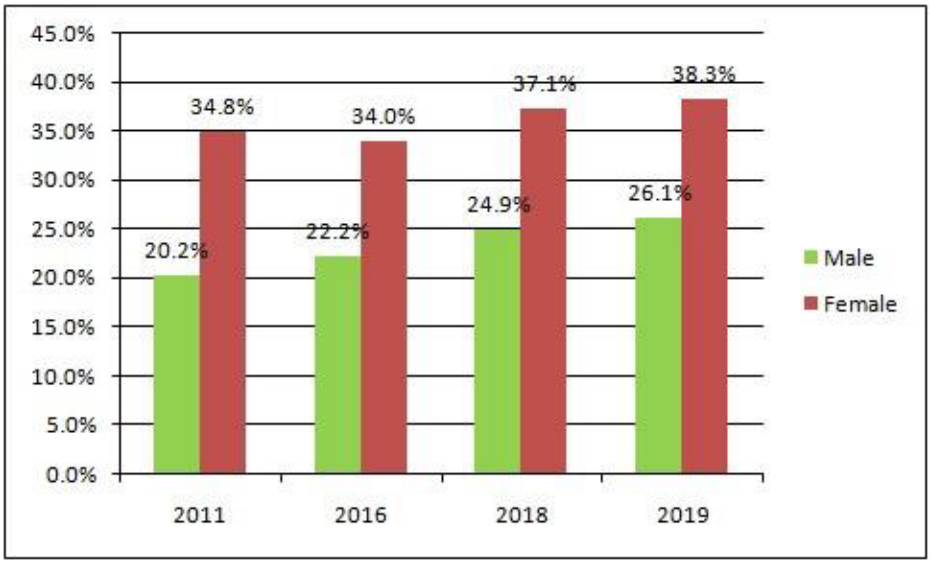

Figure 26: Unemployment by gender within the VKLM (Source: IHS and SERO, 2019)

In summary, the following labour market indicators for VKLM are pertinent (VKLM 2024/25 IDP Review):

- 30.7% official/ strict unemployment rate, deteriorated from 29.2% in 2019.
- 38.0% official female strict unemployment rate, deteriorated from 36.3% in 2019.
- 43.8% official youth (15-34yrs) unemployment rate, deteriorated from 40.4% in 2019.
- -0.9% average annual employment decline 2019-2022; worse than 1.6% per annum growth from 2014-2019.
- 2.3% share of Mpumalanga's employment in 2022.
- 3118 number of job gains in 2022, 2177 job losses in 2021 and 2130 losses in 2020.

5.1.10.3 Sector Employment

Leading industries, in terms of contribution to employment for the VKLM economy in 2019, was Trade (19.6%), Community Services (14.5%), Finance (13.2%) and Agriculture (12.1%) (Figure 27). Mining, trade and community services remained the top three (3) industry employers as per the StatsSA 2022 survey data (Figure 28).

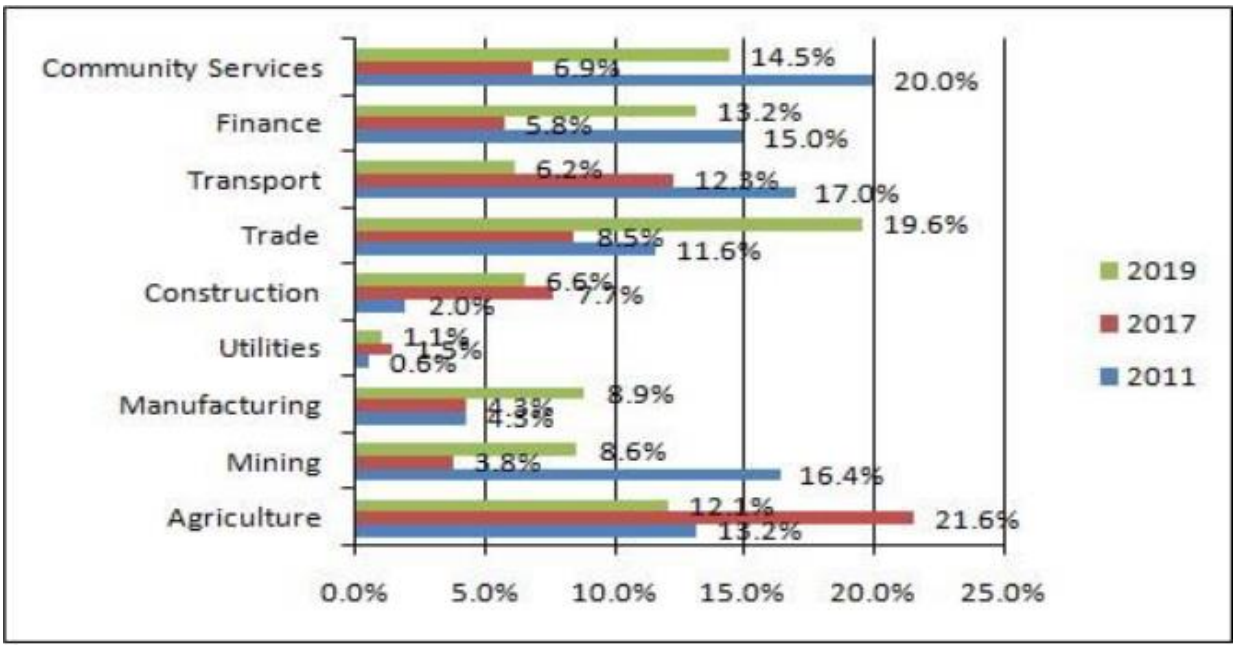

Figure 27: Economic indicator: sector employment within the VKLM (IHS and SERO, 2019)

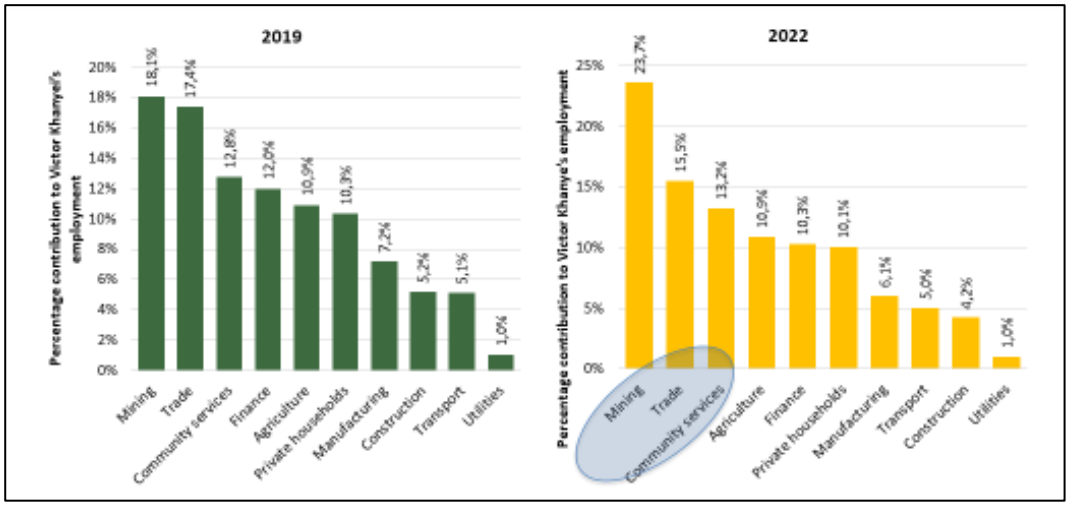

Figure 28: Employment by industry within the VKLM 2019 versus 2022 (Stats SA, 2022)

5.1.11 INFRASTRUCTURE AND SERVICES

5.1.11.1 Water Supply

According to the Community Survey (2016), 20 139 of households have access to potable water on their stands. The municipality provides 1 144 of the households in rural areas with water carrier/tanker (Table 8). The overall backlog on water is estimated to be 1 495 households. The water backlog affects the sanitation directly - as most houses without potable water are still using the bucket system, pit latrines, or septic tanks.

Table 8: Access to piped water (Source: Census 2011, Community Survey 2016)

	2011	2016
Piped water inside dwelling/yard	17100	20139
Communal standpipe	2565	2694
No access to piped water	882	1437

5.1.11.2 Sewerage and Sanitation

The bucket system is still prevalent in the informal settlements and represents the biggest development challenge, in terms of sanitation. Of the 24 270 households in the Victor Khanye Local Municipality, only 20 568 households (85%) have a reasonable sanitation service on their stands. These figures translate to a sanitation backlog of at least 3 702 households (15%) (Table 9).

Table 9: Access to sanitation within the VKLM (Source: Community Survey, 2016)

	2001
Flush toilet connected to sewer system	18 623
Flush toilet connected to septic tank/ conservancy	1 945
Chemical toilet	330
Pit toilet with ventilation	263
Pit toilet without ventilation	960
Ecological toilet	1 140
Bucket toilet (collected by municipality)	101
Bucket toilet (emptied by HH)	590
None	318
Total	24 270

5.1.11.3 Electricity

Approximately 93.5% of the households in the Victor Khanye Municipal area use electricity for lighting (Table 10). The remaining 6.5%, includes residents of the rural areas and informal settlements or farm dwellers.

Table 10: Population size per electrical service (Source: Community Survey, 2016)

	Mpumalanga	DC31: Nkangala	Victor Khanye
In-House Conventional Meter	127 340	51 634	6 552
Prepaid	970 018	298 806	14 947
Connected to other source/HH pays	16 334	7 515	675
Connected to other source/HH don't pay	9 346	3 311	181
Solar	1 162	339	0
Generator/Battery	1 631	922	71
Other	9 097	4 231	290
No Access to Electricity	103 933	54 386	1 585
Total	**1 238 861**	**421 144**	**24 270**

5.1.11.4 Waste Management

According to the 2016 Community Survey, 79% of households received a regular service from the municipality (Table 11).

Table 11: Population size: waste removal (Source: Community Survey, 2016)

	Mpumalanga	Nkangala	Victor Khanye
Removed by local authority/private company at least once a week	487 949	201 581	16 775
Removed by local authority/private company less often	40 295	13 678	1 578
Communal refuse dump	66 638	26 570	768
Own refuse dump	544 665	136 803	2 351
No rubbish disposal	80 522	35 300	2 079
Other	18 782	7 211	783
Total	**1 238 861**	**421 144**	**24 270**

5.1.11.5 Road Infrastructure

The road infrastructure was originally designed for the low volume traffic. However, the traffic volume has increased, due to growth within the mining and farming sector. About 85% of roads within the municipality are dilapidated because of the increased traffic volume, especially heavy coal haulage trucks.

5.1.12 CULTURAL HERITAGE AND PALAEONTOLOGY

PGS Heritage compiled a Heritage Impact Assessment (HIA) Report in June 2014 as part of the original EIA for the approved ADF and associated infrastructure project. Their report provides the baseline and heritage status quo for the study area. Refer to Appendix 5 for the full report. The study identified two (2) heritage structures and four (4) cemeteries within the ADF study area (Table 12 and Figure 29).

Table 12: Graves and Farm Structures located within the ADF study area

Site No.	Description
A1	Cemetery of 24 African graves, cemetery to be relocated.
A2	Small farm labourer accommodation structure, possible burials adjacent to structure.
A3	Remains of a recent farmhouse. No mitigation required before destruction.
A5	Informal cemetery with 10 informal graves, cemetery to be relocated.
A6	Informal cemetery with 10 informal graves, cemetery to be relocated.

Figure 29: Location of heritage structures and graves within the ADF study area relative to the ADF footprint

The palaeontological research (undertaken by Metsi Metseng Geological and Environmental Services in January 2013 – Appendix 5) for the project has also identified palaeontological sensitive areas within the ADF study area. The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Numerous plant fossils have been described by Bamford (2011) from the Vryheid Formation. Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1985). Thus, the palaeontological sensitivity of the Vryheid Formation was rated as a "high sensitivity" (refer to the locality map, Figure 1).

5.1.13 AIR QUALITY

Pertinent to this EA application for the development of dams, is the potential generation of dust and PM_{10}. Refer to Section 4.1.11 and 4.1.12 for details pertaining to the HPA within which Kusile is located. Because Kusile is located within the HPA, Kusile monitors dust fallout monthly. The purpose of the dust fallout monitoring survey is to report on the monitoring results regarding dust generated from Kusile's production activities and the impact this dust has on the surrounding environment and sensitive receptors. From the results of the dust fallout monitoring conducted in the month of July 2024 for Kusile, it may be concluded that:

- Of the 32 dust monitoring sampling points, 30 were sampled and analysed during the month of July 2024. Dust buckets at EK 06 (Ash Dump) and EK 24 (Construction Site - Point D) were missing or damaged. This has been addressed and monitoring will continue in August 2024.
- Dust deposition concentrations at most of the sampling sites conform to the Eskom Kusile Construction Environmental Management Plan Standard Environmental Specification limit as well as the non-residential limit

when evaluated against the dust deposition criteria stipulated by the 2013 NDCR, SANS 1929:2011 and SANS 1137:2012.

- The exception was the monitoring point EK15 (Coal Stockpile North) that exceeded the non-residential limit of the NDCR.

The following recommendations were made to limit or reduce dust:

- Increased volume and frequency of dust suppression on unpaved roads;
- Increase volume/duration and frequency of dust suppression on the ash dump and coal stockyard;
- Reduced vehicle speeds on dry, unpaved roads;
- All loads on coal vehicles should be covered or not to be overfilled;
- Increase cleaning of haulage vehicles; and,
- Dust suppression at open and exposed areas around the ash dump.

6 PUBLIC PARTICIPATION PROCESS

The Public Participation guideline (DEA, 2017) provides the following introduction and legal background with regards to the public participation process within the EIA.

According to Section (2)(4)(f) and (o) of the Act,

- *the participation of all interested and affected parties (I&APs) in environmental governance must be promoted and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured, and*
- *the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*

In order to give effect to the above sections, it is essential to ensure that there is adequate and appropriate opportunity for public participation (PP) in decisions that may affect the environment. Section 24(1A) (c) of the Act allows for this participation by requiring that the person conducting PP comply with any regulated procedure related to public consultation and information gathering through the public participation process (PPP).

The guideline further highlights the following characteristics of a comprehensive public participation process:

- It provides an opportunity for all role players (including potential and registered I&APs, EAPs, state departments, organs of state, and the Competent Authority) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- It provides role players with an opportunity to voice their support, concerns and questions regarding the project, application or decision;
- It provides role players with the opportunity of suggesting ways for reducing or mitigating any negative impacts of the project and for enhancing its positive impacts;
- It enables the person conducting the public participation process to incorporate the needs, preferences and values of potential or registered I&APs into its proposed development that becomes subject of an application for an EA;
- It provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- It encourages transparency and accountability in decision-making;
- It contributes towards maintaining a healthy, vibrant democracy; and,
- It gives effect to the requirement for procedural fairness of administrative action as contained in the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000).

The following sections detail the methodology employed to ensure an effective and transparent public participation process as part of this S&EIR application process.

6.1.1 IDENTIFICATION OF I&APS

Kusile's existing stakeholder database was utilised as the foundation for this EA application's database of all potentially I&APs, including State Departments (Appendix 7). The following categories of I&APs were identified for inclusion (if not already included) in the database:

- Landowners and all directly adjacent landowners;
- Community Organisations, such as: Rate Payers Associations, Home Owner Associations, Interest Groups, etc.;
- Relevant State Departments, such as:

  - Environmental, planning and other departments within Provincial Government, District and Local Municipalities;
  - Department of Water and Sanitation (DWS);
  - Department of Public Works;
  - Tribal Chiefs; etc.
- Ward Councillors;
- Non-Governmental Organisations (NGOs) (such as Wildlife and Environmental Society of South Africa (WESSA));
- Various environmental protection agencies/ bodies (e.g. SAHRA); and
- Any other party perceived as playing a role within the community/ study area.

All I&APs requesting registration on the project's database and those who submit comments will be captured in the Registered I&APs database. The database will be maintained throughout the S&EIR application process. Those identified I&APs (other than state departments) who do not register during the registration period will not be carried over onto the Registered I&APs database, unless they participate in subsequent stakeholder engagement meetings and/or comment on documents placed within the public domain.

6.1.2 ANNOUNCE THE APPLICATION, CALL FOR I&AP REGISTRATIONS AND REVIEW OF THE DRAFT SCOPING REPORT

The following activities were undertaken to announce the S&EIR application, to request I&APs to register, to announce the availability of the Draft Scoping Report for review and comment (refer to Appendix 7 for details):

- Newspaper advertisements published in English:
  - Beeld on Friday, 18 October 2024;
  - Witbank News on Friday, 18 October 2024; and,
  - Streeknuus on Friday, 18 October 2024.
- Fixing of site notices on Friday, 18 October 2024 at strategic locations on and around the site (in English, Ndebele & Afrikaans):
  - All three (3) of Kusile Power Station Access Control Gates;
  - Phola Public Library;
  - Bronkhorstspruit Community Library;
  - KwaGuqa Library;
  - Lynville Public Library;
  - eMalahleni Main Library & Witbank Public Library;
  - Delmas Public Library;
  - Victor Khanye Local Municipal Offices in Delmas;
  - eMalahleni Local Municipal Offices;
  - B-Winning Take Away's & Sports Bar (along R545);
  - Mahlangu Tribal Authority Delmas;
  - Borholo Tribal Authority Emalahleni;
  - Mashiane Tribal Authority Phola; and,
  - Mahlangu Tribal Authority D686 Road Balmoral.
- Notification letters were sent via email on Friday, 18 October 2024 to all potential I&APs on the project's I&APs database.

The Draft Scoping Report will be available for review and comment for a period of **30 calendar days** (excluding public holidays) **from 18 October – 18 November 2024** on EPCM's (www.epcmholdings.com) and Eskom's (www.eskom.co.za) websites as well as at the following public venues.

- Phola Public Library (Phola, 2233);
- Bronkhorstspruit Community Library (44 Market Street, Erasmus, 1020);
- eMalahleni Main Library (28 Hofmeyer Street, 1035); and,
- Delmas Public Library (Cnr Sarel Cilliers & Van Riebeeck Streets, 2210).

All comments received, together with requests for registration, will be acknowledged and captured in a Comment and Response Report (CRR).

6.1.3 FINAL SCOPING REPORT

The Scoping Report will be updated to a Final Scoping Report based on the comments and inputs received during the review and commenting period on the draft report. The Final Scoping Report will be submitted to DFFE for review. DFFE will then accept/refuse the Scoping Report, with or without conditions.

7 IDENTIFICATION OF ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

The following potential environmental impacts (both negative and positive) have been identified based on the ISO 14001 Environmental Management System (EMS) standard of firstly identifying activities, associated aspects and resultant potential impacts. Activities, aspects and impacts are defined as:

7.1.1 ACTIVITIES

Activities are the physical activities that typically unfold over the full product lifecycle. In the case of this application the activities are limited to decommissioning, which includes remediating the smelter site where this may be required.

7.1.2 ASPECTS

Environmental and social aspects are defined as 'an element of an organisation's activities, products or services that can interact with the environment.' For example, waste water discharge from washing buildings/ structures.

7.1.3 IMPACTS

Environmental and social impacts are defined as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services". For example, water quality changes that could occur as a result of the uncontrolled discharge of wash water.

The magnitude of the impact will be a function of the **receiving environment.** For example, the impacts of a water demanding activity in the south-eastern parts of KwaZulu-Natal would mean very different impacts to establishing the self-same activity in the Limpopo Province. As such, it is necessary to be able to provide an effective indication of the likely sensitivities or vulnerabilities of the receiving environment to provide for a proper assessment of the scale and severity of the impacts.

7.1.4 IDENTIFIED POTENTIAL IMPACTS

The process of identifying and characterising potential impacts is illustrated in Figure 30 and summarised below as a set of consecutive steps.

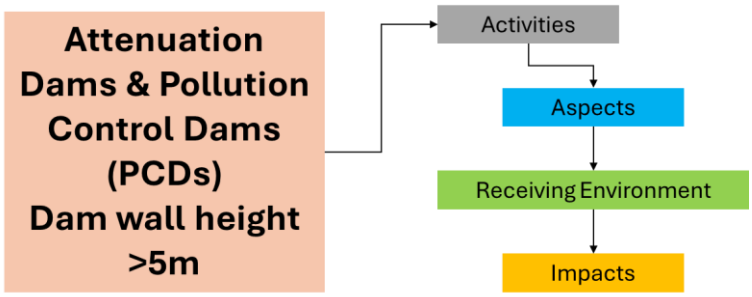

Figure 30: Schematic illustration of the process of identifying potential impacts that may occur as a result of the proposed development of the dams.

Step 1: Identifying activities

In order to identify potential impacts it is necessary to detail the activities that result from the construction and operational phases of the attenuation dams and PCDs. The following activities have been identified based on the detailed project description:

Construction Phase:

- Site preparation activities, such as:
  - Vegetation clearing and removal of topsoil; and,
  - Offloading of building materials on site.
- Installation of subsoil curtain drains;
- Soil excavations (subsoil curtain drains, PCDs and attenuation dams);
- Blasting of bedrock where required;
- Backfill of voids and embankments with imported fill material;
- Construction of the PCDs and attenuation dams;
- Dewatering excavations; and,
- Topsoil placement and re-vegetation with appropriate (indigenous) species (hydroseeding).

Operational Phase:

- On site management of stormwater by way of PCDs, CWDs and the attenuation dams;
- Discharge of clean water (post water quality testing) to the environment (as needed);
- On-going desilting and maintenance of the silt traps and/or PCDs;
- Vegetation monitoring and management; and,
- Monitoring and rehabilitation of potential erosion of dam embankments.

Step 2: Identifying aspects

For each of the identified activities it is necessary to list the associated environmental and social aspects (Table 13). These environmental and social aspects can be identified as a function of the activity list developed in Step 1.

Table 13: Broadly stated environmental and social aspects that would be evoked by the activities listed in Step 1.

Resource Use	Energy	Liquid Fuels
	Land Transformation	Vegetation
		Wetlands
Waste & Pollution	Waste (off-site disposal)	Hazardous solid/ liquid wastes
		Waste concrete
		Vegetation waste
	Effluent	Stormwater
		Wastewater
	Atmospheric emissions	Dust/ PM_{10}
	Radiation	Noise
	Spillage	Hydrocarbons
Socio-Economic	Jobs	
	Spending	
	Skills/ Experience	

Step 3: Characterising the receiving environment

The receiving environment has been described within Chapter 5.

Step 4: Identifying potential impacts

The final step is then determining the impacts themselves. Key environmental and social impacts are summarised in Table 14 and Table 15 below.

7.1.5 IDENTIFIED CUMULATIVE IMPACTS

The 2014 EIA Regulations define "cumulative impact" in relation to an activity as: "*the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*."

The cumulative impacts associated with the authorised ADF, and associated infrastructure project were assessed within the original EIA. The change in the design and number of the attenuation dams and PCDs only impacts the internal water management system of the ADF facility, with the same ultimate impact on the downstream receiving environment, as originally assessed. Thus, cumulative impacts are not applicable within this EIA – the main purpose of which is to authorise larger dams with dam wall heights exceeding 5m. ***In fact, the reduction in the footprint size of the ADF and the opportunity to avoid the diversion of the Klipfonteinspruit with the associated loss of CVB and seep wetlands, reduces the cumulative impact assessment of the authorised ADF and associated infrastructure project.***

Table 14: Construction Phase: Potential negative and positive impacts that could be invoked by the environmental and social aspects associated with the larger attenuation dams and PCD associated with the authorised ADF and associated infrastructure project.

Environmental and Social Aspects			Activities – Construction Phase								Potential Impacts (viz. potential changes in…)	Potentially Significant Impacts Requiring Assessment
			Vegetation clearing and removal of topsoil	Excavation of soils	Installation of subsoil curtain drains	Blasting of bedrock	Backfill of voids & embankments	Construction of dams	Dewatering of excavations	Topsoil placement & revegetation		
Resource Use	Energy	Liquid fuels	X	X	X	X	X	X	X	X	Resource use	No
	Land Transformation	Vegetation	X								Terrestrial biodiversity	Yes
		Wetlands	X	X			X	X	X		Wetland ecology	Yes
Waste & Pollution	Waste (off-site disposal)	Hazardous solid/ liquid waste				X		X			Landfill airspace	No
		Waste concrete						X			Landfill airspace	No
		Vegetation waste	X								Landfill airspace	No
	Atmospheric emissions	Dust/ PM_{10}	X	X	X	X	X	X		X	Ambient air quality	Assessed
	Radiation	Noise	X	X	X	X	X	X	X	X	Ambient noise quality	Yes (Blasting)
	Effluent	Stormwater	X	X	X	X	X	X	X		Sedimentation	Yes
		Wastewater						X	X		Water quality	Yes
	Spillage	Hydrocarbons	X	X	X	X	X	X	X	X	Water & soil quality	Yes
Socio-Economic	Jobs (temporary)		X	X	X	X	X	X	X	X	Socio-economics	No
	Spending		X	X	X	X	X	X	X	X		No
	Skills/experience		X	X	X	X	X	X	X	X		No

Table 15: Operational Phase: Potential negative and positive impacts that could be invoked by the environmental and social aspects associated with the larger attenuation dams and PCD associated with the authorised ADF and associated infrastructure project.

Environmental and Social Aspects			Activities: Operational Phase					Potential Impacts (viz. potential changes in…)	Potentially Significant Impacts Requiring Assessment
			Water Management	Discharge of clean water to the environment	Maintenance: desilting of silt traps and/or PCDs	Vegetation monitoring & management	Monitoring & rehabilitation of potential erosion		
Resource Use	Energy	Liquid fuels	X	X	X	X	X	Resource use	No
Waste & Pollution	Effluent	Stormwater		X			X	Sedimentation	Yes
	Spillage	Hydrocarbons	X	X	X	X	X	Water & soil quality	Yes
Socio-Economic	Jobs (temporary)		X	X	X	X	X	Socio-economics	No
	Spending		X	X	X	X	X		No
	Skills/experience		X	X	X	X	X		No

8 APPROACH TO ASCRIBING SIGNIFICANCE FOR DECISION-MAKING

The best way of expressing the cost-benefit implications for decision-making is to present them as risks. Risk is defined as the consequence (implication) of an event multiplied by the probability (likelihood) of that event. Many risks are accepted or tolerated on a daily basis, because even if the consequence of the event is serious, the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, which is potentially death, but the likelihood of such an event happening is so low that parachutists are prepared to take that risk. The risk is low because the likelihood of the consequence is low even if the consequence is potentially severe.

It is also necessary to distinguish between the event itself (as the cause) and the consequence. Again using the parachute example, the consequence of concern in the event that the parachute does not open is serious injury or death, but it does not necessarily follow that if a parachute does not open that the parachutist will die. Various contingencies are provided to minimise the likelihood of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute. In risk terms, this means distinguishing between the **inherent risk** (the risk that a parachutist will die if the parachute does not open) and the **residual risk** (the risk that the parachutist will die if the parachute does not open, but with the contingency of a reserve parachute) i.e. the risk before and after mitigation.

8.1.1 CONSEQUENCE

The ascription of significance for decision-making becomes then relatively simple. It requires the consequences to be ranked (Table 16) and a likelihood to be defined of that consequence occurring. It should be noted that there is no equivalent 'high' score in respect of benefits as there is for the costs. This high negative score serves to give expression to the potential for a fatal flaw where a fatal flaw would be defined as an impact that cannot be mitigated effectively and where the associated risk is accordingly untenable. Stated differently, the high score on the costs, which is not matched on the benefits side, highlights that such a fatal flaw cannot be 'traded off' by a benefit and would render the proposed project to be unacceptable. Note that the EAP has defined the consequence descriptors, specialists are required to select the appropriate descriptor when ascribing significance to various impacts. This will allow for efficient comparing of significance across specialist assessments to allow for an integrated assessment of the project as a whole.

Table 16: Ranking of consequence

Environmental Costs	**Inherent Risk**
Human health – morbidity/mortality. Loss of species	High
Reduced faunal populations, loss of livelihoods, individual economic loss	Moderate-high
Reduction in environmental quality – air, soil, water. Loss of habitat, loss of heritage, amenity	Moderate
Nuisance	Moderate-low
Negative change – with no other consequences	Low
Environmental Benefits	**Inherent Benefit**
Net improvement in human welfare	Moderate-high
Improved environmental quality – air, soil, water. Improved individual livelihoods	Moderate
Economic development	Moderate-low
Positive change – with no other consequences	Low

8.1.2 LIKELIHOOD

Although the principle is one of probability, the term 'likelihood' is used to give expression to a qualitative rather than quantitative assessment, because the term 'probability' tends to denote a mathematical/empirical expression. A key point here is that likelihood of the consequence occurring must *de facto* take into account the good international industry best practice that is 'intrinsically built-in' to activities or methods. For example: an electricity transformer will never be constructed without bunding and stones to contain any oil spills due to potential failure of the transformer. To highlight bunding as a specific mitigation measure to reduce the consequence of a spill is simply inappropriate. Likelihood descriptors that can be used to characterise the likelihood of the costs and benefits occurring are presented in the table below.

Table 17: Likelihood descriptors and definitions

Likelihood Descriptors	Definition
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur but a balance of probability suggests it will
Highly likely	The consequence may still not occur but it is most likely that it will
Definite	The consequence will definitely occur

8.1.3 RESIDUAL RISK

The residual risk is then determined as a function of the consequence together with the likelihood of that consequence. The residual risk categories are shown in Table 18 where consequence scoring is shown in the rows and likelihood in the columns. The implications for decision-making of the different residual risk categories are shown in Table 19. Additional mitigation to manage (and potentially further reduce) and monitor the residual risk may also be defined. All mitigation is then prescribed in the Environmental Management Programme (EMPr). What is important is that the residual risk is what decision-makers must accept if they decide to authorise the proposed activity even if that residual risk is 'high'. The residual risk cannot and will not be artificially reduced within the assessment to 'low' to facilitate decision-making.

Table 18: Residual risk categories

		Residual risk				
Consequence	High	Moderate	High	High	Fatally flawed	
	Moderate – high	Low	Moderate	High	High	High
	Moderate	Low	Moderate	Moderate	Moderate	Moderate
	Moderate – low	Low	Low	Low	Low	Moderate
	Low	Low	Low	Low	Low	Low
		Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
		Likelihood				

Table 19: Implications for decision-making of the different residual risk categories shown in Table 18

Rating	Nature of implication for Decision – Making
Low	Project can be authorised with low risk of environmental degradation
Moderate	Project can be authorised but with conditions and routine inspections
High	Project can be authorised but with strict conditions and high levels of compliance and enforcement
Fatally Flawed	The project cannot be authorised

8.1.4 A NOTE ON CUMULATIVE IMPACTS

Impacts cannot be assessed in isolation and an integrated approach requires that cumulative impacts will be included in the assessment of individual impacts. The nature of the impact will be described in such a way as to detail the potential cumulative impact of the activity, if there is indeed a cumulative impact. For example, dust and air emissions cannot be assessed in isolation of the potential cumulative impact of increased emissions into the atmosphere. Similarly, if water quality is improved within the immediate surroundings of the proposed activities, this will most certainly have a ripple effect/ cumulative impact on the greater water quality in the area.

Once all the impacts have been assessed and significance ratings allocated, the EAP will assess the project on a holistic basis to determine the overall project impact on the receiving environment. This will be a function of the individual impacts as well as the cumulative nature of combining all those impacts within a single context/ project.

8.1.5 DESCRIBING THE IMPACT

The EIA Regulations also require, in addition to consequence, likelihood and significance (as described above), that the nature, extent, duration, reversibility and irreplaceable loss of a resource also be highlighted for identified impacts. These additional impact attributes are defined as follows:

8.1.5.1 Nature of the impact

The nature of an impact refers to a description of the inherent features, characteristics and/or qualities of the impact.

8.1.5.2 Scale/extent of the impact

Extent refers to the impact footprint or stated differently the spatial area over which the impact would manifest. Note that if a species were to be lost then the extent would be global because that species would be lost to the world.

Table 20: Listing of descriptors and associated definitions to determine the extent of an impact

Extent Descriptors	Definitions
Site	The impact footprint remains within the cadastral boundary of the site
Local	The impact footprint extends beyond the cadastral boundary of the site, to include the immediately adjacent and surrounding areas
Regional	The impact footprint includes the greater surrounding area within which the site is located
National	The scale/ extent of the impact is applicable to the Republic of South Africa
Global	The scale / extent of the impact is global (or world-wide)

8.1.5.3 Duration of the impact

Duration is the period of time for which the impact would be manifest. Importantly the concept of reversibility is reflected in the duration scoring. In other words, the longer the impact endures the less likely is the ***reversibility*** of the impact.

Table 21: Listing of descriptors and associated definitions to determine the duration of an impact.

Duration Descriptors	Definitions
Construction period only	The impact endures for only as long as the construction period of the proposed activity. This implies the impact is fully reversible. Like noise and dust.
Short term	The impact continues to manifest for a period of between 3 – 10 years. The impact is reversible.
Medium term	The impact continues to manifest for a period of 10-30 years. The impact is reversible with relevant and applicable mitigation and management actions.
Long term	The impact continues for a period in excess of 30 years. However, the impact is still reversible with relevant and applicable mitigation and management actions.
Permanent	The impact will continue indefinitely and is irreversible.

8.1.5.4 Irreplaceable loss of resources

Irreplaceable loss of resources refers to the degree to which the impact will result in the loss of a resource that is impossible to replace.

Table 22: Listing of descriptors and associated definitions to determine the irreplaceable loss of resources due to an impact.

Extent Descriptors	Definitions
High	The impact is most likely to or will result in the irreplaceable loss of a resource/s.
Medium	The impact may result in the irreplaceable loss of a resource/s, however applicable mitigation or management interventions may prevent complete loss or provide a suitable substitute/"offset".
Low	The impact will not result in the irreplaceable loss of a resource/s.

8.1.6 AN EXAMPLE OF THE ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS

The following serves to highlight, by way of an example, how the significance of the impact will be presented, taking into account the methodology provided above.

Example: Operational Phase: Atmospheric Emissions:

Atmospheric emissions as a result of the proposed project were modelled to determine the impact on ambient air quality, with a view to understanding the human health and environmental risks posed by such emissions as illustrated in the impact map for this aspect (Figure 31).

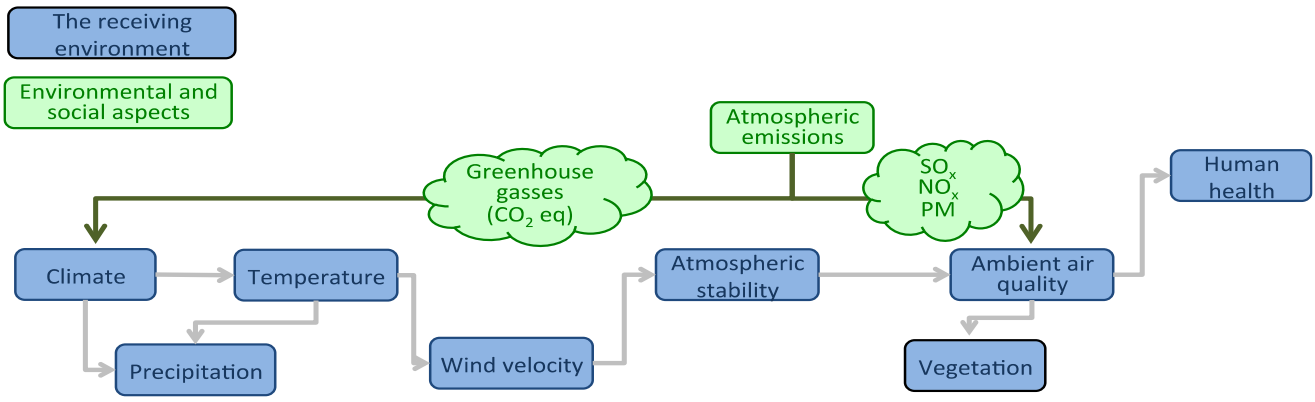

Figure 31: Example: Systems depiction of the components of the receiving environment that would be affected by atmospheric emissions from the proposed project.

The inherent risk of human health effects is high, but the likelihood of these manifesting as a result of atmospheric emissions from the proposed project is highly unlikely implying an impact significance of 'low'. Similarly, the inherent risk of vegetation damage and habitat loss as a result of atmospheric emissions from the proposed project is moderate-high, but the risk of that consequence manifesting is considered highly unlikely, resulting in an impact significance of low.

Table 23: Example: Impact significance for possible adverse human health risks as a result of atmospheric emissions from the proposed project.

Activity	Power Generation by way of Combined Cycle Gas Turbine (CCGT) technology
Environmental/ Social Aspect	Atmospheric Emissions (NO_x and PM)
Nature of the Impact	Adverse human health effects brought about by a change (deterioration) in the ambient air quality from atmospheric emissions of the power plant.
Consequence Inherent risk	High
Extent/ Scale	Regional
Duration & Reversibility	Long-term & reversible
Irreplaceable loss of a resource	Low
Causes of impacts / Event	**Likelihood of the consequence:**
Emissions of NOx result in ambient concentrations that exceed defined health-based limits (i.e. NAAQS)	Definite both on and off-site for short term averaging periods, but very limited in extent within the project footprint for longer term averaging periods. Highly unlikely for the sensitive receptors identified given the prevailing wind direction and the distance of the proposed project to the residential areas.
Emissions of PM (TSP, PM_{30}, PM_{10}, $PM_{2.5}$) result in ambient concentrations that exceed defined health-based limits (i.e. NAAQS)	Definite both on and off-site for short term averaging periods but limited to within the project footprint for longer term averaging periods. Also likely that the predicted concentrations in the Hills area are exaggerated by the modelling, which treats hills and ridges as transparent. Highly unlikely for the sensitive receptor given the prevailing wind direction and the distance of the proposed project to the residential areas.
Presence of communities within the 'exposure area/ zone' that may be exposed to ambient concentrations that exceed health-based limits (i.e. NAAQS)	Highly unlikely given that there are no communities within a 10 km radius of the proposed project, and as such there would be no exposure to ambient concentrations that exceed health-based limits (i.e. NAAQS).
Residual risk	Low
Extrinsic/ additional mitigation measures	None required.
Residual risk after mitigation	Low

Table 24: Example: Impact significance for possible damage to vegetation and reduced habitat risks as a result of atmospheric emissions from the proposed project.

Activity	Power Generation by way of Combined Cycle Gas Turbine (CCGT) technology
Environmental/ Social Aspect	Atmospheric Emissions (NOx and PM)
Nature of the Impact	Damage to vegetation and reduced habitat brought about by a change (deterioration) in the ambient air quality from atmospheric emissions of the power plant.
Consequence Inherent risk	Moderate - High
Extent/ Scale	Regional
Duration & Reversibility	Long-term & reversible
Irreplaceable loss of a resource	Low
Causes of impacts / Event	**Likelihood of the consequence:**
Emissions of NOx result in ambient concentrations that exceed defined environmental damage-based limits	Unlikely as vegetation damage would typically only occur with longer term exposure to elevated pollution concentrations which is not predicted by the dispersion model.
Emissions of PM (TSP, PM30, PM10, PM2.5) result in ambient concentrations that exceed defined environmental damage-based limits	Unlikely as vegetation damage would typically only occur with longer term exposure to elevated pollution concentrations which is not predicted by the dispersion model.
Presence of sensitive vegetation/ habitat that may be exposed to ambient concentrations that exceed defined environmental damage-based limits	Highly unlikely given the generally small, longer term averaging period ambient concentrations even over the immediate project area. No sensitive vegetation/ habitat exists within the broader study area.
Residual risk	Low
Extrinsic/ additional mitigation measures	None required.
Residual risk after mitigation	Low

9 ALTERNATIVES CONSIDERED

The 2017 EIA Regulations require the identification and assessment of feasible alternatives to the proposed activity. The following definition of alternatives is provided by the EIA Regulations:

"*Alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the -*

a) Property on which or location where it is proposed to undertake the activity;
b) Type of activity to be undertaken;
c) Design or layout of the activity;
d) Technology to be used in the activity;
e) Operational aspects of the activity;

and includes the option of not implementing the activity.

Based on the above it is important to note that alternatives do not only refer to locality alternatives, but also to a variety of technical alternatives including not proceeding with the proposed activity. Thus, alternatives that are relevant, feasible and reasonable (with the primary purpose being ways to reduce negative or enhance positive impacts) in terms of the proposed activities must be identified and assessed in the S&EIR process.

9.1.1 2018 APPROVED DESIGN VS 2024 PREFERRED DESIGN

As highlighted in the Chapter 3 (Need and Desirability), the 2018 detailed designs for the authorised ADF and associated infrastructure have been amended. The change in layout and design of key aspects (such as the management of water) for the ADF requires amendments to the existing EA and WUL. In addition, this S&EIR application process for EA is to authorise dams (i.e. the applicable PCDs and attenuation dams) with a dam wall height of greater than 5m. The following sequence of events is applicable:

- 2018 detailed designs defined some PCDs with dam wall heights >5m;
- The engineering review redesigned the PCDs from single compartment dams to dual-compartment dams to facilitate future maintenance (such as desilting) and with the redesign of the PCDs some dam wall heights were reduced; however, some are still higher than 5m; and,
- The engineering review redesigned the attenuation dams (as detailed in Chapter 3), thus 4 of the dams now have dam wall heights of >5m.

Thus, the preferred design of the PCDs and attenuation dams articulated within this Scoping Report is the alternative to be assessed within the EIA phase of the EA application process.

9.1.2 NO-DEVELOPMENT ALTERNATIVE

The no-development alternative for this particular activity (i.e. development of dams with a dam wall height of greater than 5m) would be to revert back to the authorised and approved 2018 designs (at least for the attenuation dams), which is neither feasible nor defensible given the requirements of DWS and DFFE in terms of the conditions of approval. Thus, the no-development alternative (i.e. the option of not implementing the activity) will not be discussed or assessed further.

10 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT PHASE

During the EIA Phase the potentially significant impacts identified during the Scoping Phase (refer to Section 6) will be further investigated and assessed. This Plan of Study details the approach and methodology for the detailed assessment of potential impacts in order to ensure that the Competent Authority (i.e. DFFE) will have sufficient information on which to base the decision of whether or not the development of dams with dam wall heights of >5m, as associated infrastructure of the authorised ADF project, may proceed.

10.1.1 ALTERNATIVES TO BE ASSESSED

As discussed in Chapter 9 above, the impact assessment to be undertaken during the EIA phase is *de facto* the assessment of the preferred alternative for this particular activity seeking authorisation.

10.1.2 SPECIALIST STUDIES

On the basis of the potential impacts identified during the Scoping Phase, experts in the relevant fields will be commissioned to conduct specialist investigations. These investigations are aimed at assessing the significance of potential impacts identified, this will be a function of the sensitivity and vulnerabilities of the receiving environment which will also be characterised by the specialists, as well as identifying further aspects and impacts that may have been overlooked during the Scoping Phase. Specialists will also provide feasible and appropriate mitigation measures to either reduce the significance of negative impacts or enhance positive impacts. The table below highlights the specialist assessments to be undertaken. Kindly refer to Appendix 6 the Site Verification Assessment Report which includes the specialists' terms of reference.

Table 25: Specialist assessments in support of this EIA of the PCDs and larger attenuation dams associated with the authorised ADF and associated infrastructure project.

Specialist Assessment	Specialist Company	Date of Assessment	Relevant Appendix
Existing Specialist Investigations/ Assessments			
Phase 1 ADF Full Design Report	EPCM	February 2024	Appendix 4
Ecological Survey, Search and Rescue of Plant Species and Avifauna Assessment	Kimopax Group	January 2023	Appendix 5
Wetland Environmental Impact Assessment and Offset Strategy Update	Digby Wells Environmental	July 2022	
Wetland flow driver assessment (Hydro-pedologic): Proposed 60-year Ash Dump Facility (ADF) at Kusile Power Station	Geo Pollution Technologies	July 2022	
Additional Specialist Investigations/ Assessments Required			
Blast (vibration & noise) Impact Statement/ Assessment.			
Groundwater Assessment in terms of assessing the potential impacts of dewatering of subsoil seepage and groundwater during the construction phase (for immediate release back into the receiving environment).			
Terrestrial Biodiversity Compliance Statement, including Plant and Animal Compliance Statements for the "sensitive species" flagged within the DFFE Screening Tool Report.			

10.1.3 APPROACH TO ASCRIBING SIGNIFICANCE FOR DECISION-MAKING

Refer to Section 8 of this report.

10.1.4 PUBLIC PARTICIPATION DURING THE EIA PHASE

The database of registered I&APs opened and maintained throughout the Scoping Phase will be utilised as the foundation for stakeholder engagement during the EIA Phase. All I&APs will be kept abreast of progress and invited to participate at various stages as detailed below.

10.1.5 DRAFT ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

The Draft Environmental Impact Assessment (EIA) Report will summarise the findings of the EIA Phase of the S&EIR process. The Report will highlight and discuss the findings of various specialist assessments as well as the detailed assessment of significant negative and positive impacts associated with the proposed development. All registered I&APs will be notified of the availability of the Draft EIA Report for review and comment for a period of 30 calendar days (excluding public holidays and the period between 15 Dec and 05 January) via individual notification letters. The Report will be made available on the EPCM and Eskom websites.

A **public meeting** may be held during the review and commenting period of the Draft EIA Report. All registered I&APs will be timeously notified of this meeting and the public will be informed by way of additional local newspaper advertisement/s advertising the availability of the Draft EIA Report for review and comment as well as the details of the online public meeting. The purpose of the public meeting is to present the findings and recommendations of the Draft EIA Report in order to obtain comments and inputs from I&APs. The meeting proceedings will be documented by way of a Public Meeting Comment and Response Report (CRR) which will be included within the Final EIA Report.

10.1.6 FINAL EIA REPORT

All the comments received on the Draft EIA Report will be incorporated into the CRR which will be included in the Final Report. The Final EIA Report will be submitted to the DFFE for review and consideration towards a decision.

10.1.7 ENVIRONEMNTAL AUTHORISATION

After review, the DFFE will issue their decision in the form of an Environmental Authorisation (EA). The EA is a formal statement of decision and typically includes a range of conditions that will need to be met during project implementation, should it be a positive EA. All registered I&AP's will be notified of the EA. This is to provide I&AP's with the opportunity to review the EA and its conditions and to exercise their right of appeal, should they feel the decision or components thereof is or are incorrect. The EIA Regulations stipulate that a Notice of Intent to Appeal must be lodged within 20 days from the date of the EA. During this 20-day period any party (including the Applicant) has the right to appeal the decision.

10.1.8 CONSULTATION WITH THE COMPETENT AUTHORITY

It is proposed that the Competent Authority (i.e. DFFE) will be consulted during the 30-day review period of the Draft EIA Report. A full copy of the Draft EIA Report will be submitted to the DFFE case officer for review and comment. The Applicant and EAP will present the findings of the EIA and associated specialist studies as well as the EAPs proposed mitigation measures and conditions of authorisation (should it be decided that the proposed development is supported). This will enable the team to address any outstanding issues and/or comments from the DFFE prior to the submission of the Final EIA Report for review towards a decision.

11 CONCLUSION OF SCOPING

This report serves to detail the outcome of scoping the assessment requirements for the activity of developing larger PCDs and attenuation dams associated with the already authorised ADF and associated infrastructure project at Eskom's Kusile Power Station. The Draft Scoping report has been placed in the public domain for review and comment. The Final Scoping Report will be an updated version of this Draft Report and address all comments received during the public participation process review period. The Final Report will be submitted to the authorities (in this case the National DFFE) for a decision.

12 EAP DECLARATION AND UNDERTAKING

I, Victoria Napier, hereby confirm that the information provided in this report is correct at the time of compilation and the report was compiled with inputs provided by the applicant and some of the specialists appointed for the project. I hereby also confirm that:

- all relevant information pertaining to the project will be submitted to potential interested and affected parties;
- all comments received from I&APs and communications to and from I&APs will be included in the Final Scoping Report, in the form of a Comments and Response Report (CRR) that will be submitted to DFFE;
- A record will be kept of any subsequent comments and/or communications and submitted with the Draft EIA Report; and,
- The Plan of Study for the EIA will be implemented as presented within this Scoping Report (which is available for review and comment), and the findings of specialist studies will be presented in the Draft and Final EIA Reports.

_____

Signature of EAP

16 October 2024

_____

Date

Kindly refer to the Declaration of Interest and Undertaking under Oath attached in Appendix 1.