4 PROJECT DESCRIPTION

4.1 Introduction

Eskom, as South Africa's public electricity utility, generates, transmits and distributes electricity throughout South Africa. Eskom's principal generation technology is pulverised coal with approximately 90% of its current generating capacity lying in coal-fired power stations. One such power station is the Majuba Power Station (hereafter referred to as "Majuba"), a coal-fired power generation facility, is located 16 km south of Amersfoort in the province of Mpumalanga. The first of Majuba's generating units was commissioned the 1990's and the last in 2001. Majuba Power Station currently disposes of ash (produced from the combustion of coal) in a dry format by means of conveyors, a spreader and a stacker system from the station terrace to the existing ash disposal site. Eskom, Majuba Power Station requires a continuous ash disposal facility with an area of approximately 800 ha in order to dispose of ash for the next 45 years (the remaining life of the power station). The existing ash disposal facility is located approximately 1.5 km west of the station terrace. **Figure 4.1** provides an overview of the where the ash disposal activities fit within the power generation process.

When Majuba Power Station commenced its planning process (in the 1980's) it envisaged the continuation of dry ash disposal over the remaining portion of Eskom owned land. Such land was purchased before the commencement of environmental laws, the Environment Conservation Act, in particular (i.e. prior to 1989). As part of its planning processes at that time, Eskom developed designs for the disposal of ash for the life of the power station, which were approved internally. With the promulgation of the environmental laws, and the National Environmental Management Waste Act, Act 59 of 2008, in particular, Eskom would like to pro-actively align its continued ashing activities with the requirements of the waste licensing processes.

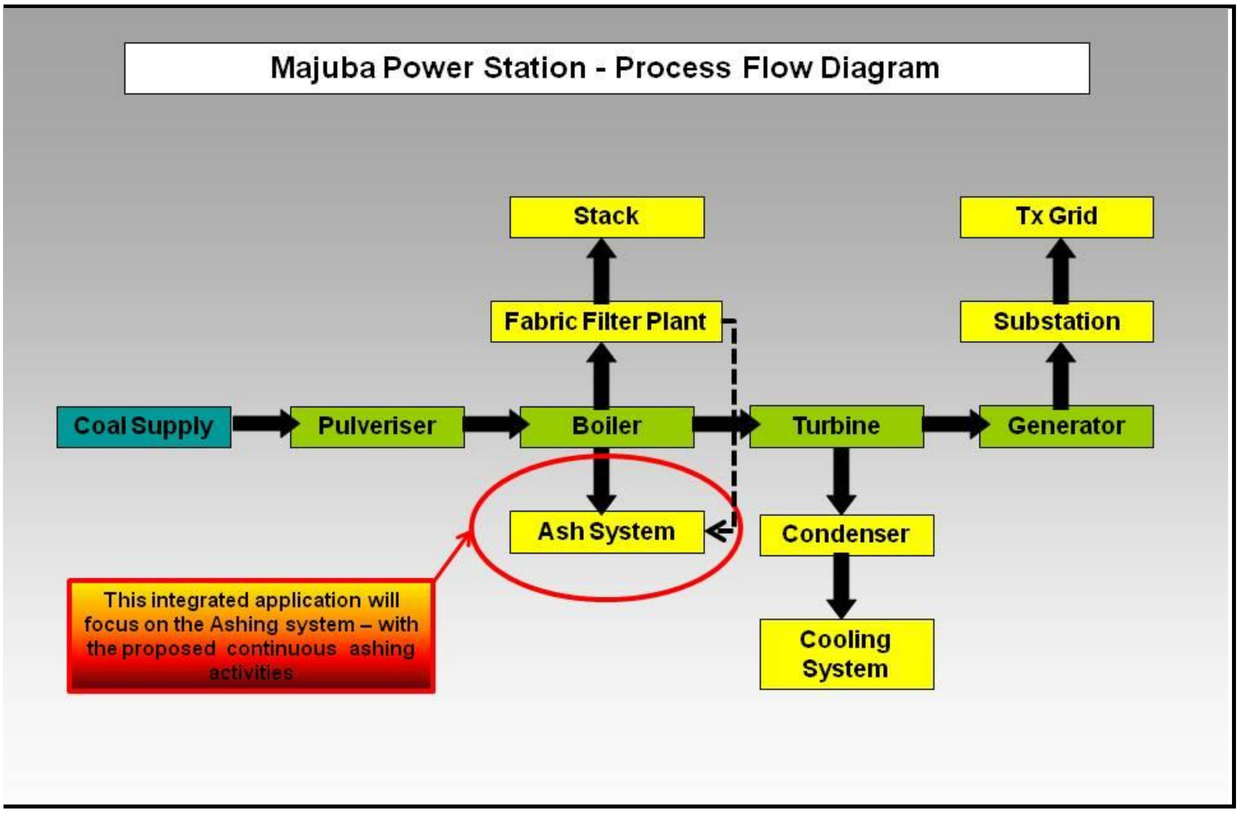

Figure 4.1: An overview of the activities on site and where this project fits within the power generation process

4.2 Location of the of the EIA study area

Majuba Power Station is located approximately 16 km southwest (SW) of Amersfoort and approximately 40km north-northwest (NNW) of Volksrust in the Mpumalanga Province. The power station falls within the Pixley Ka Seme Local Municipality which falls within the Gert Sibande District Municipality.

A greater part of the study area has agricultural, mining and power generation activities. The proposed study area, utilised in the screening study is a 12 km radius from the source of ash, being the Majuba Power Station Site (**Figure 4.2. and 4.3**).

Figure 4.2: Majuba Power Station forms the centre point of the study area

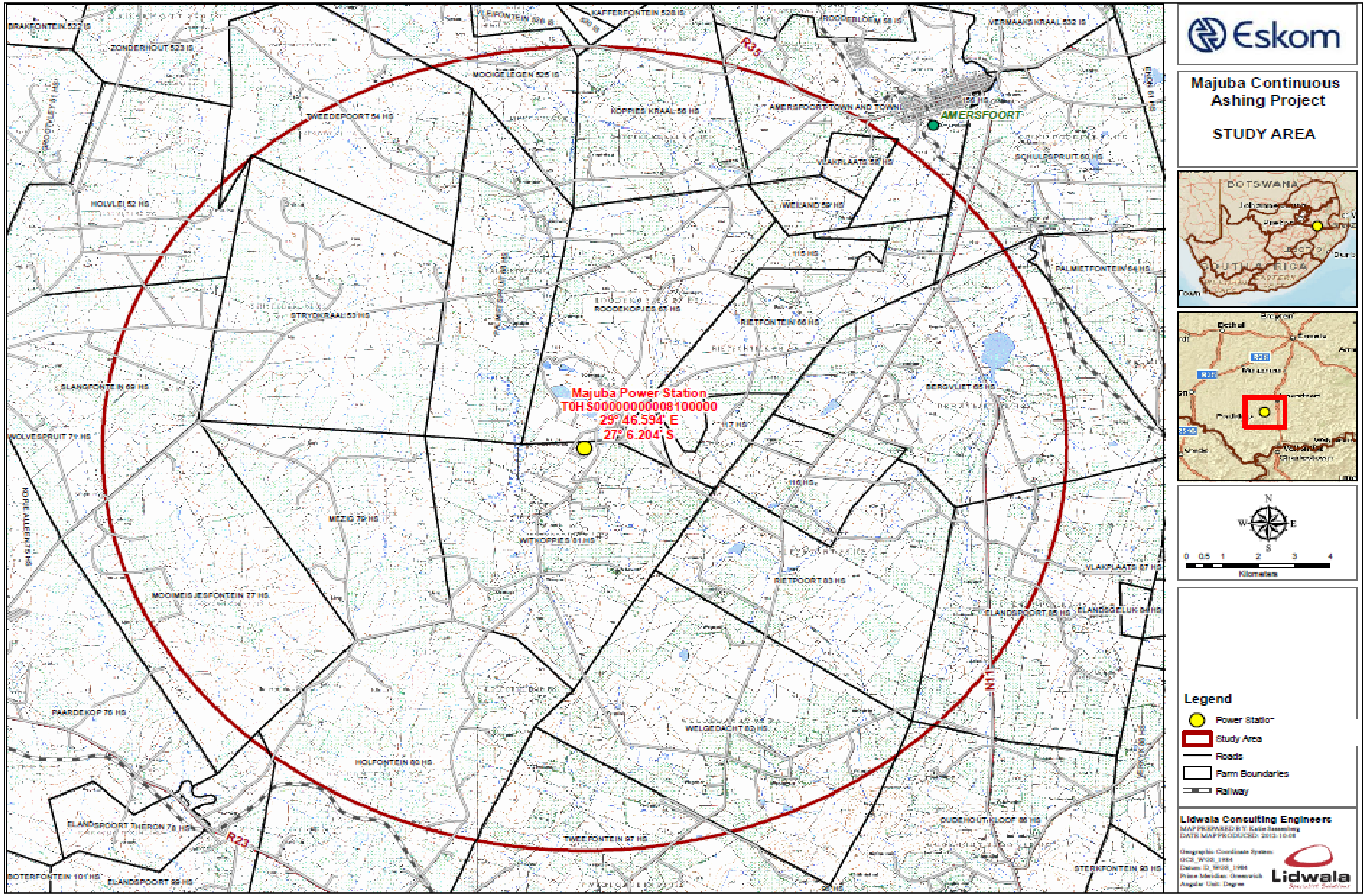

Figure 4.3: The greater study area overlaid onto a topographical map background

4.3 Detailed Description of the Project

The project involves the proposed continuous disposal of ash by the Majuba Power Station in the Mpumalanga Province.

The coal-fired power generation process results in large quantities of ash, which are currently disposed of at an ash disposal facility on Eskom's land. The station uses dry methods of ash disposal. The process involves ash being transported from the power station terrace to the ash disposal facility by means of a conveyor and stacker system (**Figure 4.4**). The ash handling currently occurs in two independent phases, handling ash on terrace to a centralised loading system at a transfer house. The ash overland conveyor transfers the material off terrace to the ash disposal facility.

The ash disposal facility structure consists of three layers of ash, at two levels or tiers (upper and lower tier):

- A stabilising layer of ash, at an average of 15m above natural ground creating the first ash stacker level (Lower tier)
- A volume of ash varying from 15 m to 45 m placed above the first tier forms the second ash stacker level (Upper tier).
- A final back stack layer of 12m is placed above the second tier

The ash is disposed by two stacker methods the parallel frontstacking method and the radial frontstacking method:

Parallel Frontstacking method

- The stackers drive east and west along a shiftable conveyor
- Ash is stacked in parallel lines over the crest of the previous frontstack overlapping the crest by approximately 1 meter
- The ash is stacked on top of the previous frontstack surface to a cone height of between 2 and 4 meters
- The stacker continues to stack until the crest is out of reach
- The bulldozer is used to flatten and doze the ash over the crest

Radial Frontstacking method

- The ash is stacked ahead of stacker in semi circles over the crest of the previous frontstack and must overlap the previous crest by approximately 1 meter
- This overlapping provides a practical working area

- The ash is stacked on top of previous frontstack surface to a cone height of between 2 and 4 meters
- The 2 meter high cone is a minimum to prevent "soft" spots forming in the frontstack surface
- The 4 meter high cone is the maximum to prevent over bulldozing, reducing bulldozing efficiency
- The bulldozer is used to flatten and doze the ash over the crest.

The dust suppresion is managed by using water from the pollution control dams to dust suppress, irrigate and rehabilitate exposed surfaces of the ash disposal facility. Rain water runoff is collected via concrete perimeter drains and then diverted to one of the pollution control dams.

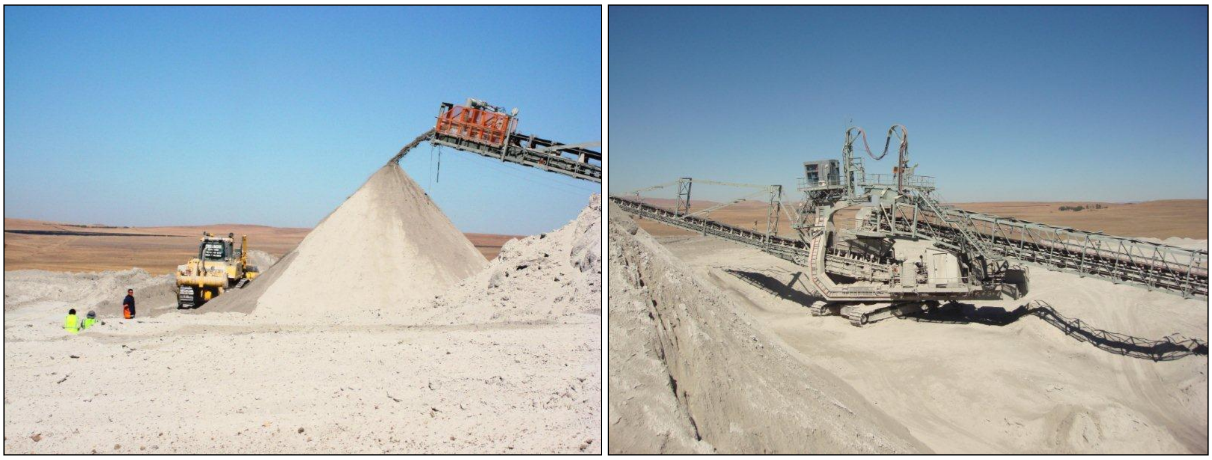

Figure 4.4: Stacker being used to dispose of ash at the Majuba Power Station

The proposed development has the following specifications:

- Capacity of airspace of <u>190</u> million m^3; and
- Ground footprint of <u>800</u> ha: 15 – 46 year (proposed) (Fenced area including pollution control dams)

This ash disposal facility will be able to accommodate the ashing requirements of the power station for the next 46 years, to 2060 (based on an annual ash production rate of 3.579 million tonnes). Ideally, the proposed progressive portion of the ash disposal facility will continue from the existing ash disposal facility.

In order to ensure that the EIA allowed for a robust environmental process, all land within a radius of 12km was assessed in order to identify potential alternative sites for the required continuous ash disposal. Five alternatives sites were identified during the scoping phase, Alternative A-E. All the identified sites are less than the required 800ha, thus a combination of sites were required.

It should be noted that location alternatives for the proposed continuous ash disposal facility footprint were identified and assessed during the EIA phase. The alternative sites are discussed in **Chapter 7**.

Water Management System

The power station water balance influences the ash plant water management and this strives to reduce contamination of all clean water with dirty water that cannot be released into natural watercourses.

The ash disposal facility has two pumping systems. The first system pumps water from the haul roads sumps to the pollution dam 1. The second pumping system pumps water continually to the pollution control dam 1 for belt washing and general cleaning at the transfer house and the irrigation and dust suppression of the ash disposal facility.

The water from the transfer house flows into the settling sump 1 where the larger solids settle, then the super fine particles settle at the larger sump 2 and then is released back to the pollution control dam.

The ash disposal facility has water management systems in place for the construction, operation and decommissioning of the facility. Surface water is divided into clean and dirty water and are handled differently.

Clean water is water that has not come into contact with the ash, it's from surface runoff from rehabilitated areas and clean water from the power station, such water is used for irrigation purposes, re-use in the power station and are released back to the natural water courses. The clean water system consists of a series of stormwater cut-off drains, diversion bunds, berm penstocks and clean water dams. The stormwater drains divert the clean water into the clean water dams where the water is used as mentioned above. All clean water is prevented from entering the settling basin and dirty water dam by a series of stormwater cut-off drains.

Dirty water is surface water runoff from exposed ash surfaces, seepage from the ash facility and power station effluent. This water is only suitable for dust suppression on exposed ash

surfaces and is not allowed to discharge into natural water courses. The dirty water system consists of a series of dirty water cut-off drains, a dirty water pipeline, settling basin (3 sumps), three dirty water dam and pump stations.
Runoff from the exposed ash surfaces is transported to a settling basin and dirty water dam by means of buried concrete pipe with manholes for flushing and inspection purposes. The dirty water settling basin where the ash residues settle and then is released back to the dirty water dam. Dirty water from the ash haul road sumps is collected to ash dam 1 and dirty water from the dewatering plant is channelled into ash sump 1 whilst runoff from the haul road and conveyor platform is collected in sumps 2 and 3.

There are two permanent water systems, one system provides water from ash dam 1 to the ashing facility for irrigation of the rehabilitated side slopes and back stack surfaces and the other system for dust suppression

Rehabilitation

The construction of ash dumps entails extensive disturbance of surface vegetation and soil material, as well as the underlying parent rock. The disturbance occur primarily through the stripping of soils. Secondary and ancillary works include haul and access roads, camp sites storage areas and workshops.

Rehabilitation is done in accordance with the general land use practiced prior to the disturbance and no excavation shall be left in a condition such that it can be used as an unauthorised waste disposal site. Replacement of soil is done with soil layers matching as far as possible the original pedological layers and revegetation with indigenous vegetation cover equivalent to that prior disturbance. Haul and access roads are maintained in a satisfactory manner such that air pollution and soil erosion are controlled. Haul roads that are not permanent roads are obliterated and their surfaces scarified and all damaged fences and other structures are reinstated.

A thick layer (50 mm) of topsoil will be placed on top of all completed cells in the ash disposal facility and re-vegetated in line with the Environmental Management Plan. For further detail on the project please refer to the Operations Manual **Appendix U**.

4.4 Associated Infrastructure

The proposed continuous ashing project requires the following relevant associated infrastructure:

- Ash pollution control dams
- Sumps
- Conveyor belts and stackers
- Stormwater trenches and drainage channels
- Access roads on the ash disposal facility and haul roads
- Dust suppression pipelines and plinths
- Clean and dirty water channels and berms
- Upgraded fence at 1.8m

4.4.1 Transitional arrangements for Class C barrier system on ash disposal facility (Eskom motivation)

As a result of the Engineering process (Conceptual and Final Design) that needs to be completed following the Authorisation, and the timeframes associated with construction, Eskom motivated for a transitional period to be granted as far as the implementation of the **Class C** barrier system are concerned, until 31 December 2019. The detailed motivation for this request as well as the implementation plan are included as (**Appendix X**).

The transitional arrangements application is the only practical means to ensure that the Majuba power station will remain in operation while the relevant internal processes are followed, until the barrier system in installed.

The EAP supports this motivation based on the available information and following a discussion with the Surface and Groundwater specialists. The Groundwater specialist indicated that according to the modelling conducted the effects of the liner are not significant enough to alter the model in any drastic manner if this transition is granted. The migration of the plume and the quality of water in the aquifer are very similar when the existing situation (without liner) are compared to the predicted situation (with liner) which is due to the nature of soils and rock in the area as well as the fact that a dry method of ash disposal are used.

It is therefore recommended that the Environmental Authorisation make provision for the allowance of this Five year transitional period.

This allowance, if granted, should place so much more emphasis on the importance of the monitoring programme. Close monitoring needs to be conducted especially during this transition period. Should any exceedance of standards be detected, the ECO would have to report it to the relevant departments, and this arrangement and the conditions in the Environmental Authorisation might have to be revised.