# Zitholele Consulting

# Medupi Flue Gas Desulphurisation

# Traffic Impact Assessment

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| **Date** | **Rev.** | **Status** | **Prepared By** | **Checked By** | **Approved By** | **Approved By** |
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# 1. Introduction

Hatch Goba was appointed by Zitholele Consulting to investigate the traffic implications arising from the construction and operation of the Medupi Power Station Flue Gas Desulfurization (FGD) integrated system. Medupi Power Station is located about 15km west of the town of Lephalale in the Limpopo Province as shown in Figure 1.1: Medupi Power Station – Locality plan, Figure 1.1.

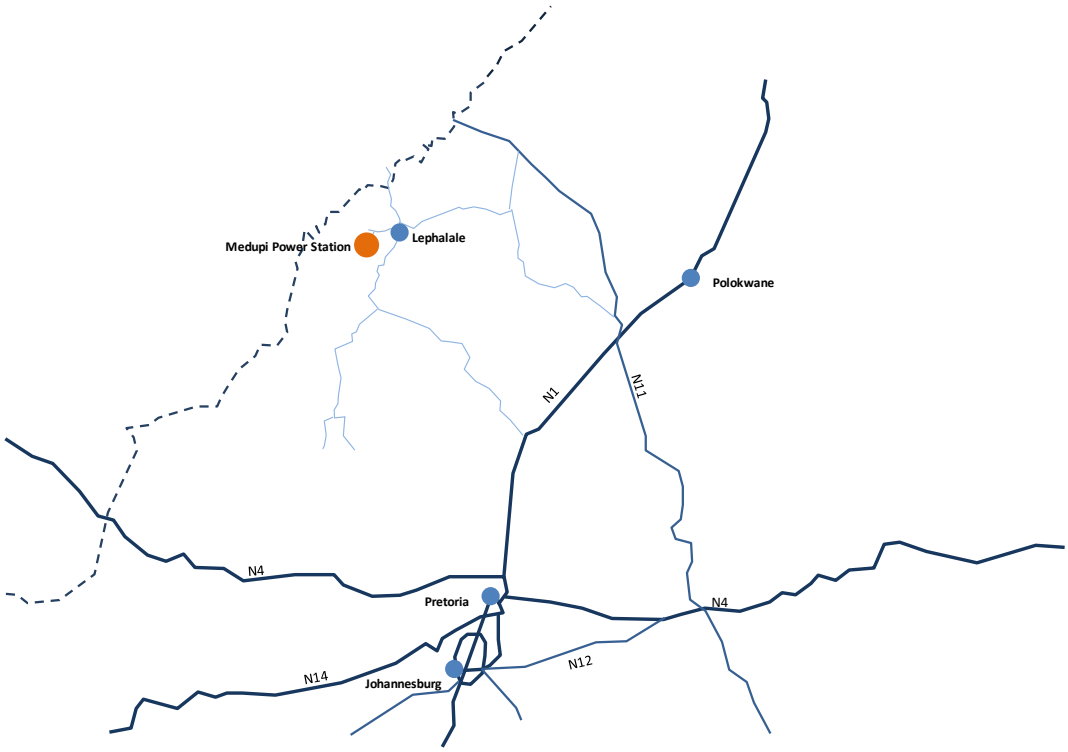



**Figure 1.1: Medupi Power Station – Locality plan**

## 1.1 Background

The Medupi Power Station Flue Gas Desulfurization (FGD) Retrofit Project consists of adding FGD systems to six 800 megawatt (MW) coal fired steam electric generating units. The six units at Medupi Power Station were designed and are being constructed to accommodate the installation of wet limestone Flue Gas Desulphurisation technology which is an $SO_2$ $SO_2$abatement technology. FGD is a set of technologies designed for removing sulphur dioxide from exhaust flue gases of fossil-fuel power plants and from the emissions of other sulphur oxide emitting processes. The FGD process requires input material and the process will generate by- products, which should be disposed of at a suitable waste disposal site. The inputs will have to be transported to the facility by means of trucks and/or rail and the by-products will have to be transported to the waste disposal facility by trucks, rail or conveyor.

The purpose of the Traffic Impact Assessment (TIA) is to quantify the impact of normal traffic, as well as the transportation of abnormal loads, on the road network during construction, operation and decommissioning of the FGD facility. The following specific study elements were undertaken as part of the TIA:

- Quantifying the impact of person and freight transport on local and external roads during construction, operation and decommissioning of the FGD facility.

- Identifying the impact on existing traffic as a result of the additional traffic generated by the facility.
- Recommending mitigation measures for accommodating the additional vehicle movements.

The TIA scope of works includes the following aspects:

1. Gypsum and ash will be disposed of at the existing Ash Disposal Facility (ADF), it will be conveyed to the existing ADF, therefore no additional road traffic impacts. In the immediate future, if there is a market for gypsum, the gypsum will be collected by trucks from overhead conveyor system.
2. The limestone will be trucked to site as the FGD operation ramps up and will be railed to site at a future date. Eskom have several potential sources of limestone and an assessment of traffic impacts from these sources has to be provided.
3. Salts and sludge will be transported by truck to a licensed hazardous waste facility, after being stored at a temporary waste storage facility at the station; a professional opinion is required.

**Chapter 1** will discuss the scope of work and background to this study, while **chapter 2** will focus on the baseline transport assessment. **Chapter 3** will discuss the traffic implications during the construction phase and **chapter 4** will focus on the operational phase, **chapter 5** will discuss the traffic impact assessment with the impact assessment ratings explained in **chapter 6. Chapter 7** will consist out of the conclusion and recommendations from the Traffic Impact Assessment study.

# 2. Baseline Transport Assessment

## 2.1 Methodology

Phase 1 of the study included the following tasks:

- Conducting a site visit to assess the road network for the study area, including the accesses onto the external road network and key intersections onto the national/public road network.
- Confirming the transportation methods of the type 1 wastes from the power station to an existing licensed hazardous waste facility and type 3 wastes to the existing NADF.
- Obtaining and process existing traffic counts in the area and where necessary arrange to undertake additional traffic count surveys and prepare a summary thereof.
- Compiling a list of technical information to be obtained from the engineering team.

In order to complete the Traffic Impact Assessment (TIA) we had to make some assumptions with regards to some outstanding information.

## 2.2 Proposed development

The location of the proposed FGD plant within the existing Medupi Power Station precinct is shown in Figure 2.1. The FGD plant is situated more or less in the middle of Medupi, and access to this plant will either be from Entrance Gate 1, 2 or 4.


**Figure 2.1: Location of FGD plant within Medupi Power Station**

Given the nature of trips generated during construction and operations, and the different types of mitigation measures that would be considered for these activities, the traffic impact of the FGD plant discuss construction and operational traffic impact separately in **Chapter 3 and 4**.

## 2.3 Existing Conditions

A desktop study of the Medupi study area was carried out prior to the site visit. The desktop study identified the most likely routes to be used for various types of vehicles for the construction of the FGD plant and during the operational phase of the plant. A site inspection was undertaken on the 28th/29th of October 2015.

### *2.3.1 Existing road network*

The external road network is shown in Figure 2.2 below, with Figure 2.3 showing the roads surrounding Medupi Power station as well as the internal road network. The major routes in the study area are the R518 and R510 which links Lephalale to the N1 and Nelson Mandela Drive connects Lephalale with Medupi and Marapong, while the minor routes surrounding Medupi Power station are the D1675 and Afguns Road.

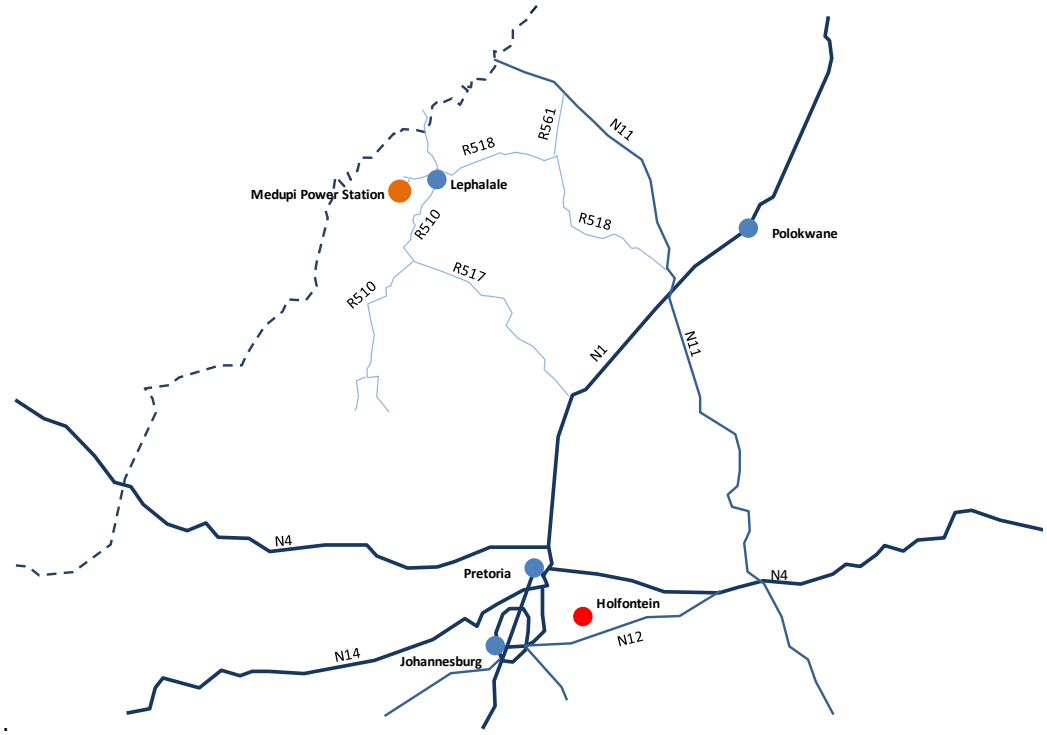



**Figure 2.2: External road network - Medupi**

Nelson Mandela Drive and the Afguns Road provides access to Medupi Power station, following onto the D1675 and then through Entrance Gate 1, 2 or 4. Afguns road provides access to farms in the area and connects with the R510 further south.

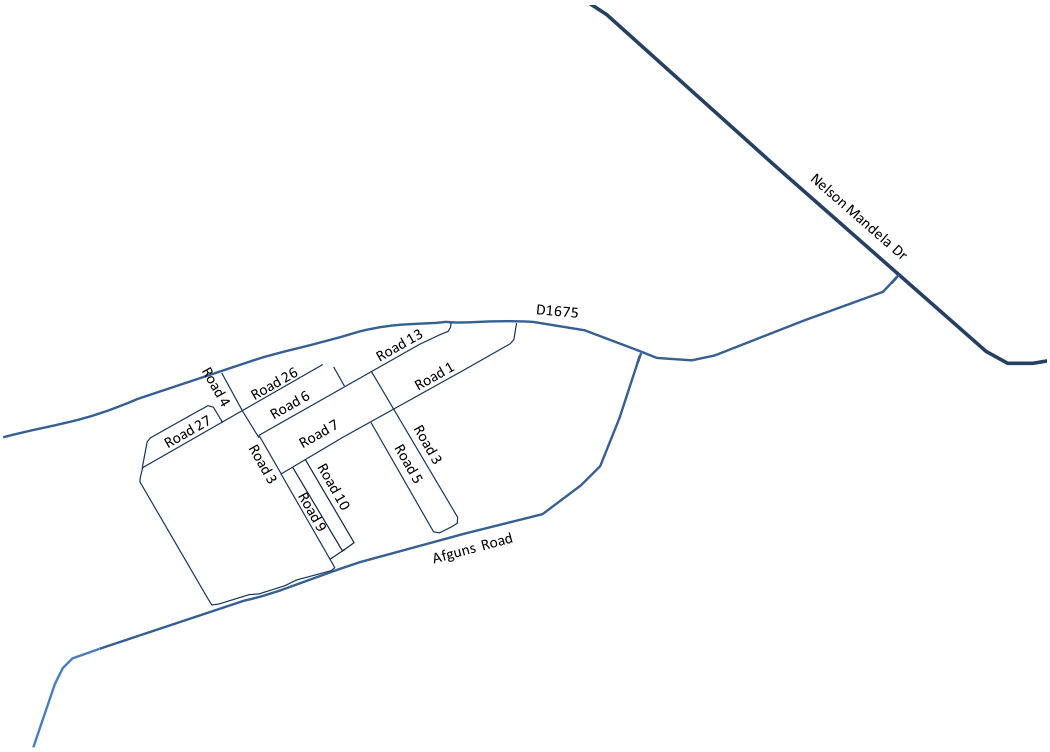



**Figure 2.3: Internal road network – Medupi**

Traffic counts were undertaken at the following intersections:

- Nelson Mandela Drive / D1675
- D1675 / Afguns Road
- Road 1/ Road 3
- Road 3 / Road 13
- Road 7 / Road 10
- Road 26 / Road 4

These intersections are briefly discussed below. This study will not entail a detail assessment of the internal road network and internal circulation or parking planning. It will only provide an overview of the existing road network.

The internal road network around the FGD plant has very narrow roads, which makes it difficult for heavy vehicles to travel along these roads, causing delays to light vehicle movement.

Nelson Mandela Drive / D1675

This is a T-junction with one lane in each direction. It is the main entrance to Medupi Power station. During the peak period a pointsman is used to direct traffic and improve the traffic flow at this intersection. This intersection is also used as a pick-up and drop-off area for passengers using public transport and employee transport.

D1675 / Afguns Road

This intersection is a T-junction with one lane in each direction. The main movement is the east-west traffic flow with minor traffic coming from the south. A pointsman is also used here to direct traffic during the peak period.

Road 1/Road 3

This intersection is close to Entrance Gate 1. It is a 4-way intersection with the western leg leading to the FGD plant. Mainly visitors and single occupant vehicles enter Medupi Power Station via Gate 1. Buses and minibus-taxis use an area west of this intersection to pick-up and drop-off passengers.

Road 3/Road 13

This intersection is a T-junction leading to Entrance Gate 2. Gate 2 is mainly used by vehicles carrying more than 1 person, especially buses and minibus-taxis. A large number of buses and minibus-taxis were observed during the peak hours.

Road 10/Road 7

The southern leg of this T-junction comes from the proposed FGD plant construction area, while the eastern leg comes from Road 1/Road 3 intersections. Heavy vehicles with large and bulky loads were observed at this intersection travelling between the power station and Road 26/Road 4 intersection.

Road 26/Road 4

This intersection leads to Entrance Gate 4. It also provides access to the current exit point for coal heavy haul route. Heavy vehicle movement was observed at this intersection.

### *2.3.2 Traffic count summary*

Traffic counts were undertaken on the 28th and 29th of October 2015. **Figure 2.4** and **Figure 2.5** show the location of the traffic surveys, 12-hour classified vehicle counts were undertaken at seven locations. It should be noted that the traffic counts were undertaken while construction took place at Medupi, which would have generated additional traffic.

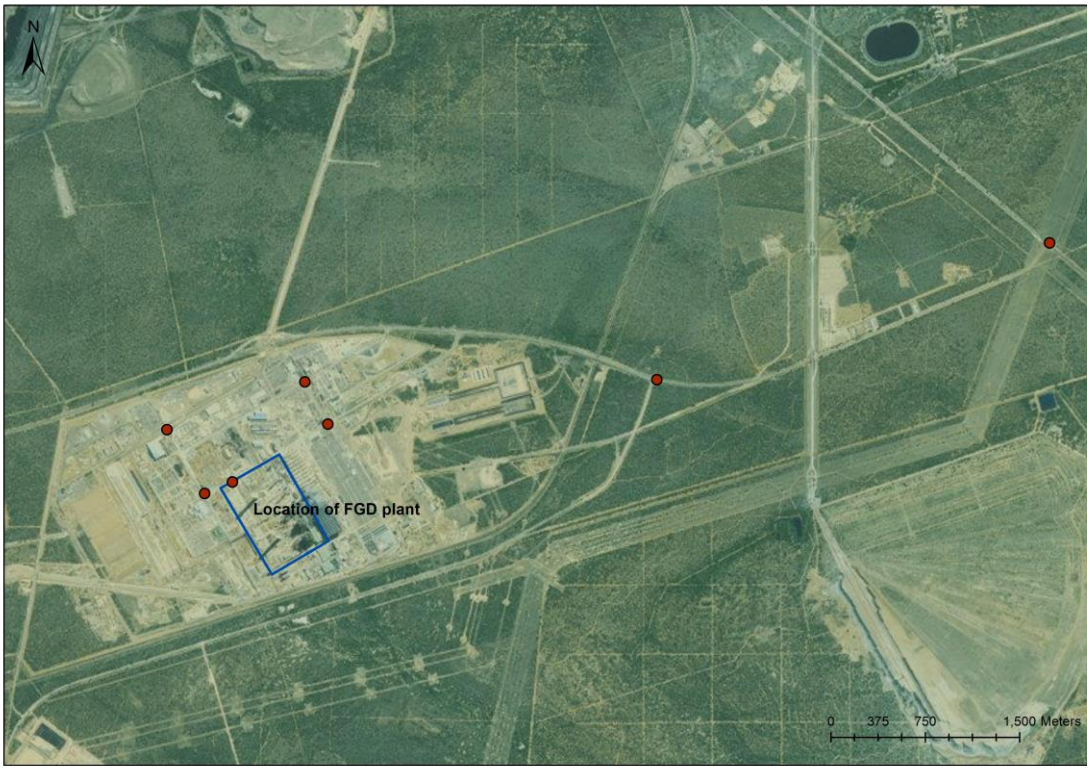



**Figure 2.4: Traffic survey locations**


**Figure 2.5: Traffic count locations within Medupi site**

The peak hour was identified as 16:00 to 17:00 for the 24-hour period. The peak hour traffic volumes are displayed in Figure 2.6 to Figure 2.11 below.

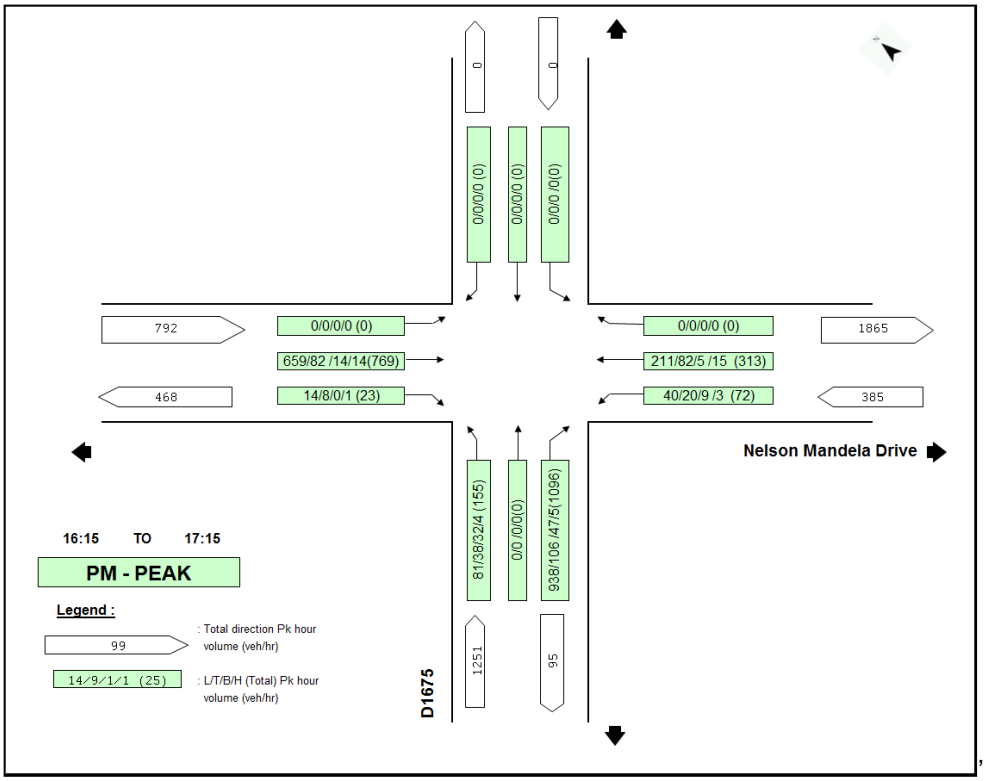



**Figure 2.6: PM peak hour traffic volumes – Nelson Mandela Drive/D1675**

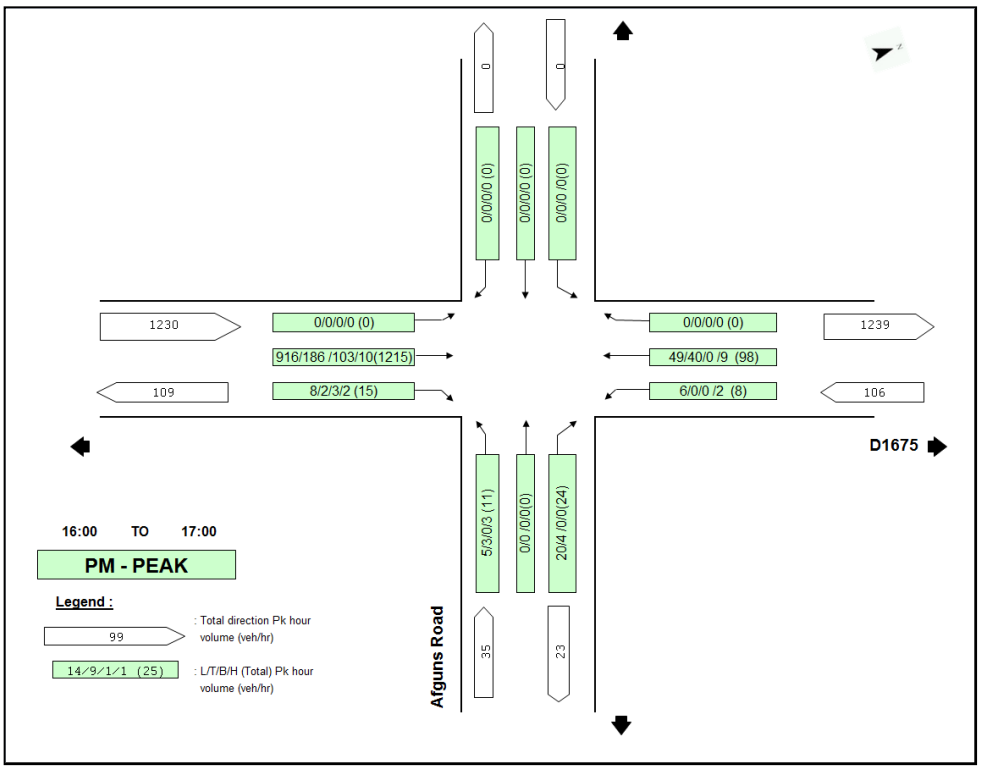



**Figure 2.7: PM peak hour traffic volumes – D1675/Afguns Road**

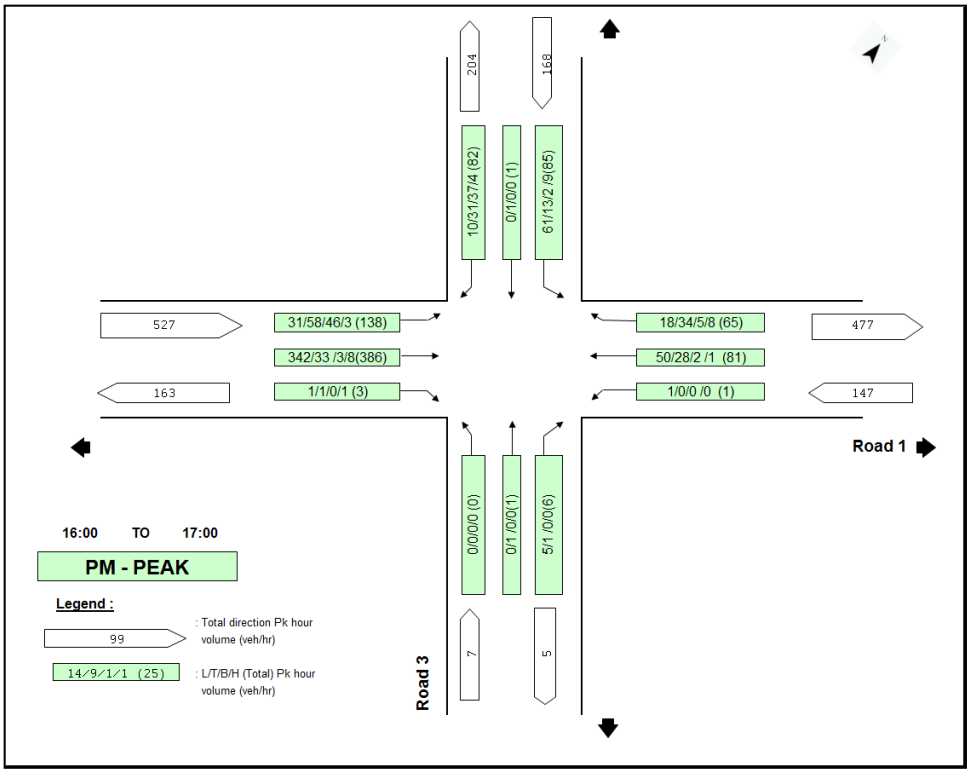



**Figure 2.8: PM peak hour traffic volumes – Road 1/Road 3**

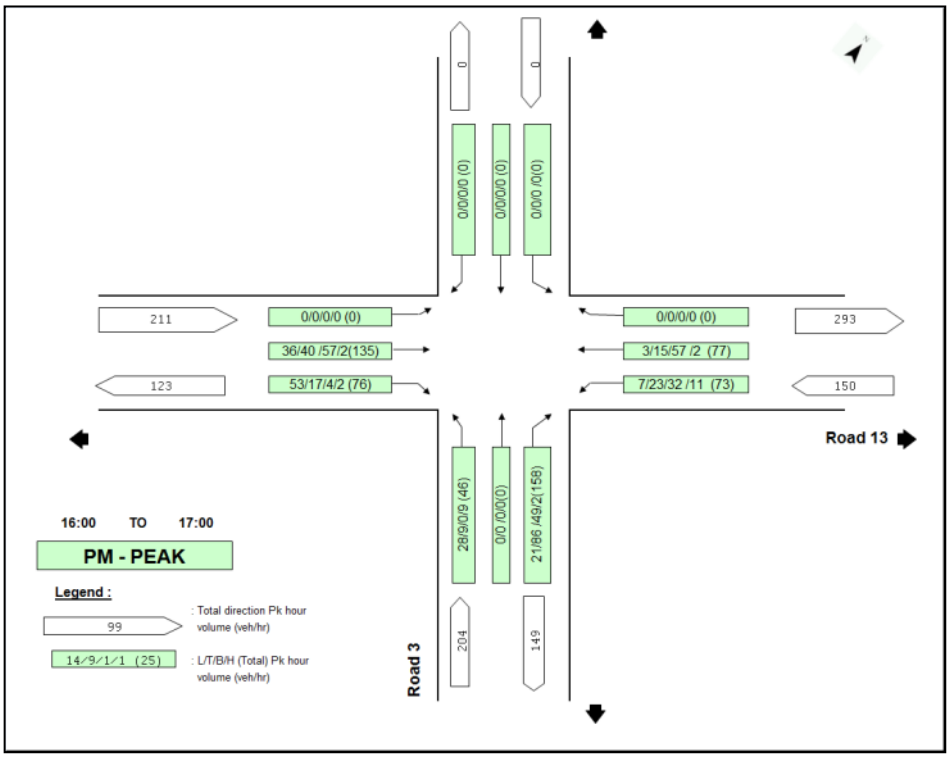



**Figure 2.9: PM peak hour traffic volumes – Road 13/Road 3**

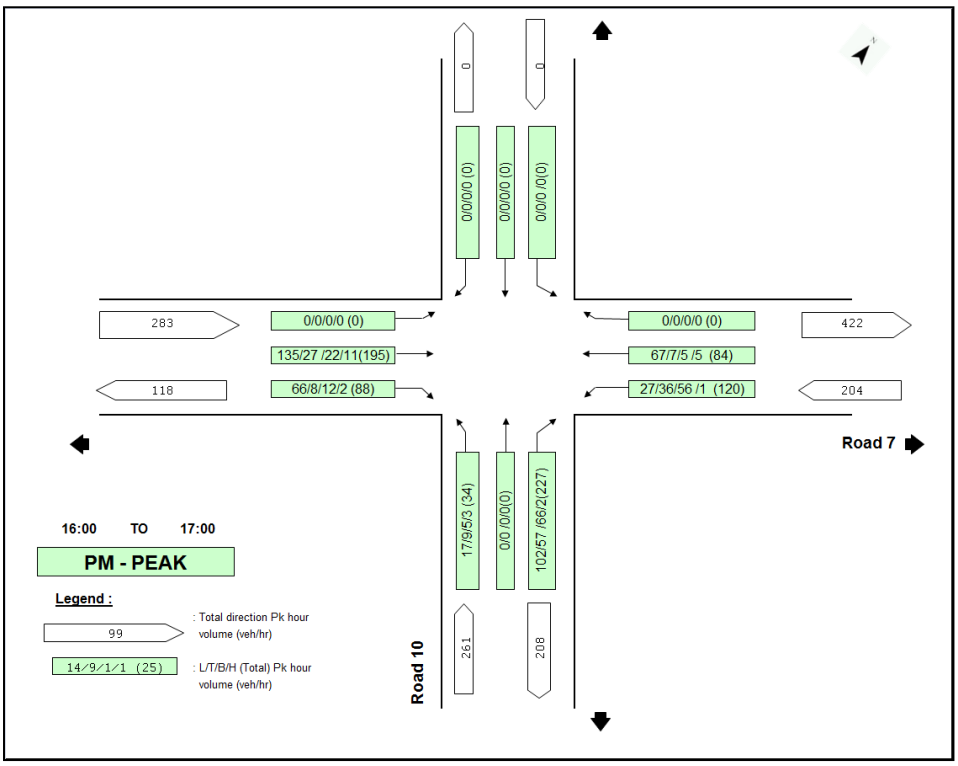



**Figure 2.10: PM peak hour traffic volumes – Road 7/Road 10**

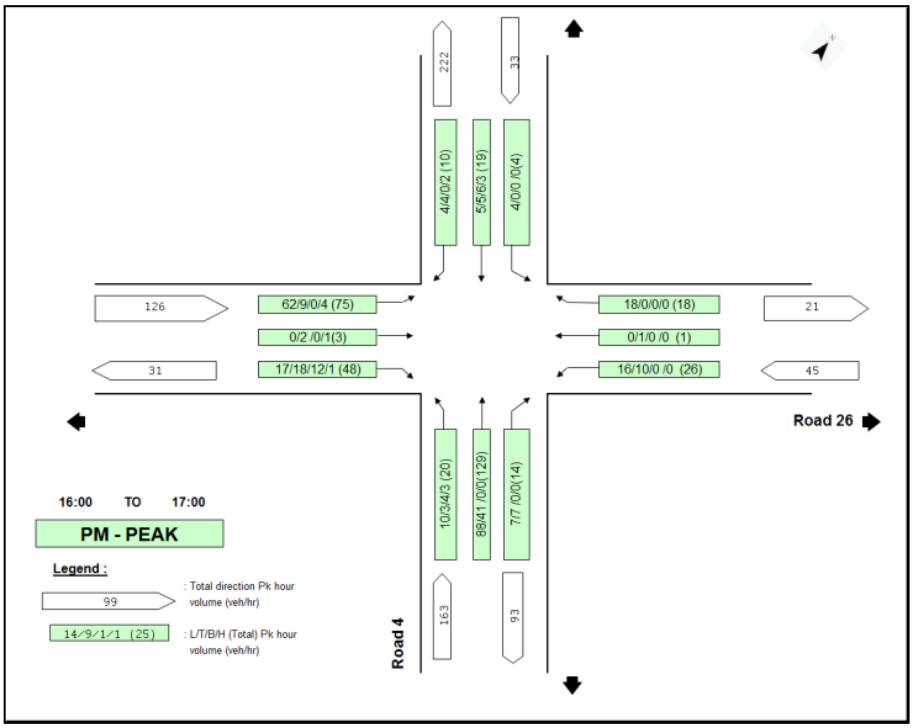



**Figure 2.11: PM peak hour traffic volumes – Road 26/Road 4**

Analysis of the traffic counts indicated the following:

- Nelson Mandela Drive/D1675 – There are a large number of light vehicles, minibus-taxis and buses exiting Medupi Power Station via D1675 during the pm peak period, in the morning the opposite applies.

- D1675/Afguns Road – There are only a few vehicles exiting and entering Afguns Road during the peak period, with most of the vehicles travelling east towards the Nelson Mandela Drive/D1675 intersection in the afternoon and west towards the power station in the morning.
- Road 1/Road 3 – Many buses and minibus-taxis were observed with most of them turning left or right into Road 3 or turning left from Road 3 into Road 1.
- Road 13/Road 3 – Most of the vehicles observed at this intersection are minibus-taxis or buses, this road leads to Entrance Gate 2 where all the vehicles that have one or more passengers must exit or enter.
- Road 7/Road 10 – Several heavy vehicles with large abnormal loads (construction material) were observed at this intersection.
- Road 26/Road 4 – The traffic volumes observed at this intersection are far less than the other intersections, with especially lower minibus-taxi and bus movement.

The following observations were also made during the site visit:

- Heavy pedestrian movement within the Medupi site, without any pedestrian sidewalk provision or crossings.
- Heavy vehicles travel slowly along the internal roads, causing delays for light vehicles since they can't overtake on the narrow roads.

# 3. Construction

The construction of the FGD plant and the waste disposal sites will include the following transport and traffic activities:

- Transport of staff, materials and equipment to site.
- Transport of abnormal load to site.
- Management of existing traffic around the site during construction.

## 3.1 Transport route options

The current access routes and access points to the Medupi Power Station, from a construction viewpoint, are described below.

Divided highway N1 is the main overland traffic route between the project site and major ocean ports, international airports, and Johannesburg. The most direct traffic route from Johannesburg uses the N1 to reach regional roadways R33, R517, and R510. Medupi Power Station is reached from roadway R510 by utilizing either Nelson Mandela Drive to D1675 (Magol Drive) to Medupi Power Station entrance road, or by using a new 26 km long plant entry roadway located off of R510, approximately 23 km south of Nelson Mandela Lane.

A single rail line services the Exxaro Grootegeluk coal mine and Medupi Power Station, running approximately north/south adjacent to R510 highway. This line passes through the towns of Thabazimbi, Amandelbult, and Rustenburg.

The closest South African ports to the project site are Durban (925 km, approximately a 9-hour drive via highways N3, N1, R33, R517, and R510); Port Elizabeth (1,445 km, approximately a 14-hour drive via highways N2, N10, N1, R33, R517, and R510); and Cape Town (1,768 km, approximately a 17.1/2-hour drive via highways N1, R33, R517, and R510).

## 3.2 Transport of staff, materials and equipment

The majority of project material will be transported to the project site via truck from Johannesburg via highways N1, R33, R517, and R510. Major equipment will be partially fabricated into truckable components in vendor fabrication shops, shipped to the project site, and fully assembled.

The following section will describe the construction roads and parking plan as developed by Eskom. Staff will be bussed to the site, checked through the permanent plant main access control facility (Entrance gate 1), and transported to their work locations. Empty busses will either exit the site or be parked until end of shift. A parking and load/unloading area for vehicles used on the site to transport personnel from/to remote site areas is located adjacent to the access control facility at the main site entrance. This area will be used only for off-shift parking for staff transport vehicles. Staff, vendors, and visitors arriving on the site via personal vehicles will enter through the main site entrance (Entrance gate 1), pass through access control and drive to a dedicated construction parking lot and office complex located on the southeast side of the plant site. This asphalt surfaced parking area will have approximately 200 parking positions. A special permit will be required to have a personal vehicle on-site and to park in this lot.

A separate site entrance and access control facility is located north of the main site entrance. It is dedicated for material delivery and heavy haul transport trucks and also includes pullover

and short-term parking areas for use during security check-in and inspection prior to being allowed onsite for unloading. The construction parking lot and the roads to and from the construction parking and construction entrance are hard surfaced with asphalt to minimize maintenance and provide dust control. Parking areas will be lighted and have barriers to control parking pattern and traffic flow.

In addition to the permanent plant roads and parking facilities, construction roads and parking are required to provide access to temporary construction facilities and lay-down areas in the work areas. The temporary roads are all weather, mostly gravel surfaced, and of sufficient width and location to accommodate efficient use and traffic pattern control for the construction process. Parking at temporary construction facilities and laydown is limited to vehicles necessary for the contractors to conduct work and will be controlled by permit.

Adjacent to the construction security and induction building will be a separate bus depot for drop off and collection of pedestrians and artisans at the pedestrian entrance turnstiles. The buses will enter the construction site through a gate adjacent to these turnstiles to collect and transport the artisans to the contractor's.

It is suggested that construction vehicles and trucks should utilise the Afguns road in order to avoid other road users on the main roads (as explained in **Section 4.1**). By utilising the Afguns – Thabazimbi road, the heavy vehicles trucks will avoid travelling through Lephalale town and avoid other busy nodes within the study area. Construction vehicles should enter via Entrance Gate 4 and use the suggested travel routes shown in Figure 3.1 below, depending on whether they are travelling to/from the FGD plant or the railyard/stockpile.

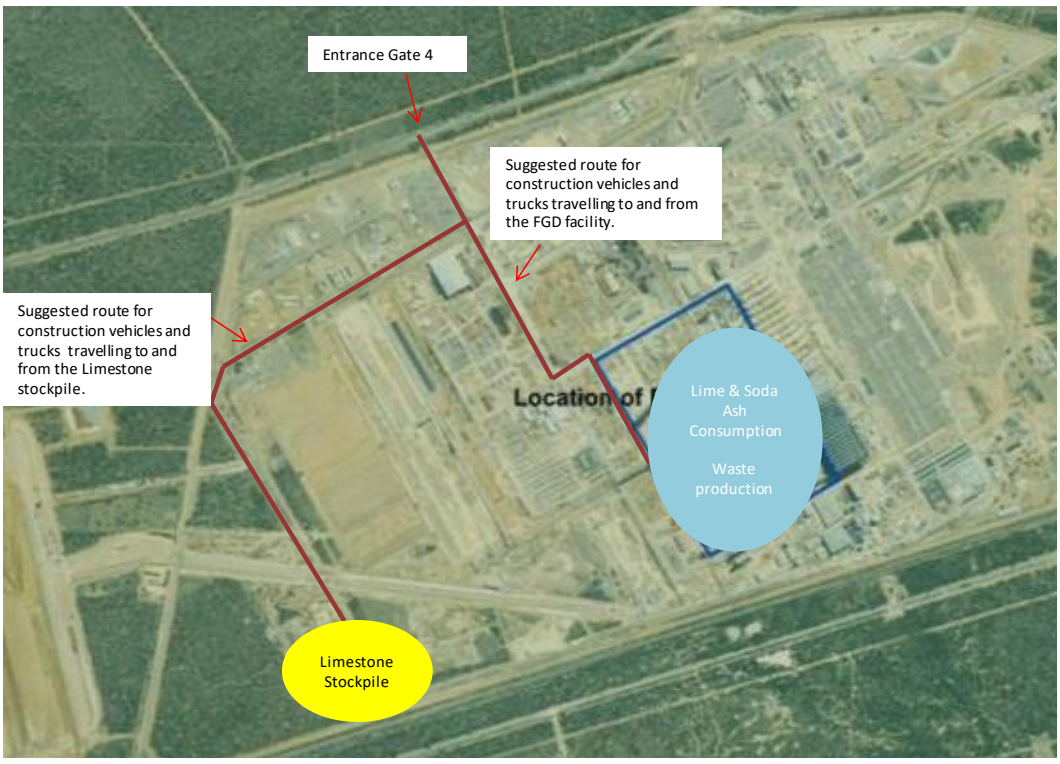



**Figure 3.1: Suggested travel routes for construction vehicles**

## 3.3 Transport of abnormal load to site

Abnormal load vehicles will use the existing road network, assisted by traffic officials and the stakeholders involved. The transportation of cargo will not be permitted when it rains or when

there is mist. The truck combinations can usually travel only at a speed of 10km/h for safety reasons and a traffic official must escort these combinations in a separate vehicle at any given time. The truck company that will be used for the transport of abnormal loads to site, will have to ensure that their trucks meet the safety standards. Eskom is still in the process of developing their heavy haul/lift plans and information will be updated once that information is available.

## 3.4 Management of traffic around the site during construction

The permanent plant site security organization will manage the plant traffic control program within the perimeter fence on the project site. Site Security will be responsible for enforcing speed limits, assigning parking areas and enforcing parking restrictions, installing and maintaining traffic control signs, delineating emergency response and evacuation routes, adjusting traffic patterns to accommodate construction and operation activities, informing plant personnel of current traffic patterns and restrictions, and assisting emergency medical personnel with accidents.

The Field Management Personnel Staffing Plan section will be expanded during the execution phase of the project to include paragraphs describing:

- Relocation Plans
- Personnel De-Staffing Plan
- Housing Availability or Camp
- Staff Transportation - Availability/Plan
- Other Considerations

## 3.5 Weigh bridge

It is planned and suggested by Eskom that a weigh bridge should be built at Entrance Gate 4. The concern from a traffic and transport safety viewpoint is that it may cause queuing to back up onto the public road (D1675), which will have an impact on other road users.

The weigh bridge will allow for the weighing of delivery trucks carrying the following loads:

- Fuel Oil;
- Coal (reject or supply);
- Limestone for future Flue Gas Desulfurization plant
- Gypsum for future FGD plant;
- Any other loads that require to be verified.

The weigh bridge will have a Bi-directional weigh bridge system, consisting of two Weigh Bridges. Each system will allow for haulage traffic to be weighed in both directions. Traffic control signage and lights will be installed to ensure oncoming traffic can clearly identify the lanes and activities in the area. The weigh bridge will be able to accommodate 12 trucks per hour. The estimate is that there will between six to twelve trucks per hour delivering limestone and approximately two trucks per hour transporting salts and sludge to a hazardous waste disposal facility. In order to assess the potential of trucks queuing into the public road and the impact on other road users, we will have to undertake a traffic count at

the intersection D1675 and the access road to the Entrance Gate 4 to establish the number of through traffic along this road. A detail plan showing the queuing distance available between the weigh bridge and public road together with a truck scheduling programme will be required. It is suggested that we undertake this investigation as part of this project under a variation order.

## 3.6 Conclusion and recommendation

It should be noted that there is some information that is not available which has an impact on the full assessment of the traffic impact during the construction period, however the following is recommended:

- The trucks delivering building material to the site should follow a similar route as recommended for the trucking of Limestone and salts and sludge in **Section 4.1** and **Section 4.2.**
- There should be a pointsman at the intersection of D1675 / Afguns Rd and Nelson Mandela Drive / D1675 during the peak hours to alleviate the traffic congestion.
- Undertake an assessment study with regards to the proposed weigh bridge design and determine whether it may cause queuing to back up onto the public road, which might have an impact on other road users.

# 4. Operational transport

The input materials to the FGD process are soda ash, lime or limestone. The limestone will be either brought in by rail to the plant via a rail siding from where it is collected, handled and stockpiled until used in FGD system or it could be transported to the plant with conventional bulk side-tipper trucks. The Soda ash will also be transported to the FGD plant with conventional bulk powder trucks.

Waste from the FGD process includes gypsum (which will be dewatered) and waste water. The waste water will be treated and cleaned for re-use in the plant. By- products of the waste water treatment process (salts and sludge) will be disposed at an existing licensed hazardous waste facility, after storage at a temporary storage facility in the vicinity of the waste water treatment plant. The gypsum together with the ash will be disposed of at the existing Medupi Ash disposal facility, which will be designed with the appropriate barrier system, given that ash and gypsum are both classified as the same waste type.

Figure 4.1 shows the input material that has to be transported to the FGD facility and the by-products that will be transported away from the facility to the existing licensed waste facilities.

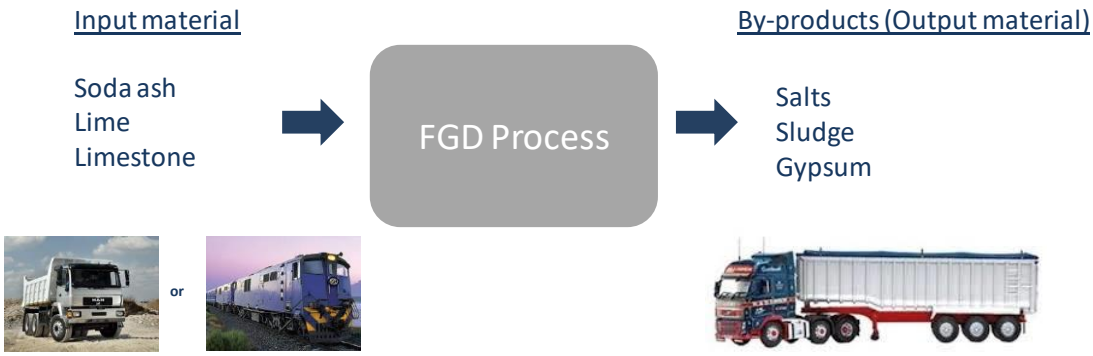



**Figure 4.1: Input and output material during the FGD process**

## 4.1 Limestone Transport

Limestone is purchased off-site and is transported to the Medupi Power Station by rail and/or road. The Limestone will be offloaded at the proposed limestone storage facility, which includes a rail siding and road access, located south-west of the six power units within the Medupi Power Station footprint. Limestone will be initially delivered by road and will be delivered to a truck offloading facility in close proximity to the Limestone Stockyard.

Some of the potential sources where limestone would be trucked from are Thabazimbi, Marble Hall and Vereeniging, as shown in Figure 4.2**,** although work still needs to be done before deciding on the limestone sources.

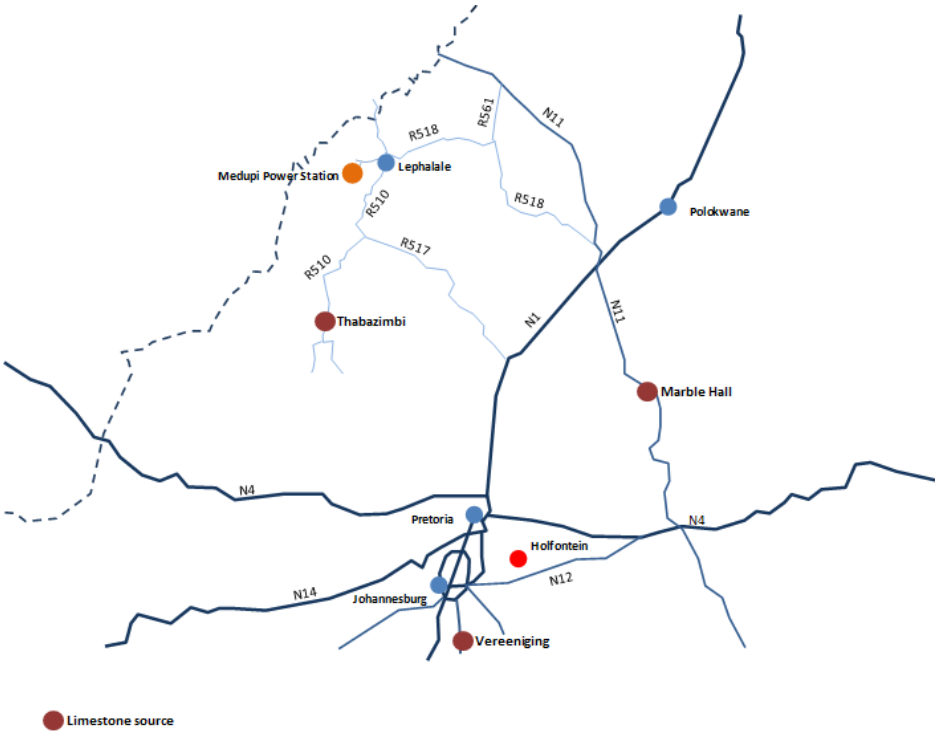



**Figure 4.2: Possible limestone collection points**

It is suggested that the trucks delivering limestone to the power station could utilise the Afguns road in order to avoid other road users on the main roads. By utilising the Afguns – Thabazimbi road, the trucks will avoid travelling through Lephalale town and avoid other busy nodes within the study area (see Figure 4.3). It is suggested that trucks travel from/to Medupi Power Station;

- to/from Thabazimbi via the Afguns road and the R510,
- to/from Vereeniging travel via the Afguns road, R510, R517, N1, N3 and R59 and
- to/from Marble Hall via Afguns road, R510, R517, N1 and the N11.

It is suggested that an economic study that takes into consideration travel cost, travel time, accident cost and the quality of the road surface, should be undertaken to fully understand and evaluate which of the potential limestone sources would be the best alternative to use. However, it is expected that the limestone source closest to Medupi Power Station, would have the least vehicle operating cost and impact to other road users.

The contractor would be responsible to discuss the trucking with the relevant roads agency to ensure that all legal requirements are met.

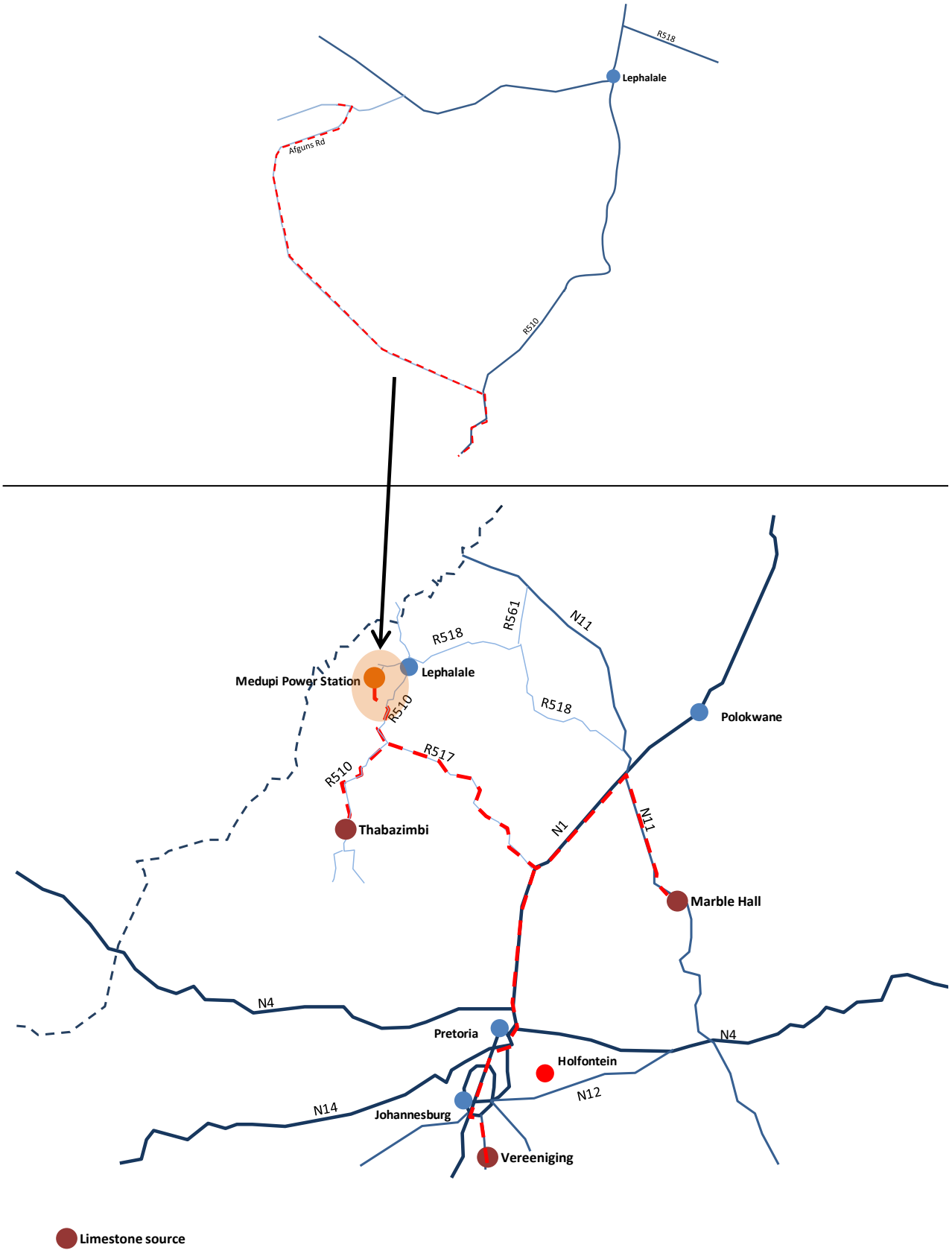



**Figure 4.3:Suggested route for trucks to and from limestone sources**

## 4.2 Salts and sludge transport

Salts and sludge will be transported to an existing licensed hazardous waste facility, there are four known options that are currently being investigated:

- Holfontein – Border of Gauteng and Free State;
- A facility in Natal;
- A facility in Western Cape;
- Vlaklaagte – within the Vaal Triangle

At the time of the assessment the selected/preferred hazardous waste facility where salts and sludge will be trucked for approximately the next five years, has not been confirmed. It is suggested that the trucks follow similar routes as described for the transport of limestone in **Section 4.1**, onto the N1 and then onto the various routes that are necessary to reach the hazardous waste facility. For transportation of the waste to a disposal site, Eskom will utilise the services of a service provider who has all required authorisations and systems to manage transportation from the temporary storage to disposal facility.

It is suggested that trucks delivering limestone should follow the yellow route to the Limestone Stockpile, while trucks transporting salts and sludge to the Hazardous Waste facility should follow the red route as shown in **Figure 4.7.** The trucks should enter via Gate 4.

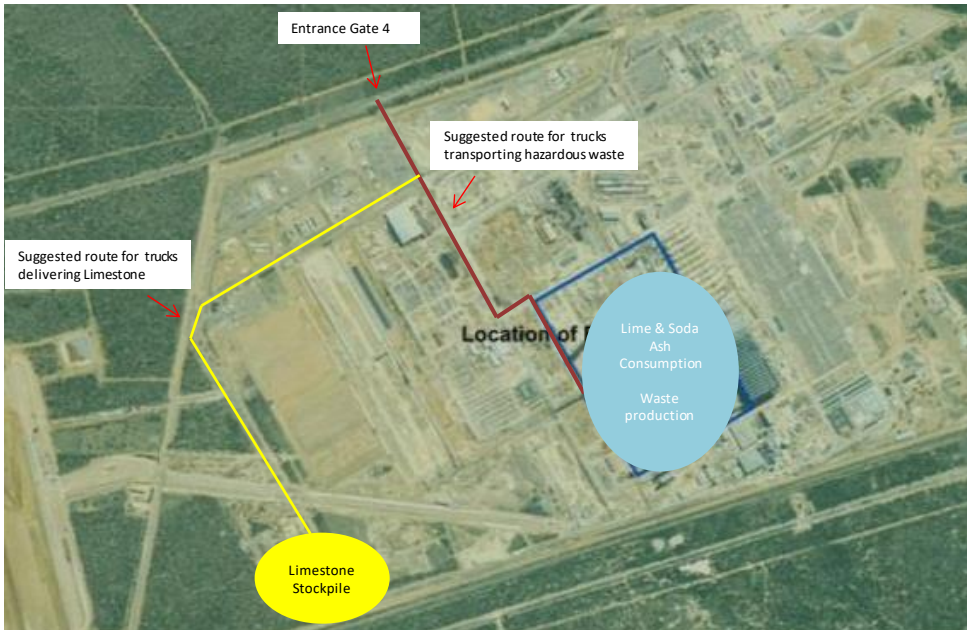



**Figure 4.4: Internal travel routes for trucks**

## 4.3 Ash and gypsum transport – Ash disposal facility

Conveyors are used to transport the ash from the power plant to the NADF. At the power plant, the ash is deposited onto an overland conveyor, while the overland conveyor transports the ash to a Transfer House (Transfer House 9) at the ash disposal facility. The transfer house will deposit the ash onto the ash dump extendable conveyor. If one or both stackers are temporarily out of commission, ash will temporarily be off loaded onto the emergency ash platforms situated close to Transfer House 9.

There is a possibility that 20% of the gypsum offtake might be removed via rail for sale, although this means that it will not be transported by conveyor to the NADF, it will only have a short-term impact on road users as it will be transported via rail in the long-term.

### *4.3.1 Access roads*

The side entry gate will be on the eastern side of the site. Leading from the gate will be the service roads along the conveyors and the patrol road that follows the fence around the site. At certain points along the patrol road will be roads that branch off toward infrastructure such as storm water trenches or pollution control dams.

There are three service roads; one on either side of the two conveyors and one that runs between the conveyors. The service roads along the conveyors lead to the starter and erection platforms and then onto the conveyor corridor on the ash dump.

Access to the rehabilitated back stacks of the dump will be from the northern or southern end of the starter platform. On the rehabilitated back stacks, access roads are included on the northern and southern edges with crossroads every fourth shift. Access roads that run on either side of the dump also provide access to leakage detection outlets of the liner systems.

Roads will be used for access to carry out maintenance, inspections, material delivery and construction. All the access roads will be inspected for depressions, potholes and erosion. The position of all depressions shall be indicated on the inspection form. No standing water or ponding will be allowed and occurrence shall be noted.

## 4.4 Truck movement

### *4.4.1 Trucking of Limestone and Sludge & Salts*

The trucks will operate for 12 hours a day, seven days a week and will be the same volume side tipper trucks that deliver coal. Table 4.1 indicates the expected daily number of truck loads required for the transport of sludge and salts to the licensed hazardous waste disposal facility per the number of units that are operational.

**Table 4.1: Daily number of trucks needed for the transport of sludge and salts**

| Unit | No. of Units with FGD Plant Operating | Chemical Sludge Production Rate (tph) | Chemical Sludge Production Rate (tpd) | Chemical Sludge Number of Trucks per day | Chemical Salts Production Rate (tph) | Chemical Salts Production Rate (tpd) | Chemical Salts Number of Trucks per day | Daily no. of truck loads required per FGD Plant Operational |
|---|---|---|---|---|---|---|---|---|
| 6 | 1 | 3.39 | 81.41 | 2 | 0.89 | 21.46 | 1 | 3 |
| 5 | 2 | 6.78 | 162.83 | 4 | 1.78 | 42.93 | 1 | 5 |
| 4 | 3 | 10.17 | 244.25 | 5 | 2.68 | 64.39 | 2 | 7 |
| 3 | 4 | 13.56 | 325.67 | 7 | 3.57 | 85.86 | 2 | 9 |
| 2 | 5 | 16.96 | 407.09 | 9 | 4.47 | 107.32 | 3 | 12 |
| 1 | 6 | 20.35 | 488.51 | 10 | 5.36 | 128.79 | 3 | 13 |

Based on the information provided in Table 4.1**,** the number of daily truck loads required for the transport of sludge and salts are 13 (if all of the units are operational). Based on a 12-hour operational day, it can be expected that a maximum number of two truckloads will be required during the peak hour, if the delivery schedule is evenly distributed through the day.

**Table 4.2: Daily number of trucks needed for the transport of limestone**

| Unit | No. of Units Operating | Limestone consumption (tph) | Limestone consumption Rate (tpd) | Limestone Number of Trucks per day |
|---|---|---|---|---|
| 6 | 1 | 24 | 576 | 12 |
| 5 | 2 | 48 | 1152 | 23 |
| 4 | 3 | 72 | 1728 | 35 |
| 3 | 4 | 96 | 2304 | 46 |
| 2 | 5 | 120 | 2880 | 58 |
| 1 | 6 | 144 | 3456 | 69 |

The information in Table 4.2 shows that a maximum number of daily trucks required for the transport of limestone to the facility are 23 for the year-2017+6 years (2023) and 69 for the year 2019 +6 years (2025). For a 12-hour operational day, it can be expected that a maximum number of six truck loads will be required during the peak hour, if evenly distributed throughout the day, and if all the limestone will be transported via road.

### *4.4.2 Truck types*

#### *4.4.2.1 Limestone*

It is expected that conventional bulk side-tipper trucks will be used, if transport of limestone is performed by road, using trucks (Figure 4.5). They will have the following specification:

- Weight
  Tare – 11 420kg
  Payload – 35 080kg

- Specifications
  Wheels – 12R22.5/315/80R22.5 Dual Wheels
  Rims – 9.00 x 22.5 Steel Rims
  Suspension – Air Suspension

- Other
  2 x 20m3 Light Weight Bins
  3mm Domex Chasis
  Tarpaulin Top Covers
  Spare Wheel Carrier
  Catwalk

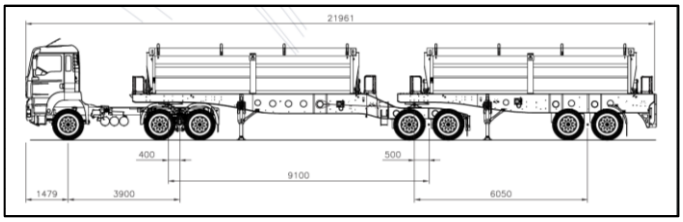



**Figure 4.5: Conventional bulk side-tipper trucks**

#### 4.4.2.2 *Soda Ash, Lime or Limestone*

If transport of soda ash, lime or limestone is performed by road, using trucks, it is expected that conventional bulk powder trucks will be used (see Figure 4.6). They will have the following specification:

- Horse – 6m.
- Trailer – 7-11m.

**Figure 4.6: Conventional bulk powder trucks**

### 4.4.3 *Feeder roads to Northern Ash Disposal Facility*

Currently it is planned that gypsum and ash will be conveyed to the NADF and therefore this process will generate no additional traffic impacts. If trucked; only internal roads will be utilized to carry the gypsum and ash to the NADF. A schematic showing the likely transport routes is shown in Figure 4.7**.**

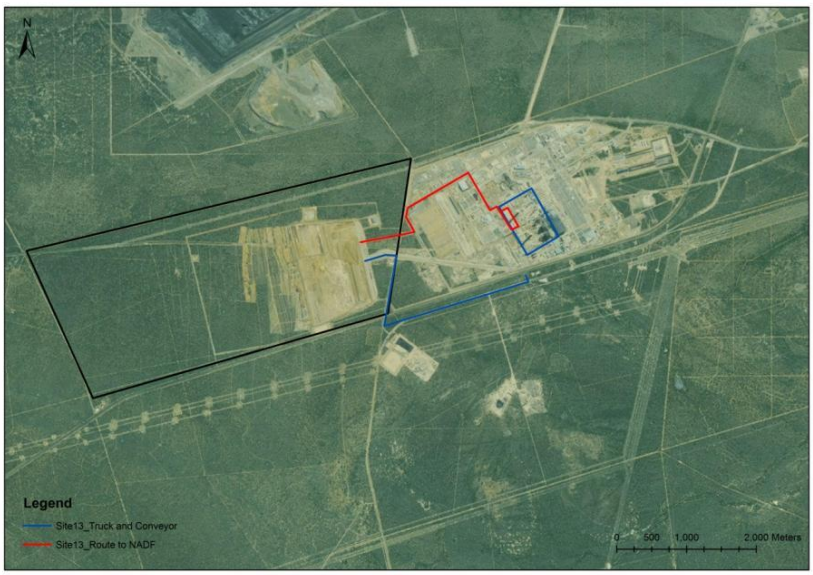



**Figure 4.7: Proposed transport routes to site 13 (NADF – Northern Ash Disposal Facility)**

# 5. Traffic Impact Assessment

The study area for the traffic impact assessment is confined to a 10km radius as specified in the scope of work document and shown in **Figure 5.1**. The 10km radius was selected based on the Medupi Power Station study area for possible waste disposal sites, before it was decided that the salts and sludge will be transported to a licensed hazardous waste disposal facility that falls outside the study area. The intersection analysis will be based on the affected intersections within the study area; however, the transport assessment will include affected areas outside the study area.

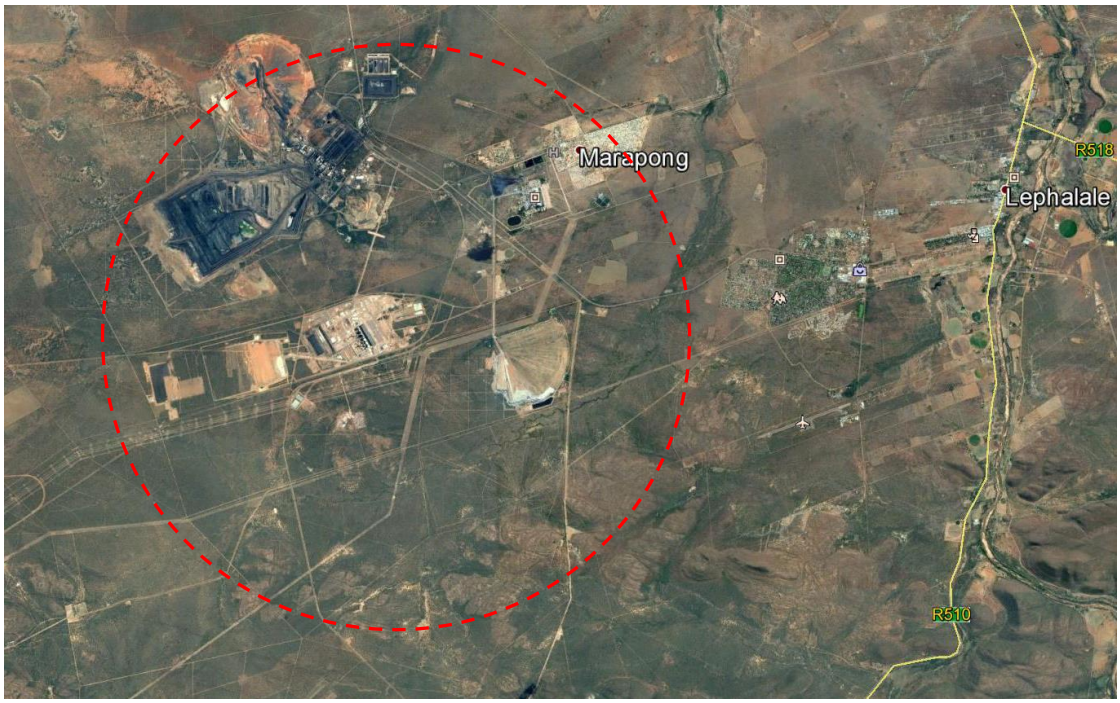



**Figure 5.1: Study area – Traffic Impact Assessment**

## 5.1 Traffic Analysis: Existing

The existing 2015 traffic count data (**Section 2.3.2**) has been used as input using SIDRA Intersection Analysis software to analyze the intersections. The peak hour was identified as 16:00 to 17:00 during the afternoon period. The peak hour analysis results are shown in **Figure 5.2** and **Figure 5.3**.

Level of Service (LOS) ratings have been used to evaluate the existing and future traffic situation. LOS tries to answer how good the present traffic situation is at a particular intersection. Thus it gives a qualitative measure of traffic in terms of delays experienced. It is represented by six levels ranging from level A to level F. Level A represents minimal delays where the driver has the freedom to drive with free flow speed and level F represents uncomfortable conditions accompanied by long delays (see **Table 5.1**).

**Table 5.1: Level of Service Criteria**

| LOS | Control Delay sec/veh(signalised) | Delay sec/veh (unsignalised) |
|---|---|---|
| A | $\leq 10$ | $\leq 10$ |
| B | 10-20 | 10-15 |
| C | 20-35 | 15-25 |
| D | 35-55 | 25-35 |
| E | 55-80 | 35-50 |
| F | $> 80$ | $> 50$ |

### *5.1.1 Nelson Mandela Drive / D1675*

**Figure 5.2** shows that this intersection currently operates at a LOS F for the northbound movement during the PM peak hour, and a LOS A for the west- and eastbound movement. This indicates that it operates well within capacity for the priority movement, but the vehicles coming from Medupi Power Station and Afguns road, wanting to turn into Nelson Mandela Drive are struggling to find a gap and long delays are experienced by motorists.

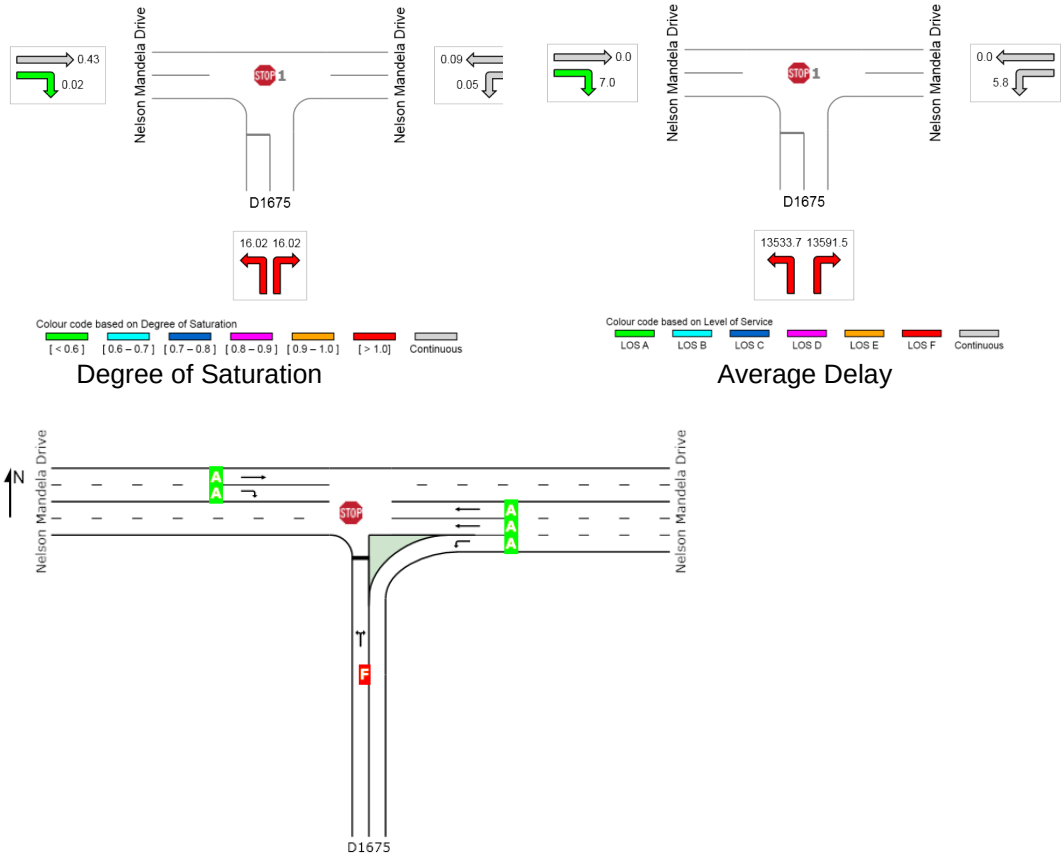



**Figure 5.2: 2016 Existing Scenario – Nelson Mandela Dr / D1675, PM peak hour**

### 5.1.2 *D1675 / Afguns Rd*

**Figure 5.3** shows that this intersection also operates at a LOS F for the northbound movement during the PM peak hour, and a LOS A for the west- and eastbound movement. This indicates that the vehicles coming along Afguns road who want to turn into D1675 are struggling to find a gap and long delays are experienced by motorists.

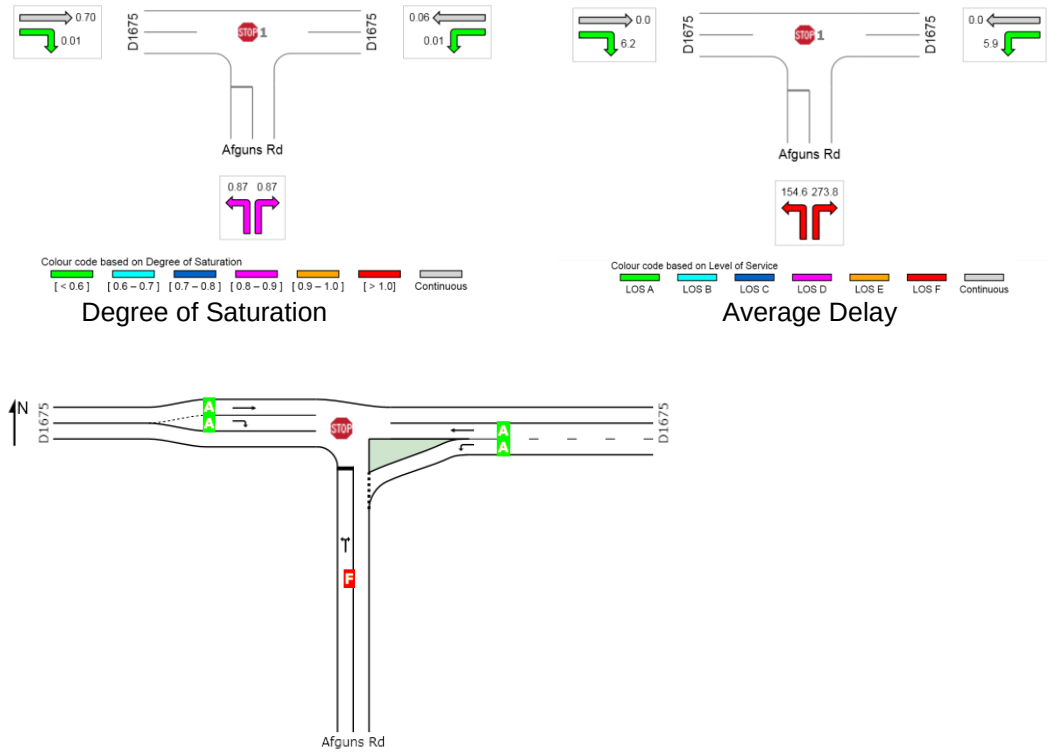



**Figure 5.3: 2016 Existing Scenario – D1675 / Afguns Rd PM peak hour**

## 5.2 Traffic Analysis: 10-year Post Development

Section 5.2.1 and 5.2.2 below summarise the analysis undertaken for the 2027 scenario and include the Degree of Saturation, Average Delay and LOS results. The 10-year scenario was analyzed using 2% growth for background traffic. The development traffic was grown to the year 2027. Based on **Section 4.4** it was assumed that there will be a peak hour flow of eight trucks in both directions, two for salts and sludge and six for the limestone, for the year 2025.

### *5.2.1 Nelson Mandela Drive / D1675*

**Figure 5.4** shows the anticipated performance of Nelson Mandela Drive / D1675 in 2027 after the development. The results indicate that the intersection will most probably operate at a LOS F for the northbound movement during the PM peak hour, and a LOS A for the west- and eastbound movement.

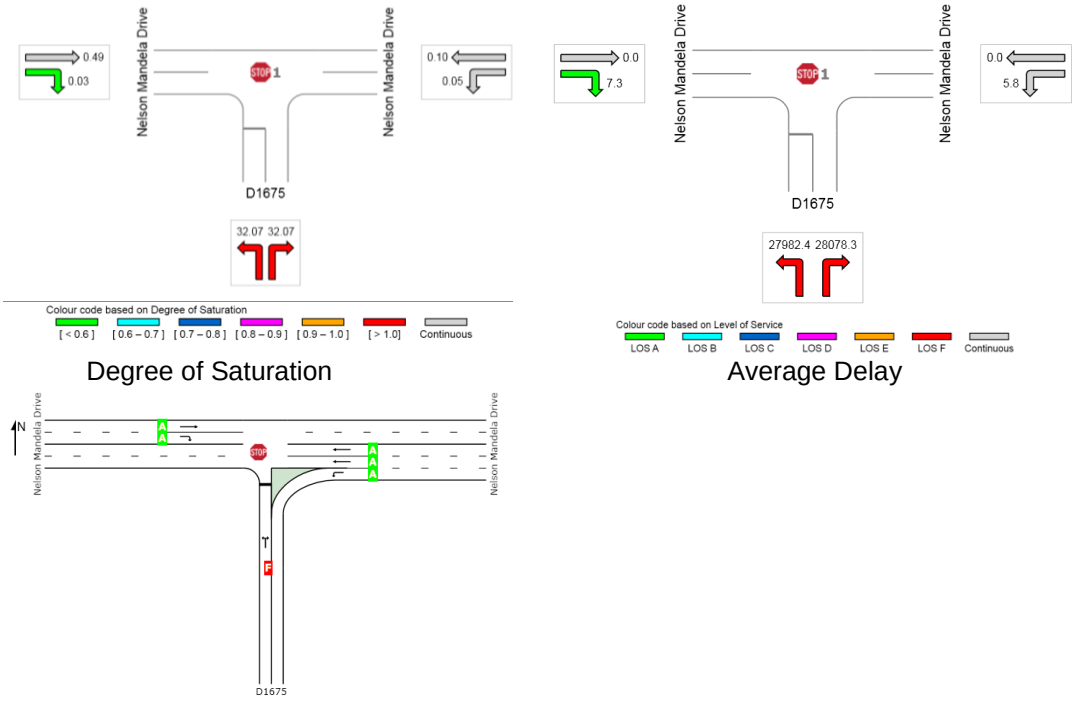
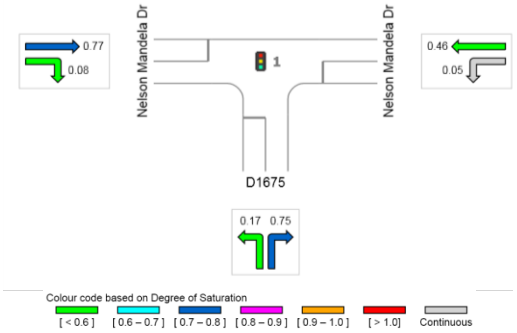



**Figure 5.4: 2027 Future Demand – Nelson Mandela Dr / D1675 PM peak hour**

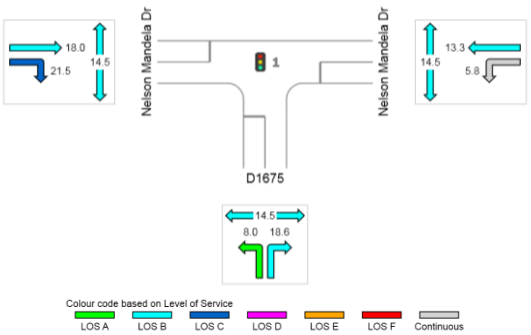
The following upgrades are suggested:

- Provide signals;
- Add a left turning slip lane along D1675 (northbound);
- The introduction of a right turning lane for the northbound right movement;
- Provision of an additional eastbound lane for the straight movement.

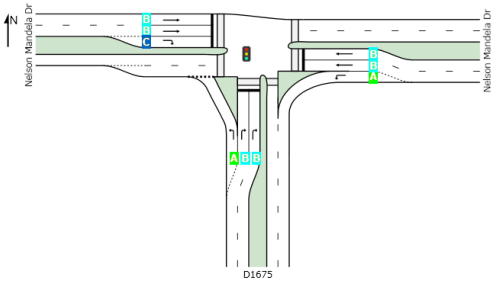
**Figure 5.5** shows the anticipated performance of Nelson Mandela Dr / D1675 intersection in 2027 with the proposed changes to the road layout. The results indicate that this intersection is likely to operate at a LOS B, which is a significant improvement from a LOS F. The results indicate that the signals, additional lanes and sliplane will solve most of the congestion issues. It is recommended that the relevant road authority should fund the upgrade of this intersection, since the existing intersection is already operating at a LOS F.




Degree of Saturation




Average Delay




Level of Service

**Figure 5.5: 2027 Future Demand & Future Layout– Nelson Mandela Dr / D1675 PM peak hour**

### 5.2.2 *D1675 / Afguns Rd*

**Figure 5.6** shows the anticipated performance of D1675 / Afguns Rd intersection in 2027, during the operational phase of the Medupi Power Station. The results indicate that this intersection is likely to operate at a LOS F for the northbound movement during the PM peak hour, and a LOS A for the west- and eastbound movement.

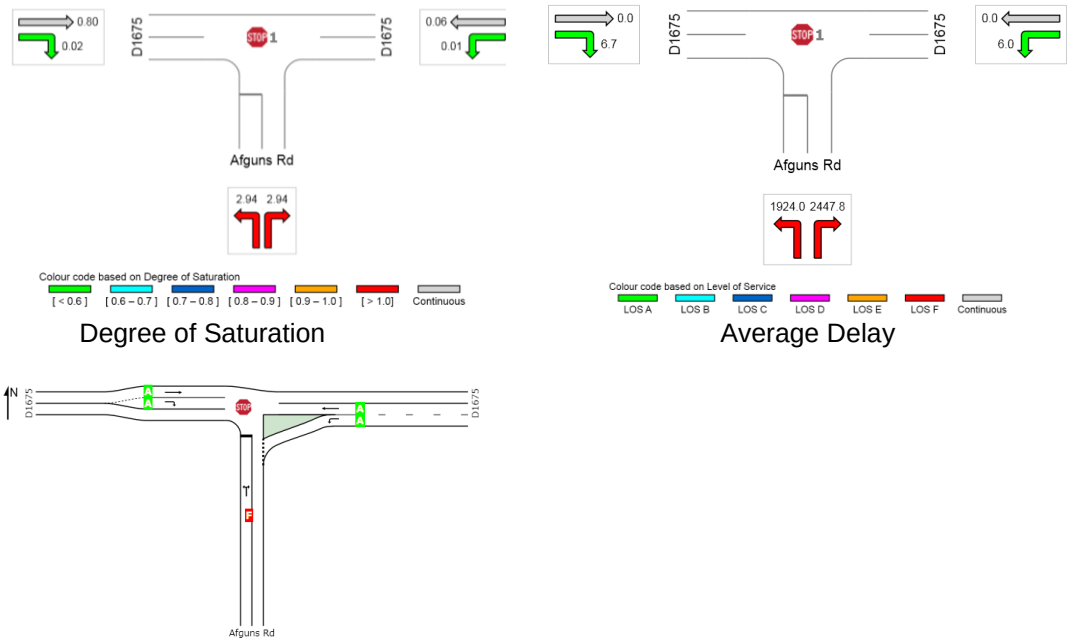
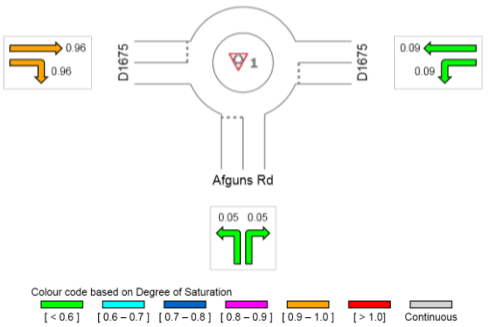


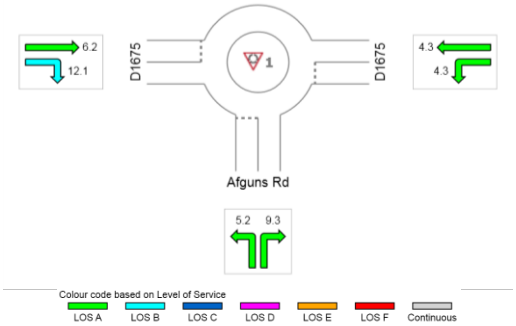

**Figure 5.6: 2027 Future Demand – D1675 / Afguns Rd PM peak hour**

A possible solution would be to upgrade the priority control intersection to a one lane roundabout. It should be noted that a roundabout is just one of the possible upgrade scenarios and it is recommended that a detail design study should be undertaken at this intersection to determine the best upgrade option based on the traffic volumes, percentage of heavy vehicle, size of trucks, geometry and other important aspects that should be taken into consideration.

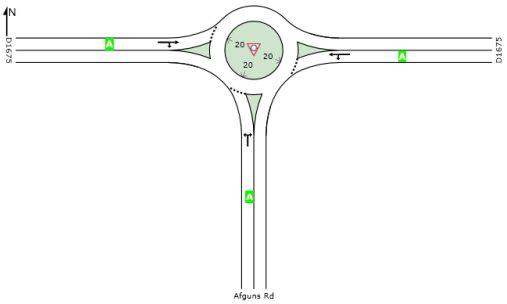
**Figure 5.5** shows the anticipated performance of D1675 / Afguns Rd intersection in 2027 with the proposed changed to the road layout. The results indicate that this intersection is likely to operate at a LOS A. This is a significant improvement on the LOS and will be beneficial to the trucks travelling to and from Medupi Power Station, leading to travel time savings and vehicle operating cost saving in the long term.




Degree of Saturation




Average Delay




Level of Service

**Figure 5.7: 2027 Future Demand & Future layout – D1675 / Afguns Rd PM peak hour**

It is recommended that a detail design phase should be carried out as part of the traffic impact assessment for this project. During the detail design process various intersection upgrade options (roundabout, signals, sliplanes etc) will be tested and compared to ensure that the most optimum and cost-effective intersection upgrade are selected.

# 6. Impact Assessment – IA Rating

The following section will discuss the IA Rating for the construction, operational and de-commissioning phase for Medupi FGD process.

**Table 6.1: IA Rating for Construction Phase**

| CONSTRUCTION PHASE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Nature of Impact** | **Impact type** | **Extent** | **Duration** | **Potential Intensity** | **Likelihood** | **Rating** | **Mitigation** | **Interpretation** |
| Traffic Impact | Direct Impact: | Existing | 3 | 4 | 4 | 1 | 11 - HIGH | Upgrade the existing road intersections as described in Chapter 5, which will improve the LOS from F (worse) to B or A (A being the best). | Current LOS at the intersections is already at a LOS F due to high traffic volumes. |
| | Impact of additional generated traffic due to the construction phase on existing road layout and road users. Nelson Mandela Dr / D1675 Intersection and D1675 / Afguns Rd Intersection. | Cumulative | 3 | 1 | 8 | 1 | 12 - HIGH | | With the additional traffic generated during the operational phase, the delay at these intersections will increase. |
| | | Residual | 3 | 3 | 1 | 0.1 | 1 - LOW | | With the road upgrades at the two intersections the LOS will improve from a LOS F to B or A. |

## Table 6.2: IA Rating for Operational Phase

| OPERATIONAL PHASE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Nature of Impact** | **Impact type** | **Extent** | **Duration** | **Potential Intensity** | **Likelihood** | **Rating** | **Mitigation** | **Interpretation** |
| Traffic Impact | Direct Impact: | Existing | 3 | 4 | 8 | 1 | 15 - HIGH | Upgrade the existing road intersections as described in Chapter 5, which will improve the LOS from F (worse) to B or A (A being the best). | Current LOS at the intersection is already at a LOS F due to high traffic volumes. |
| | Impact of additional generated traffic during operational phase of the FGD plant on the existing road layout and road users. Nelson Mandela Dr / D1675 Intersection and D1675 / Afguns Rd Intersection. | Cumulative | 3 | 5 | 16 | 1 | 24 - FLAW | | With the additional traffic generated during the operational phase the LOS (delay) at these intersections will be worse. |
| | | Residual | 3 | 3 | 1 | 0.1 | 1 - LOW | | The road upgrades will improve the LOS from F to B or A (A being the best, no delays). |
| Transort of Limestone | Indirect Impact: | Existing | 4 | 3 | 4 | 0.1 | 1 - LOW | It is suggested that trucks delivering limestone to Medupi Power Station should utilise the Afguns Road in order to have a minimal impact on other road users. By utilising the Afguns - Thabazimbi road, the trucks will avoid travelling through Lephalale town and avoid other busy nodes within the study area. | Truck traffic on SA roads impacts on road condition, safety, travel time and vehicle operating cost. They have a negative impact on other road users. |
| | Impact of the transport of Limestone from the limestone sources. | Cumulative | 4 | 4 | 8 | 0.75 | 12 - HIGH | | Increase in truck traffic on the various roads between Medupi and Limestone sources, could have a negative impact on the road condition, travel times and traffic volumes. |
| | | Residual | 4 | 3 | 4 | 0.2 | 2 - LOW | | It is suggested that trucks delivering limestone should utilise the Afguns Rd in order to have a minimal impact on other road users. |
| Transport of Salts and Sludge | Indirect Impact: | Existing | 4 | 3 | 4 | 0.1 | 1 - LOW | It is suggested that trucks transporting salts and sludge to the waste facilities should utilise the Afguns Road in order to have a minimal impact on other road users. By utilising the Afguns - Thabazimbi road, the trucks will avoid travelling through Lephalale town and avoid other busy nodes within the study area. It is suggested that an Economic Evaluation study should be undertaken to select the most optimum facility. | Truck traffic on SA roads impacts on road condition, safety, travel time and vehicle operating cost. They have a negative impact on other road users. |
| | Impact of transport of salts and sludge to one of the four potential licensed hazardous waste facilities. | Cumulative | 4 | 4 | 8 | 0.75 | 12 - HIGH | | Increase in truck traffic on the various roads between Medupi and Limestone sources, could have a negative impact on the road condition, travel times and traffic volumes. |
| | | Residual | 4 | 3 | 4 | 0.2 | 2 - LOW | | It is suggested that trucks transporting salts and sludge should utilise the Afguns Rd in order to have a minimal impact on other road users. |

**Table 6.3: IA Rating for Decommissioning Phase**

| DECCOMMISSIONING PHASE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Activity** | **Nature of Impact** | **Impact type** | **Extent** | **Duration** | **Potential Intensity** | **Likelihood** | **Rating** | **Mitigation** | **Interpretation** |
| Traffic Impact | Direct Impact: | Existing | 2 | 1 | 1 | 0.5 | 2 - LOW | Monitoring of intersection conditions and capacity | LOS at intersections should be at an acceptable level due to the road upgrades proposed for the construction phase |
| | Impact of reduction in traffic volumes due to decommisioning phase. | Cumulative | 2 | 1 | 1 | 0.5 | 2 - LOW | | Reduction in traffic volumes. |
| | | Residual | 2 | 1 | 1 | 0.1 | 0 - LOW | | With the reduction in traffic volumes and the road upgrades the LOS will improve. |

From the results in **Table 6.1, 6.2** and **6.3** it is evident that with the right mitigation measures the traffic and transport impact due to the Medupi FGD Plant will be low, and thus the project can proceed.

# 7. Conclusions and Recommendations

This Traffic impact assessment has reviewed the traffic impact of the proposed construction and operation phase of the Medupi Flue Gas Desulphurisation power plant.

The major findings and recommendations of this report can be summarised as follows:

- The following observations were made during the site visit:
  - Heavy pedestrian movement within the Medupi site, without any pedestrian sidewalk provision or crossings. It is recommended that safe and secure sidewalks should be provided for pedestrian movement within the plant.
  - Heavy vehicles travel slowly along the internal roads, causing delays for light vehicles since they can't overtake on the narrow roads. It is suggested that an internal mobility plan should be developed for Medupi Power Station, focusing on the movement of light vehicles, heavy vehicles, public transport and pedestrians.
- Analysis of the traffic counts indicated the following:
  - Nelson Mandela Drive/D1675 – There are a large number of light vehicles, minibus-taxis and buses exiting the Medupi Power Station via D1675 during the pm peak period. In the morning there are a large number of light vehicles, minibus-taxis and buses entering Medupi Power Station.
  - D1675/Afguns Road – There are only a few vehicles exiting and entering Afguns Road during the peak period, with most of the vehicles travelling north towards the Nelson Mandela Drive/D1675 intersection.
- The following is recommended during the construction period:
  - The trucks delivering building material to the site should follow a similar route as recommended for the trucking of limestone and salts and sludge in **Section 4.1** and **Section 4.2.**
  - There should be a pointsman at the intersection of D1675 / Afguns Rd and Nelson Mandela Drive / D1675 during the peak hours to alleviate the traffic congestion and assist the northbound traffic.
  - Undertake an assessment study with regards to the proposed weigh bridge design and determine whether it may cause queuing to back up onto the public road, which will have an impact on other road users.
- From the Baseline traffic impact assessment, the following were decided upon with regards to the transport of products to and from the facility:
  - Ash and gypsum will be conveyed to the existing Northern Ash Disposal Facility and therefore this process will generate no additional traffic impacts.
  - The sludge and salts will go to an existing licensed hazardous waste facility.
- It is suggested that the trucks delivering limestone to Medupi Power Station could utilise the Afguns Road in order to have a minimal impact on other road users. By utilising the Afguns – Thabazimbi road, the trucks will avoid travelling through Lephalale town and avoid other busy nodes within the study area. It is suggested that trucks travel from Medupi Power Station to Thabazimbi via the Afguns road and the R510, to Vereeniging

via the Afguns road, R510, R517, N1, N3 and R59 and to Marble Hall via Afguns road, R510, R517, N1 and the N11. However, if the trucks will not be able to use the Afguns road, an additional traffic impact assessment should be undertaken to determine the impact of the trucks travelling through Lephalale.

- The contractor would be responsible to discuss the trucking with the relevant roads agency to ensure that all legal requirements are met.
- At the time of the assessment the final location for the disposal of salts and sludge has not been confirmed. It is suggested that the trucks follow similar routes as described for the transport of limestone in **Section 4.1**, onto the N1 and then onto the various routes that are necessary to reach the hazardous waste facility.
- 10 Year Post development traffic analyses have indicated that both intersections, Nelson Mandela Drive / D1675 and Afguns Rd / D1675 have poor levels of service for the northbound movement. The following road layout changes are proposed:
  - Nelson Mandela Dr / D1675:
    - Provide signals;
    - Add a left turning slip lane along D1675 (northbound);
    - The introduction of a right turning lane for the northbound right movement;
    - Provision of an additional eastbound lane for the straight movement.
    - It is recommended that the relevant road authority should fund the upgrade of this intersection, since the existing intersection is already operating at a LOS F.
  - Afguns Rd / D1675 – It is recommended that the priority control intersection should be upgraded, this study is only looking at conceptual design and it is recommended that a detail design study should be undertaken at this intersection to determine the best upgrade option (i.e. roundabout, increase of capacity etc. depending on the size of the trucks).
- It is recommended that a detail design phase should be carried out as part of the traffic impact assessment for this project. During the detail design process various intersection upgrade options (roundabout, signals, slip lanes etc.) will be tested and compared to ensure that the most optimum and cost-effective intersection upgrade is selected.