

**GRUISFONTEIN PROJECT
LOCATED WITHIN
THE LEPHALALE LOCAL MUNICIPALITY,
WATERBERG DISTRICT MUNICIPALITY,
IN THE LIMPOPO PROVINCE**

TRAFFIC IMPACT ASSESSMENT



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JULY 2019

Avzcons

Siviele Ingenieurskonsultant & Projekbestuurder
Civil Engineering Consultant & Project Manager

202 Lavata Street, La Montagne, Pretoria 0184 - Tel.: (012) 803-0762 - Fax.: 086-696-3780 - Cell.: 082-551-4655 - avzcons@intekom.co.za

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1. INTRODUCTION

This report was prepared for **JACANA ENVIRONMENTALS cc**, and compiled by Abraham Albertus van Zyl in his capacity as director of AvzconS (Pty) Ltd.

PROFESSIONAL REG. : 920506-12-11-1992
PRESENT POSITION : Director of AvzconS (Pty) Ltd, Transportation and Civil Engineers and Project Managers.
SPECIALISATION : Traffic impact studies, Roads design, Contract Documentation & Project management
QUALIFICATIONS : BSc Eng, University of Pretoria

PROFESSIONAL MEMBERSHIP :
Registered Engineer, Engineering Council of South Africa.
Member of the South African Institute of Civil Engineers.
Member of the Institute of Municipal Engineers of South Africa.

KEY EXPERIENCE :
Since 1974, Abraham A van Zyl was involved in the planning, design and construction of roads and civil services projects as well as management of multi-disciplinary projects. He was employed by BKS Inc for a period of 19 years, when he was appointed as Town Engineer of Montagu in 1993. He joined the practice of Dr AJ Kruger and Partners as full partner in October 1995 and established the company "AvzconS (Pty) Ltd" during 2006.


His experience obtained during the more than 40 years of practice includes the planning, design, documentation, supervision, quality control, budgets and project management for projects from property and township developments, provincial roads and freeways as well as airports, traffic impact analysis and the management of municipal engineering services, all with the required and applicable computer knowledge.

For 4,5 years he was also deployed by SAICE and the DBSA, on a part time basis, to attend to all transportation related aspects (traffic studies, access applications, geometric standards, master plans, etc.) in the Metsweding District Municipality.

Clients include international and national governments, provincial and local authorities, authorities of national states and a variety of private developers. Projects are handled worldwide with special attention to the market throughout South Africa and neighbouring states, serving both public and private clients.

DECLARATION OF INDEPENDENCE:

I, Abraham Albertus van Zyl, the author of this report, hereby declare my independence as a practicing transportation engineer, with no interest in the Gruisfontein Project.



AA van Zyl
pp AvzconS (Pty) Ltd

1.1 Purpose of this study

This mining project is being planned on the farm Gruisfontein 230-LQ and referred to as the Gruisfontein Project Area, which is situated approximately 48km west of Lephalale and ± 15 km north of Steenbokpan in the Waterberg District of Limpopo.

AvzconS (Pty) Ltd were appointed to conduct a traffic impact study to assess the traffic implications of the future mining operations on the transport route along the available public road network.

Figure GP-TR-01 is a general locality map of the proposed Gruisfontein Project Area and **Figure GP-TR-02** is a cadastral key plan which shows the locality of the proposed Gruisfontein Project Area in relation to the surrounding region and the existing road network serving the area, as well as the various route numbers of all the roads within the scope of the study area.

1.2 Study approach/Methodology

In order to make recommendations to the relevant roads authority on the feasibility of the proposed transport modes for the future mining operations, the study is structured as follows:

- Determine the scope/boundaries of the required survey field and study area in terms of the road sections involved with the possible alternative routes available to the transport of production by truck.
- Identify all possible factors and elements which might influence the adjudication of the revised transport mode such as possible congestion of traffic by conducting various current traffic counts in the area of interest.
- Discuss existing standards which are normally applied and which are to be satisfied, in relation to applicable norms experienced at similar developments.
- Compile a database of the latest available information which might influence the decision of the relevant authorities.
- Discuss the expected traffic impact of the proposed Gruisfontein Project on the regional road network.

1.3 Proposed development

The future mining operations, aiming towards producing $\pm 10,000$ ton per day (towards Medupi/ Matimba power stations and/or for export purposes), will be within the mine boundary of the Gruisfontein Project Area. The purpose of this planned future mining project will be to establish new mining operations, which in turn is coupled to major regional benefits of which the most important are sustained employment opportunities and extended foreign revenue generation.

The current operational planning, with regard to the distribution of the expected daily coal production of $\pm 10,000$ ton, is that the production is to be transported via the existing provincial road infrastructure network towards the existing Medupi and/or Matimba Power Stations (see **Figure GP-TR-08**) and/or for export purposes.

2. PRESENT SITUATION

Figures MC-TR-01 and **-02** indicate the location of the Gruitfontein Project Area in relation to its surroundings. The proposed mining area is situated ± 48 km to the west of Lephalale, east of the Provincial road D175 and ± 15 km north of the town of Steenbokpan.

All planned future operations will be conducted in accordance with the mining right applicable to the properties within the project boundary and no public road route-alignments will be affected by the planned mine boundaries of the Gruitfontein Project Area.

For the purpose of the portion of production from the Gruitfontein Project, planned to be transported on a daily basis by road to the Medupi and/or Matimba Power Stations outside of Lephalale, the transport route which was investigated and evaluated is as follows: (see **Figures GP-TR-02, -03** and **-05**)

- i) Haul road from product stockpiles to south-eastern corner of Gruitfontein.
- ii) Along an existing service road situated on the southern border of the farm Verloren Valley 246-LQ.
- iii) Southbound for ± 15 km to Steenbokpan along the existing provincial gravel road D175.
- iv) Eastbound for ± 30 km to the Medupi or Matimba Power Station along the existing paved provincial road D1765.

Figure GP-TR-08 also indicates the three intersections evaluated during the compilation of this report. The different public roads involved with this planned transport route are:

- **Provincial Road D1675** is a well maintained paved provincial road under the jurisdiction of the Roads Agency Limpopo, stretching from Lephalale westbound passed Medupi Power Station, towards Steenbokpan.



- **Provincial Road D175** is a gravel provincial road, running northwards from Road D1675 at Steenbokpan towards Stockpoort on the Botswana border. This gravel road is also under the jurisdiction of the Road Agency of the Limpopo Provincial Government (RAL).



3. TRAFFIC ASPECTS

3.1 Present traffic volumes

Traffic movements during the changing of shifts at the future mining operations were considered as the worst case scenario from a traffic point of view and in view of this assumption, traffic volumes were obtained from manual traffic counts during November 2018 as well as the data base of the provincial roads authority.

The available traffic counts obtained were then converted to average daily trips and together with the records from the provincial data base were used to reflect the current daily traffic movement on each road link (i.e. section between each pair of intersections). These average daily trips are recorded in **Figure GP-TR-05**.

This reflection of the current average daily traffic volumes, provides a clear indication of the current relative priority of the various road links within the area of interest.

Table 1:

Road	Link	Ave. daily trips
Road R1675	Between Road D2001 and Road D2649	1508
	Between Medupi Power Station and the D175	274
Road D175	Between Road D1675 and Road D2286	61
	Between Road D2286 and Stockpoort	54
Road D2286	West from Road D175	31

3.2 Expected future trip generation

According to the available information on the current planning for the proposed Gruisfontein Project, the transport related operational activities will consist of the following expected increase in peak hour traffic movements:

(Via the mine access as proposed to be off Road D175)

(A summary of the base traffic calculations are indicated on **Figure GP-TR-07**)

a) Production transport by road:

The expected daily production volume of coal transported by road relates to a daily number of 400 truck trips, which is equal to **32 trips during peak hour** on the surrounding road network.

b) Other trips (deliveries and staff vehicles):

The expected number of deliveries and staff movements to/from the site is estimated to generate 92 trips per day. Of these trips less than 50% is expected during the peak hour on the surrounding road network, resulting in **28 trips during peak hour**.

c) Staff mass transport trips:

Mass transport of staff and labourers to site is estimated to be equal to 28 trips per day of which 50% is estimated to take place during the peak hour on the surrounding road network resulting in **14 trips during peak hour**.

The various transport modes identified above can therefore be expected to generate a total of 74 additional new trips during the peak operational hour of the surrounding road network. This is equal to 37 new trips inbound and 37 new trips outbound during the peak hour.

3.3 Accommodation of future activities

The Gruisfontein Project will be a new operational mining development, which will require new infrastructure to support the planned mining operations. The new construction work (over ± 18 months), that will be required in preparation towards the proposed new mining activities, can be expected to generate trips on the surrounding road network very similar to the trips expected during the operational period.

In order to accommodate the future activities of the planned Gruisfontein Project, the following available information were taken into account:

- The financial sustainability of the planned Gruisfontein Project.
- Regional benefits for the community due to this project.
- Traffic capacity constraints of existing roads impacted upon.
- Road safety aspects related to an area with active mining operations.
- The availability of road transport routes and their current conditions.

3.4 Trip distribution and assignment

Taking into account transportation related aspects such as current traffic patterns, current traffic volumes, route preferences by the current road users, road geometry and road safety, no reason could be identified that will cause any expected re-assignment of any current trips on the road network due to the mining operation of the proposed Gruisfontein Project.

The available information regarding the operational planning of the Gruisfontein Project, indicated that all the production trucks as well as the bulk of the staff and visitors/deliveries will travel along the Provincial Roads D175 and Road D1675 to and from the site access road.

As recorded on **Figure GP-TR-08**, this expected distribution implies an estimated 90:10 split at the site access point off the Provincial Road D175 of vehicle trips during the peak hours, which is expected to be during the change of shifts.

4. TRAFFIC IMPACT ANALYSIS

4.1 Level of service (LOS)

In terms of available capacity, the surrounding roads of a new development should cater for the traffic demand as determined in the previous section, and road improvements for the account of the developer have to be done to enable the existing road infrastructure to function effectively, given the additional traffic caused by the development.

The level of service (LOS) of a traffic movement is recorded on the following scale on which the operational capability of a movement or collection of movements is judged, primarily according to the delay times experienced:

A	:	Very good
B	:	Good
C	:	Acceptable
D	:	Poor
E	:	Very poor
F	:	Unacceptable

4.2 Assessment

In accordance with the Manual for Traffic Impact Studies, Report RR93/635 of the Department of Transport, a level of service (LOS) analysis is required for the following situations:

- a) Each intersection impacted upon which is already congested or experiencing a very poor level of service during peak hours.*
- b) Each intersection impacted upon where 75 additional development trips are added to the sum of the critical lane volumes during peak hour.*

The following **Table 2** provides a summary of the trips (during the expected peak hour), to pass through the three intersections of the surrounding road network along the planned route during the peak hour:

Table 2:

Intersection Number (See Figure GP-TR-08)	Trips Through Intersections	
	Current Peak Hour Trips	Expected New Additional Trips
1 (Future mining area access)	8	74
2 (Steenbokpan intersection)	26	67
3 (production delivery at Medupi)	28	40

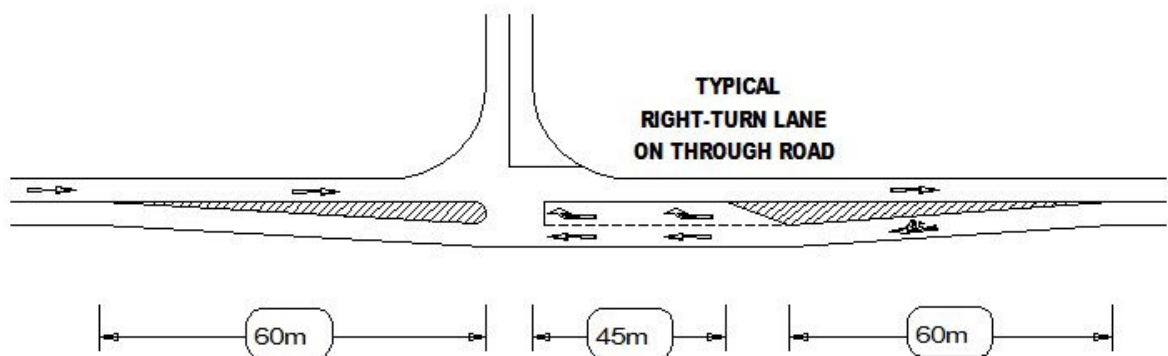
In terms of the required standard of the *Manual for Traffic Impact Studies, Report RR93/635 of the Department of Transport* and the fact (as recorded in **Table 2**), that at all three relevant intersections, less than 75 additional development trips will be added to the sum of the critical lane volumes during the expected peak hours, none of the three intersections along the route to be used by the proposed mining operations, need to be submitted to a detailed capacity analyses.

However, the current trips passing through all three intersections during the expected peak hours are so minute, that all three the relevant intersections will still operate at a very good level of service (LOS A), even with the additional trips due to the Gruisfontein Project.

There are however two very specific aspects that requires to be attended to, namely:

a) Road safety:

All three identified intersections are situated along sections of road with acceptable sight distance and with acceptable operational conditions in terms of their respective operational classifications. But, from a traffic point of view and in terms of road safety, the lane configurations at the intersection of Road D175 and Road D1675 as well as at the access off Road D1675 at Medupi (where mine production trucks from the Gruisfontein Project will turn in), should in future at least provide for dedicated right turning lanes on the approaches along the through road (Road D1675), to allow for the speed difference between the through traffic and slow moving turning trucks, in accordance with the provincial standard design detail. (See example below)



b) Current road condition:

The condition of the road sections identified in Section 2 of this report, in relation to the applicable status of each road, were obtained from the data base of the provincial road authority and updated and verified with on-site surveys and evaluations during November 2018 and March 2019.

According to the recorded data and as supported by the on-site evaluations, the relevant section of Road D1675 is a paved road and currently in a fair condition in relation to the design status thereof.

Road D175 is however a gravel road. A gravel road, such as Road D175, do however pose very specific maintenance challenges in terms of dust and/or mud control and general layer work decline. In order to attend to these aspects a bitumen based emulsion (“dust-a-side” or similar product) should be applied to the section of Road D175 between Road D1675 and the planned access to the Gruisfontein Project, in accordance with a regular and official maintenance program. Such products have been applied with great success around various other major mines. After application, gravel roads and other dust-bearing surfaces are dust and/or mud free and functional in almost all weather conditions.

Following on-site visual inspections and evaluations of the three intersections along the identified transport route, the following conclusions were made:
(See **Figure GP-TR-08** for positions of intersections)

- (i) **Intersection 1:** Future access off Road D175 as new eastern approach
 - This existing T-junction intersection of Road D2286 with Road D175 will, with the necessary supporting road signs, be able to accommodate the future additional traffic due to the Gruisfontein Project, via an upgraded eastern approach, at a very good level of service.



- (ii) **Intersection 2:** Intersection of Road D175 with Road D1675
- This existing 4-legged intersection will be able to accommodate the future additional traffic due to the Gruisfontein Project at a very good level of service on condition that a dedicated right turn lane on the eastern and western approaches (on D1675) is included as an essential mitigation measure to allow for the speed difference between the through traffic and slow moving right-turning trucks and/or busses.



- (iii) **Intersection 3:** Delivery access to/from Medupi off Road D1675
- This T-junction intersection, as delivery access to/from Medupi Power Station, will be able to accommodate the future additional traffic due to the Gruisfontein Project at a very good level of service on condition that a dedicated right turn lane on the western approach (on D1675 coming from the Steenbokpan) is included as an essential mitigation measure to allow for the speed difference between the through traffic and slow moving right-turning trucks.



4.3 Road improvements

Based on the following aspects, no road improvements or amendments, other than those identified in Section 4.2 above, is required:

- a) All immediate sections of road along the identified preferred route are currently in an acceptable condition in relation to the design status thereof.
- b) All existing paved intersections are expected to still operate at a very good level of service with the additional new trips.
- c) All proposed road upgrades and amendments will be designed by a professional engineer and submitted for official approval prior to implementation.

4.4 Economic evaluation

The on-site evaluations clearly indicate that from a traffic point of view there are no factors that could overshadow the positive impact of the Gruisfontein Project which will create benefits such as:

- New job opportunities for an extended period of time.
- Earning of foreign revenue for an extended period of time.
- Coal end-users can be supported for an extended period of time.

5. CONCLUSIONS AND RECOMMENDATION

It is concluded that the road network, surrounding the Gruisfontein Project, will, with the improvements identified in Section 4.2 of this report, be able to handle the traffic with no detrimental impact on the traffic on any of the relevant roads.

It is therefore recommended that the proposed Gruisfontein Project, including the identified required road works and the project access road onto Road D175, be approved from a traffic point of view, by the relevant road authorities, on condition that all improvements be constructed to the applicable standards of the provincial authority.

However, it is in addition recommended that negotiations between the operator of the Gruisfontein Project and the Roads Agency Limpopo (RAL) towards the identified improvements (see Section 4.2 of this report), should also allow for project specific agreement on the following matters:

- a) Responsibility towards road maintenance, when transport trucks serving the Gruisfontein Project are found to be overloaded in terms of the applicable standard and required axle loads of the specific trucks.
- b) Addressing and attending to possible spillage from loaded trucks between the mining area and the Medupi Power Station, such as suitable covering required for loads (tarpaulins) with a regular monitoring process.
- c) Speed and safety control of truck movements, with specific reference regarding a 40km/h speed limit for truck movements within built-up areas and 80km/h on provincial roads with a regular monitoring process.