TRANSNET

TRAFFIC IMPACT ASSESSMENT

LEPHALALE RAILWAY YARD

27 March 2019

Report prepared by:

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CONTENT

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DECLARATION

It is herewith certified that this TRAFFIC IMPACT ASSESSMENT: LEPHALALE RAILWAY YARD has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

Signed: ……

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TRAFFIC IMPACT ASSESSMENT
LEPHALALE RAILWAY YARD

1. BACKGROUND INFORMATION AND PURPOSE OF THE REPORT

This Traffic Impact Assessment forms part of the Environmental Authorisation process for the proposed Lephalale Railway Yard. The Lephalale Railway Yard is an existing 100 wagon yard along the existing Lephalale –Thabazimbi railway track in the Waterberg District. This requires an extension for it to accommodate 200 train wagons in future for the increase in load and capacity.

The aim with the extension of the yard is to allow more trains to enter and exit Lephalale, to check rolling stock, allow switching of crew and to function as a service and maintenance facility for diesel locomotives. The yard will be 5km in length along the existing rail track and 60 metres (m) wide.

The Lephalale Railway Yard development will mainly comprise of 4 new service tracks, three buildings namely an office building, administration building (North Facility) and maintenance & repair building (South Facility) to be constructed in two phases. Phase 1 will include building a bypass line south of the existing track to enable an alternative route whilst building the new tracks. Phase 2 will include building the additional railway tracks, the bulk of the earthworks and building the facilities. The total development period for the project is estimated at 2 years and 6 months, commencement is estimated to be year 2021.

Facilities and infrastructure to form part of the yard include:

- 4 new railway lines of 4.8km (Phase 1= 4.8km and Phase 2 = 3.7km)
- Construct and extend culverts from the existing single track railway line to the new tracks
- New tarred access road (7.4 m wide, 3.7km long) from yard entry to the furthest railway yard facilities;
- Lights will also be fitted along the railway yard site;
- Gravel service road (4m wide, 3.7km long) north of the arrival line, in existing rail servitude;
- Guard House with storage tank (20 000 litre/21m^3 JoJo Tank) and septic tank;
- Roads and carports at facilities;
- North Facility (office and administrative buildings): Provisional Facility, Staff amenities, Store room, Administration Building, Infra Crew Building, Water Reservoir (steel tank) with a volume of 260m^3;
- Diesel storage area: 600m^3 of diesel storage tanks and 4 decanting slabs at one point, 500 litre (0.5m^3) diesel tanker in fire pump room;
- South Facility (Maintenance and repair building): Provisional Facility, Sanding facilities, 6720 litres of oil storage (32 drums of oil), Parts storage room, Staff amenities (to be used for the facility), Effluent management (water/oil separator); and
- Fire suppression systems which require a foam storage tank, water storage tank and foam pipelines.

The study will identify possible traffic impacts resulting from the Lephalale Railway Yard development and, where necessary, proposes remedial action.

2. METHODOLOGY

The basis of this report will be done in accordance with the South African Traffic Impact Standards Site Traffic Assessment Standards and Requirements Manual[(1)]. From the Manual Section 2.4 the following section pertaining to traffic impact assessments will be highlighted:

The purpose of the traffic impact assessment is to investigate and assess the feasibility of accommodating the impact of a proposed change in land use rights on the roads and transportation system. An acceptable assessment means that the proposed change in land use can be accommodated to an acceptable standard by the transportation system, possibly with the implementation of mitigation measures or improvements. However, an acceptable traffic assessment does not necessarily imply any approval or otherwise of the land use application itself.

It is important to note that a traffic impact assessment is essentially a feasibility study.

The specific objectives of a traffic impact assessment are to determine:

- *The local impact of a proposed change in land use on the road and transportation system surrounding the proposed development.*
- *Whether it is possible to accommodate the proposed change in land use, with or without the implementation of mitigation measures within acceptable norms specified in the manual.*
- *The mitigation measures and improvements that may be required to accommodate the proposed change, including:*
  - *Demand side mitigation measures aimed at reducing traffic generation, such as mixed use developments and reducing the size or changing the type of the development.*
  - *Supply side mitigation measures aimed at improving transportation infrastructure, such as roads and public transport infrastructure.*
  - *The estimated cost of the required improvements and services.*

Where these guidelines are lacking, past experience with similar projects will be applied as well as the input of other members of the project team.

3. SITE LOCATION AND ACCESS

The Lephalale Railway Yard is situated approximately 13.2km south west of the Medupi Power Station as depicted in Figure 1 in the annexure and on the Google aerial photo below.

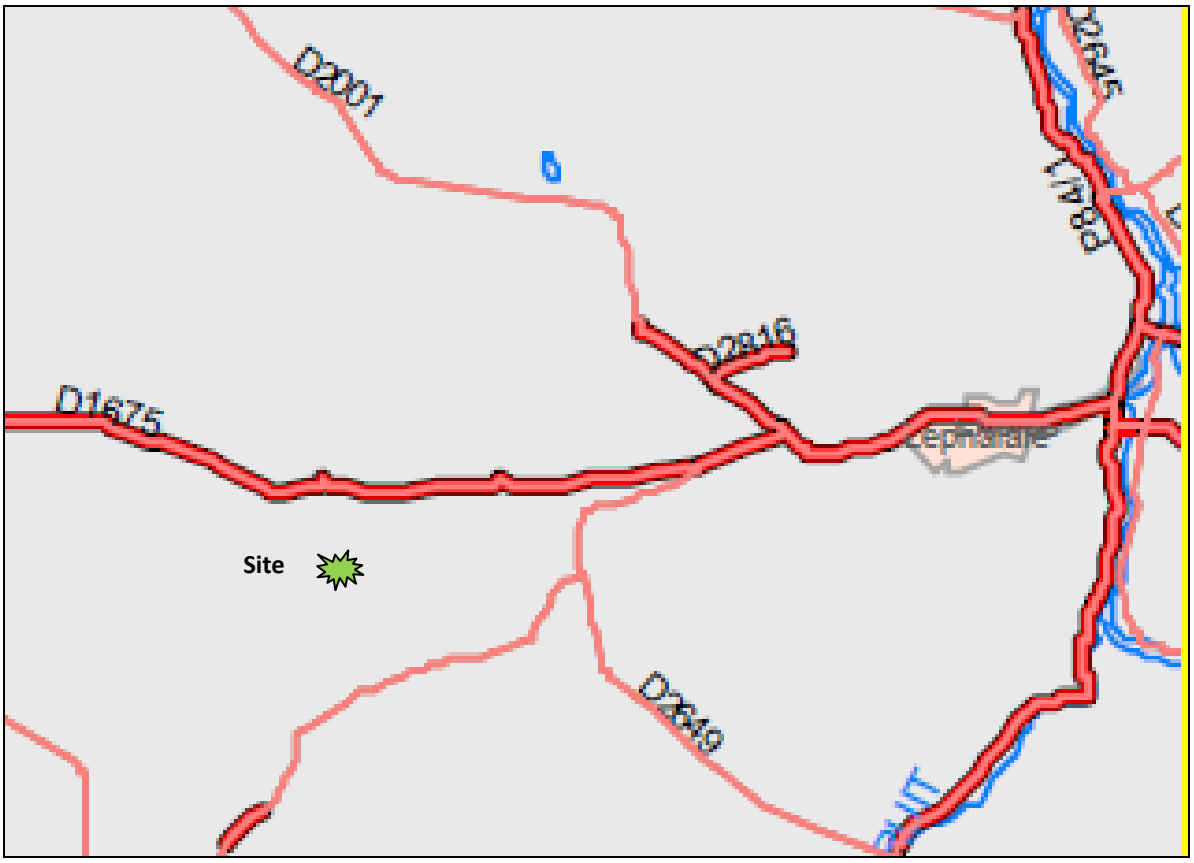
The Site

Access to the railway yard is obtained via the road network depicted on the Google aerial photo below. Roads D2001, D1675 and D2649 are existing surfaced roads and the existing access road from Road D2649 to the railway yard is a gravel road within the railway line servitude.

Access roads

4. ROAD NETWORK

The site is depicted on an extract of the Limpopo Road Network presented below.



Extract from RAL Road Network

The road network that will be used comprises of Roads D2001, D1675 and D2649.

4.1 ROAD D2001

Road D2001 runs from Lephalale towards the Medupi and Matimba Power Stations. From this road, Road 1675, the road to Medupi Power Station, is used. The intersection with the Road D1675 is depicted in the photos below.

Intersection: D2001 and D1675

D2001 towards Lephalale

D1675 towards Medupi Power Station

D2001 towards Stockpoort/Matimba Power Station

4.2 ROAD D1675

Road D1675 is used for ±3.2km to the intersection with Road D2649, the intersection with the Road D2469 is depicted in the photos below.

Intersection: D1675 and D2649

D1675 towards D2001

D26491 towards the Steenbokpan/Railway Yard

D1675 towards Medupi Power Station

4.3 ROAD D2649

Road D2649 is used for ±5.4km to the intersection with the Railway Yard access. This intersection does not have any turning lanes. The intersection with the existing gravel road is depicted in the photos below.

Intersection: D2649 and access road to Railway Yard

D2649 towards D1675

D2649 towards Steenbokpan

Access road to Railway Yard

4.4 ACCESS ROAD TO RAILWAY YARD

From Road D2649 the existing gravel road is used for approximately 10km to the Railway Yard. This is an existing access road. Photos depicting the roads are presented below.

Eskom Gate (closed)

Start of road along railway line (near Eskom gate)

Typical section along the railway line

Typical section along the railway line

Typical section along the railway line

Typical section (start of yard)

Typical section along the railway line (near the end of the yard)

6. EXISTING TRAFFIC DEMAND

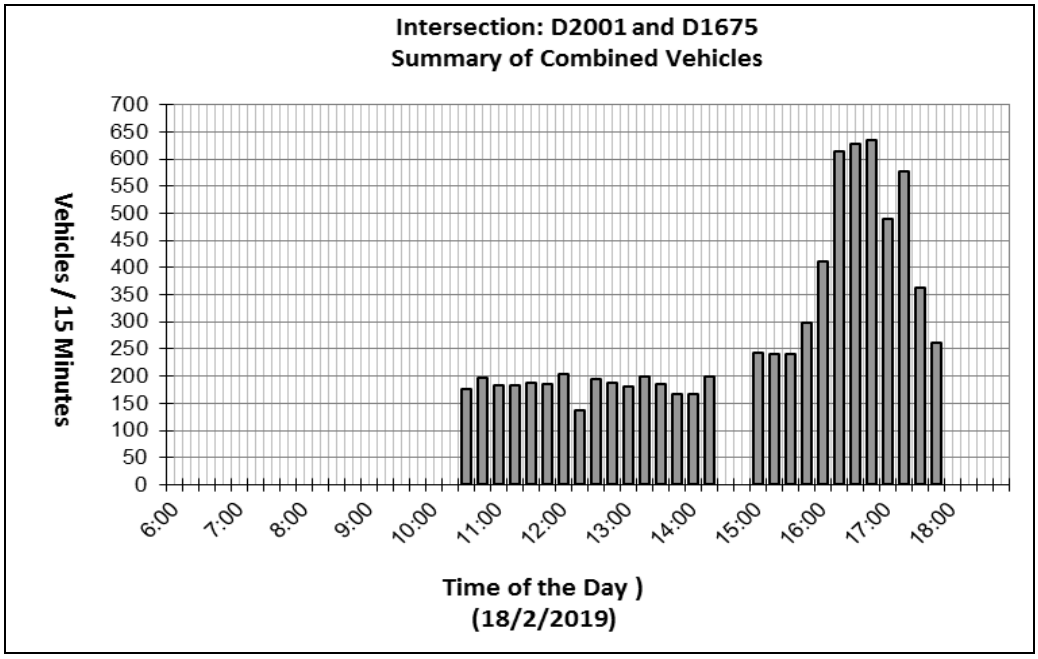
The existing traffic demand is normally obtained by conducting manual traffic counts during the morning and afternoon peak traffic periods on a normal weekday. In this instance we observed the morning peak period starting much earlier than normally expected. The traffic counting periods were therefore adjusted and the counts were done during the following periods:

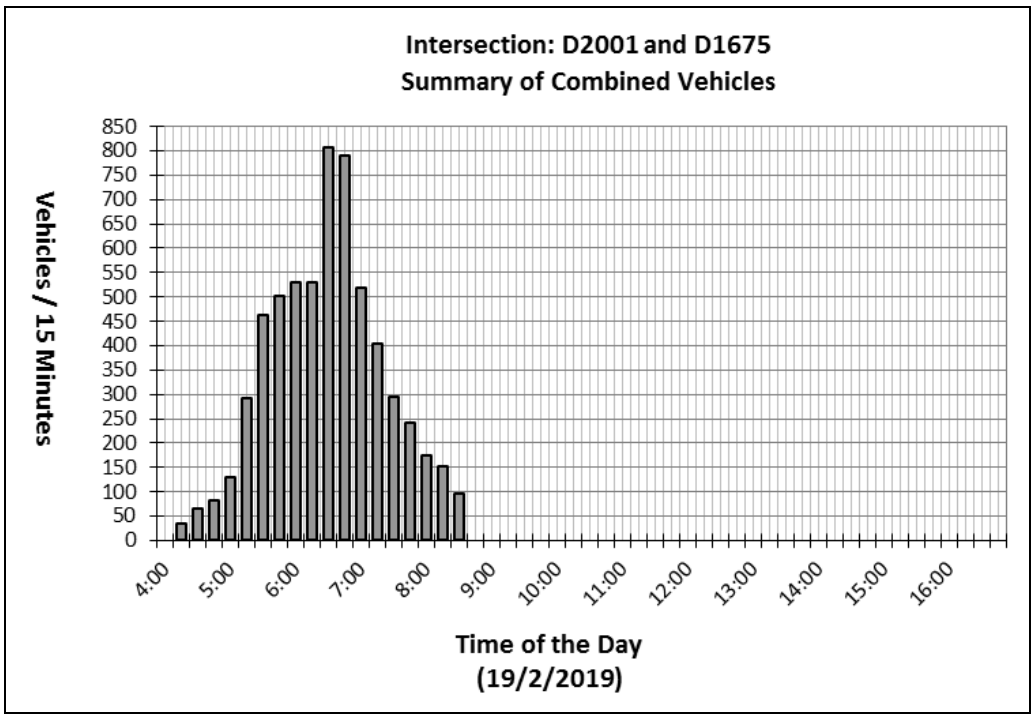
18 February 2019: 10:15 – 14:30, 14:30 - 18:00
19 February 2019: 04:15 – 08:45

The existing morning and afternoon peak hour traffic demand is depicted in Figure 2 and the midday demand in Figure 3. The survey results for each intersection are presented below.

6.1 INTERSECTION: D2001 AND D1675

The graphs below depict the 15-minute traffic volumes (cars, heavy vehicles and minibus taxis) through the intersection.





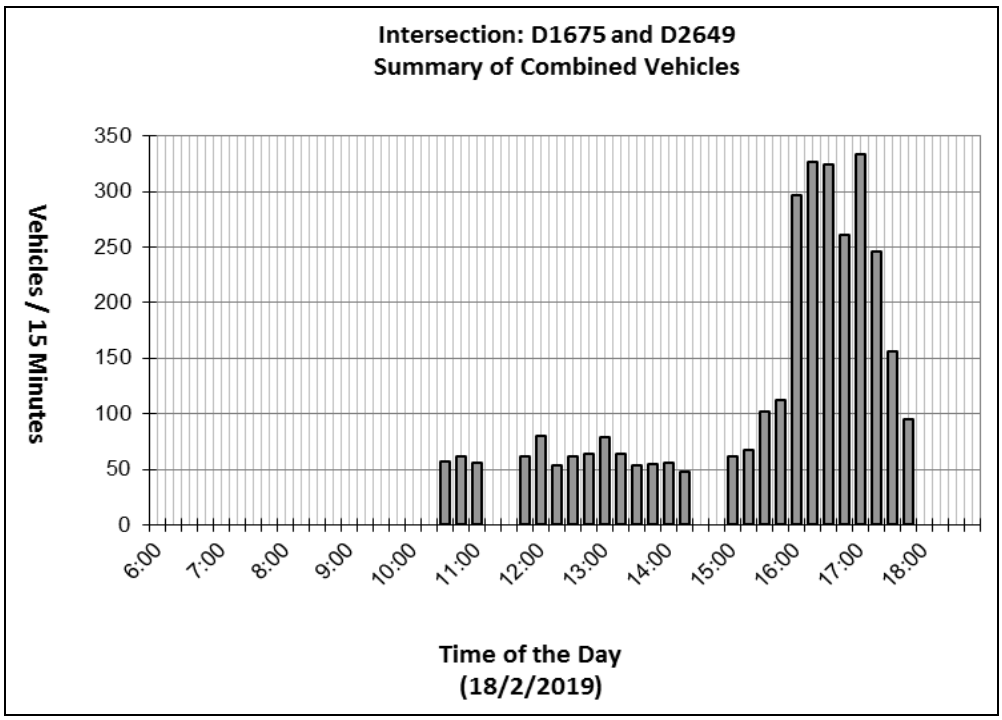
The peak traffic hours are as follows:

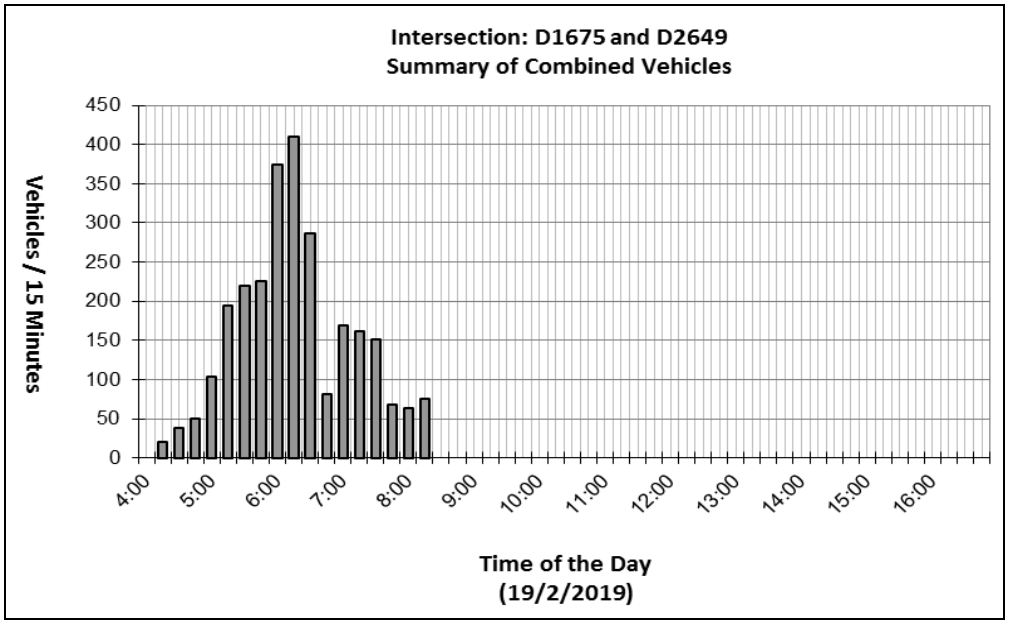
Morning peak hour:	06:00 - 07:00
Total all vehicles:	2659 vehicles per hour
Heavy vehicles:	154
Mini-bus taxis:	411
Afternoon peak hour:	16:15 - 17:15
Total all vehicles:	2366 vehicles per hour
Heavy vehicles:	106
Mini-bus taxis:	282

Total number of vehicles through the intersection during the survey period: 14 041 vehicles

6.2 INTERSECTION: D1675 AND D2649

The graphs below depict the 15-minute traffic volumes (cars, heavy vehicles and minibus taxis) through the intersection.





The peak traffic hours are as follows:

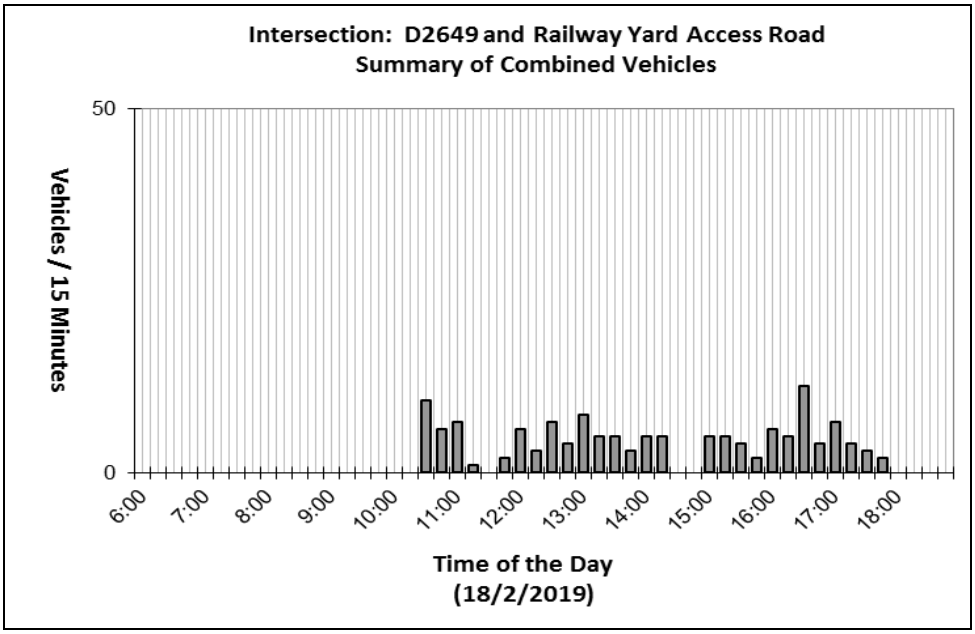
Morning peak hour:	06:00 - 07:00
Total all vehicles:	1152 vehicles per hour
Heavy vehicles:	69
Mini-bus taxis:	193

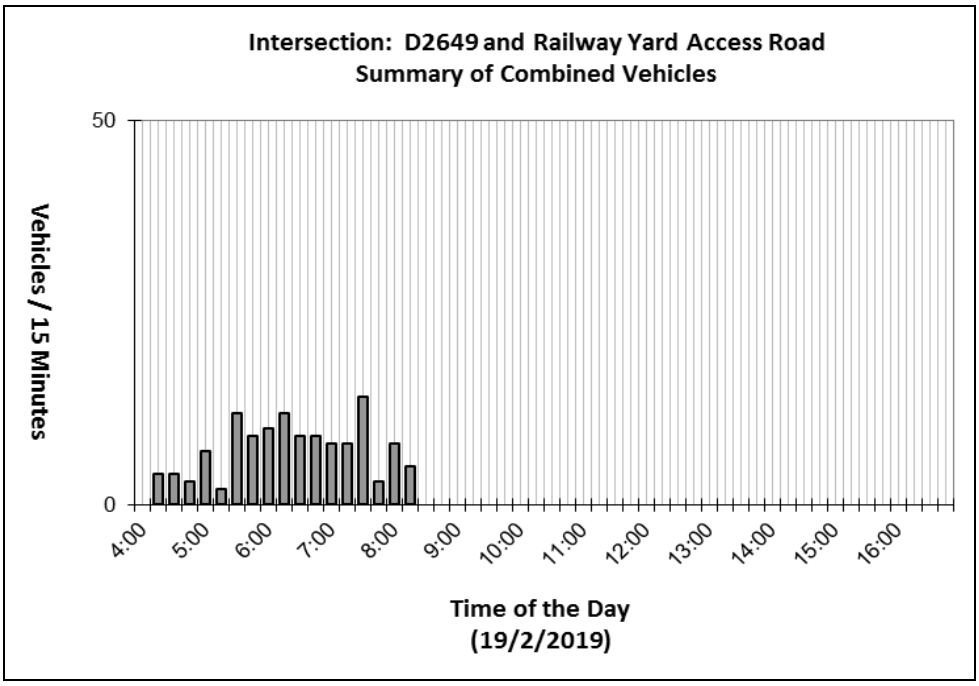
Afternoon peak hour:	16:15 - 17:15
Total all vehicles:	1244 vehicles per hour
Heavy vehicles:	64
Mini-bus taxis:	122

Total number of vehicles through the intersection during the survey period: 5 923 vehicles

6.3 INTERSECTION: D2649 AND RAILWAY YARD ACCESS ROAD

The graphs below depict the 15-minute traffic volumes (cars, heavy vehicles and minibus taxis) through the intersection.





The peak traffic hours are as follows:

Morning peak hour:	06:00 - 07:00
Total all vehicles:	40 vehicles per hour
Heavy vehicles:	3
Mini-bus taxis:	2

Afternoon peak hour:	16:15 - 17:15
Total all vehicles:	28 vehicles per hour
Heavy vehicles:	0

Mini-bus taxis: 0

Total number of vehicles through the intersection during the survey period: 263 vehicles

7. TRIP GENERATION

The railway yard is not a land use for which trip generation figures are available in the TMH 17 Volume 1, South African trip Data Manual3[(2)]. During a site visit on 12 February 2019, with the Environmental Consult and Transnet, the following information was provided to us:

Staff component:	Maximum of 100 staff Normal weekday day operations Of these 5-10 staff will work during the night
Diesel delivery:	Storage capacity: 600 000 l for diesel locomotives Diesel delivered by road
Water:	Storage capacity: 260 000 l Water to be delivered by road
Sewer:	Cannot connect to municipal sewer, it will be treated on site or trucked to a disposal site or point.
Maintenance:	Will be done on site

In terms of the South African Traffic Impact Standards Site Traffic Assessment Standards and Requirements Manual[(1)] the worst case scenario from a traffic impact point of view is when the expected peak hour trip generation from the Railway Yards co-inside with that on the adjacent road network.

We expect that some of the employees will make use of public transport, car pool and own transport. For the purposes of this study the following assumptions are made for modal splits (see Table 1):

Type of Transport	No of Employees	Number of Vehicles
Public Transport (15 passengers per bus)	30 people	2
Own Vehicle with 2 occupants	30 people	15
Own vehicle with single occupant	30 people	30
Total		**47**

Table 1: Expected number of trips

For the night staff component the following assumptions are made for modal splits (see Table 2):

Type of Transport	No of Employees	Number of Vehicles
Public Transport (15 passengers per bus)	0	0
Own Vehicle with 2 occupants	6 people	2
Own vehicle with single occupant	4 people	4
Total		**6**

Table 2: Expected number of trips

The directional split of these trips are 75:25 during the morning peak hour and 25:75 during the afternoon peak hour which is in line with the directional split for Heavy Industry/Manufacturing in the SA Trip Data Manual..

The delivery of diesel and water will gradually increase until the yard is operating at capacity. The expected daily diesel and water usage could not be confirmed during the site visit. For the purpose of this study we will use the following assumptions for truck deliveries:

Diesel: 200 000 litres per day, 4 trucks per day to site
Water: 120 000 litres per day, 4 trucks per day to site
Sewer: 1 truck per day to site
Maintenance: 2 trucks per day to site
Daily trips: Normal day to day trips outside peak traffic hours, we work on an estimate of 20% of the daily trips occurring during peak hours, (55 trips x 2)/0.4 = 275 trips during the day. The off peak trips 275 - 110 = 165 will have a 50:50 directional split.

For the capacity analyses the worst case traffic scenario is when the trips occur during the peak hour on the adjacent road network. The expected peak hour trip generation is depicted in Table 3.

Peak hour	Transport Mode	Directional split (in/out)	Total number of trips	New trips In	New trips out
Morning (a.m.)	Minibus	50:50	4	2	2
	Own vehicle (Occupancy 2)	75:25	17	13	4
	Own vehicle (Occupancy 2)	75:25	34	26	8
Total			**55**	**41**	**14**
Afternoon (p.m.)	Minibus	50:50	4	2	2
	Own vehicle (Occupancy 2)	25:75	17	4	13
	Own vehicle (Occupancy 2)	25:75	34	8	26
Total			**55**	**14**	**41**

Table 3: Expected weekday morning and afternoon peak hour trip generation

These will all be new trips.

8. EXPECTED PEAK HOUR TRIP ASSIGNMENT

We expect the majority of the staff to reside in the Lephalale and Marapong areas. Trips will therefore be assessed to and from these areas. The expected peak hour trip assignment is depicted in Figure 4 presented in the annexure.

9. BACKGROUND TRAFFIC GROWTH

There is currently construction work in progress at Medupi Power Station and this is not regarded as a normal traffic flow pattern. This traffic flow pattern will gradually be replaced with the normal traffic flow pattern associated with the day to day operations at the power station.

We will analyses a 10 year horizon year and apply a 2% per annum background traffic growth for the purpose of this study.

10. CAPACITY ANALYSIS

PTV Vistro 7[3] was used to simulate the operating conditions of the major intersections in proximity of the proposed Lephalale Railway Yard development. The following design scenarios were adopted for the purposes of this investigation:

- Scenario 1: 2019 - existing a.m. and p.m. peak hour traffic demand (Figure 2 in the annexure).
- Scenario 2: 2029 - expected a.m. and p.m. peak hour traffic demand with a 2% per annum background traffic growth (Figure 5 in the annexure).

- Scenario 3: 2021 – expected a.m. and p.m. peak hour traffic demand with a 2% per annum background traffic growth and the expected traffic demand from the proposed project (Figure 6 in the annexure).
- Scenario 4: 2029 – expected a.m. and p.m. peak hour traffic demand with a 2% per annum background traffic growth and the expected traffic demand from the proposed project (Figure 7 in the annexure).

We used a peak hour factor of 0.95 in the capacity analyses. Queue lengths indicated are 50 percentile values. The operation of priority-controlled intersections is acceptable when the following conditions are met for each individual turning movement:

Period	Maximum Volume/Capacity	Minimum Level of service (TRB 2004)
Normal 15-minute peak	85%	D

Table 4: Performance measures priority-controlled intersections

For signalised intersections the following will apply:

Period	Maximum Volume/Capacity	
	Left-turn/through	Right-turn
Normal 15-minute peak	90%	95%

Table 5: Performance measures for signalised intersections

Where these conditions cannot be met, the conditions are acceptable when the following parameters are met on each approach:

Period	Maximum Volume/Capacity		Minimum Level of service (TRB 2004	
	LT & ST	RT	LT & ST	RT
Normal 15-minute peak	95%	100%	D	E

L – Left-turn, T – Through, R – Right-turn

Table 6: Performance measures for signalised intersections

The operating conditions of the various intersections were determined using PVT VISTRO[3]. The measure of performance according to the Highway Capacity Manual (HCM) Sixth Edition (2010) is total delay and the best service level is A which indicates free flow conditions while F indicates congestion and jammed conditions.

The HCM uses the following level of service (LOS) delay thresholds for un-signalised intersections. The critical side road level of service (LOS) and delays is reported. These are:

LOS A <10 seconds
LOS B >10 and <15 seconds
LOS C >15 and <25 seconds
LOS D > 25 and <35 seconds
LOS E > 35 and <50 seconds
LOS F > 50 seconds

In general traffic operations are acceptable when during a peak 15-minute period:

- The volume/capacity ratio (V/C) does not exceed a maximum of 1.0 (demand volume does not exceed the capacity of facility); and
- The levels of service (LOS) as defined by the Highway Capacity Manual (HCM) are not worse than the service levels given in Table 7 below.

Acceptable levels of service for normal and abnormal days		
Area/Road Class	**Normal days**	**Abnormal days**
Urban Road	LOS D	LOS E
Rural Class 3-5	LOS C	LOS D
Rural Class 1-2	LOS B	LOS C

Table 7: Acceptable levels of service

Right-turn movement at traffic controlled intersections may however operate at a LOS of E provided that sufficient provision is made for accommodating the queue lengths (95th percentile).

A summary of the results for each scenario that was analysed are presented below.

10.1 SCENARIO 1

The results of the capacity analyses are summarised in Tables 8 and 9 below.

10.1.1 Scenario 1 (A.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	All-way stop	HCM 2010	NWB Left	1.618	491.6	F
2	D1675 & D2649	All-way stop	HCM 2010	WB Thru	1.336	559.9	F
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Thru	0.021	7.1	A

Table 8: Intersection Analysis Summary (Scenario 1 a.m.)

10.1.2 Scenario 1 (P.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	All-way stop	HCM 2010	NWB Left	2.247	1 580.0	F
2	D1675 & D2649	All-way stop	HCM 2010	WB Thru	1.464	767.2	F
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Thru	0.017	7.1	A

Table 9: Intersection Analysis Summary (Scenario 1 p.m.)

The two main intersections cannot operate at acceptable levels of service during both peak hours. The following upgrades are proposed:

Intersection: D201 & D1675 (Figure 8)

- Traffic signal;
- Extend 60m left-slip lane to 120m (D2001);
- Additional 60m right-turn lane on south-western approach to allow for double right-turn; and
- Additional 60m through-lane on north-western approach (D2001).

Intersection: D1675 & D2649 (Figure 9)

- Traffic signal;
- additional 60m through lane on eastern approach; and
- Additional 60m through lane on western approach.

10.1.3 Scenario 1 with mitigation measures (A.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	NEB Left	0.346	7.2	A
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.306	5.4	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Thru	0.017	7.1	A

Table 10: Intersection Analysis Summary (Scenario 1 a.m.) with mitigation measures

10.1.4 Scenario 1 with mitigation measures (P.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	SEB Thru	0.579	17.7	B
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.366	5.8	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Thru	0.017	7.1	A

Table 11: Intersection Analysis Summary (Scenario 1 p.m.) with mitigation measures

Note:

With the proposed upgrades, the intersections operate at acceptable levels of service during both peak hours.

10.2 SCENARIO 2

The upgrades proposed in Scenario 1 are applied. The results of the capacity analyses are summarised in Tables 12 and 13 below.

10.2.1 Scenario 2 (A.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	SEB Right	0.502	9.0	A
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.374	6.2	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.028	7.3	A

Table 12: Intersection Analysis Summary (Scenario 2 a.m.)

10.2.2 Scenario 2 (P.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	SEB Thru	0.706	23.5	C
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.409	6.6	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.017	7.3	A

Table 13: Intersection Analysis Summary (Scenario 2 p.m.)

Note:

With the proposed upgrades, the intersections continue to operate at acceptable levels of service during both peak hours.

10.3 SCENARIO 3

The upgrades proposed in Scenario 1 are applied. In addition the intersection where access is obtained is upgraded to provincial design standards.

Intersection: D2649 & Access Rd (Figure 10A and 10B)

The following upgrade is proposed:

- 60m passing lane on Road, D2649.

The results of the capacity analyses are summarised in Tables 14 and 15 below.

10.3.1 Scenario 3 (A.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	NEB Left	0.376	7.5	A
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.321	5.6	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.051	7.6	A

Table 14: Intersection Analysis Summary (Scenario 3 a.m.)

10.3.2 Scenario 3 (P.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	SEB Right	0.614	18.8	B
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.372	6.5	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.039	7.1	A

Table 15: Intersection Analysis Summary (Scenario 3 p.m.)

Note:

With the proposed upgrades, the intersections continue to operate at acceptable levels of service during both peak hours.

10.4 SCENARIO 4

The upgrades proposed in Scenario 1 are applied. The results of the capacity analyses are summarised in Tables 16 and 17 below.

10.4.1 Scenario 4 (A.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	SEB Right	0.508	9.1	A
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.359	6.0	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.051	7.6	A

Table 16: Intersection Analysis Summary (Scenario 4 a.m.)

10.4.2 Scenario 4 (P.m. peak hour)

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	D2001 & D1675	Signalised	HCM 2010	NEB Right	0.718	24.6	C
2	D1675 & D2649	Signalised	HCM 2010	NB Right	0.431	7.1	A
3	D2649 & Access Rd	All-way stop	HCM 2010	SWB Right	0.039	7.2	A

Table 17: Intersection Analysis Summary (Scenario 4 p.m.)

Note:

With the proposed upgrades, the intersections continue to operate at acceptable levels of service during both peak hours.

11. INCREASED TRAFFIC VOLUMES ON ACCESS ROAD

The expected normal weekday trip generation for this railway yard based on the data contained in this report is as follows:

Weekday morning peak hour:	55
Weekday afternoon peak hour:	55
Off peak trips:	165, of this we estimate that ±20% can also be truck trips
Truck trips:	22 (11 in and 11 out)
Total	**297 trips per day**

The estimated number of truck trips is 56 trips per day.

Based on the traffic volumes the upgrading of this road is proposed from the Afguns Road (D2649) to the railway yard.

12. ACCESS CONTROL

Access control is envisaged for the railway yard. This is such a long way from Road D2649 that stacking and overspill onto this road will not occur.

There was a request in a Focus Group meeting that access control should be implemented near Afguns Road (D2649). During the site visit we observed that the existing service road is also used by the surrounding farms and access will therefore not only be limited to Transnet employees.

If access control is implemented the following is proposed for the access control point:

With a guardhouse in the middle separating lanes:

Inbound lane:	at least 4.5m wide
Outbound lane:	at least 4.5m wide
Spacing from Road D2649:	100m (due to geometry of the road ±150m)

With a guardhouse on the side of the road:

Inbound lane:	at least 3.7m wide
Outbound lane:	at least 3.7m wide
Spacing from Road D2649:	100m (due to geometry of the road ±150m)

There are other factors surrounding access control which also need to be taken into consideration with access control at this point such as power supply, water and ablution facilities.

13. PUBLIC TRANSPORT

We expect 30 staff member to make use a public transport or staff busses. Due to the location of this railway yard we allowed for two minibuses to and from the railway yard during both weekday peak traffic hours. This will transport employees to and from the railway yards and not drop off and pick up at the intersection on Road D2649.

14. MITIGATION PROPOSALS

Based on the results of the capacity analyses there are already road upgrades and traffic control improvements required at two of the major intersections analysed. The required road upgrades based on the results of the capacity analyses are as follows:

14.1 INTERSECTION: D201 & D1675

The following is proposed as depicted in Figure 8:

- Traffic signal;
- Extend 60m left-slip lane to 120m;

- Additional 60m right-turn lane on western approach to allow for double right-turn; and
- Additional 60m through-lane on northern approach.

14.2 INTERSECTION: D1675 & D2649

The following is proposed as depicted in Figure 9:

- Traffic signal;
- additional 60m through-lane on eastern approach; and
- Additional 60m through-lane on western approach.

These upgrades are not related to the planned railway yard and it's associated additional traffic demand.

The implementation of the access road and associated upgrade of the intersection on Road D2649 serves the railway yard with access and is not seen as a mitigation measure from a traffic impact point of view.

14.3 INTERSECTION: D2649 AND ACCESS ROAD

The following is proposed:

- 60m passing lane on Road D2649.

There are two alignments for the access road:

14.3.1 Existing gravel road alignment from Road D2649 to the railway line:

The intersection and first part of the access road's alignment is depicted in Figure 10A. This alignment will require lane widening around the curves and the positioning of a possible access control point approximately 150m from Road D2649. In this position the access control is not visible from Road D2649.

14.3.2 Re-alignment of the section from the railway line to Road D2649:

The intersection and first part of the realigned access road is depicted in Figure 10B. This alignment will eliminate all the sharp curves and lane widening around the curves. If required an access control point can be located approximately 100m from Road D2649, at this point it is visible from Road D2649.

From a geometric point of view this option is preferred.

14.4 ACCESS ROAD

Transnet indicated during the site visit that they are planning the upgrade of the access road from the Afguns Road (D2649) to the railway yard. Based on the estimated traffic volumes this road can carry 297 vehicles per day of which an estimated 56 trips can be truck trips.

15. CONCLUSION AND RECOMMENDATION

This Traffic Impact Assessment forms part of the Environmental Authorisation process for the proposed Lephalale Railway Yard. The study has identified possible traffic impacts resulting from the proposed project and, where necessary, proposes remedial action.

Access is proposed off Road D2649, an existing surfaced road and from there via the existing access road in mostly in the railway line servitude.

The railway yard is not a land use for which trip generation figures are available in the TMH 17 Volume 1, South African trip Data Manual3[(2)]. During a site visit on 12 February 2019 with the Environmental Consult and Transnet information was provided to us to enable us to estimate an expected weekday morning and

afternoon as well as a daily trip generation for the railway yard. For the capacity analyses the worst case scenario is when the trips occur during the peak hour on the adjacent road network. The expected peak hour trip generation is depicted in Table 3.

Peak hour	Mode	Directional split (in/out)	Total number of trips	New trips In	New trips Out
Morning (a.m.)	Minibus	50:50	4	2	2
	Own vehicle (Occupancy 2)	75:25	17	13	4
	Own vehicle (Occupancy 2)	75:25	34	26	8
Total			**55**	**41**	**14**
Afternoon (p.m.)	Minibus	50:50	4	2	2
	Own vehicle (Occupancy 2)	25:75	17	4	13
	Own vehicle (Occupancy 2)	25:75	34	8	26
Total			**55**	**14**	**41**

Table 3: Expected weekday morning and afternoon peak hour trip generation

Based on the results of the capacity analyses there are already road upgrades and traffic control improvements required at two of the major intersections analysed without the expected trips from the proposed development. The proposed upgrades are:

Intersection: D2001 & D1675

- Traffic signal;
- Extend 60m left-slip lane to 120m;
- Additional 60m right-turn lane on western approach to allow for double right-turn; and
- Additional 60m through-lane on northern approach.

Intersection: D1675 & D2649

- Traffic signal;
- additional 60m through lane on eastern approach; and
- Additional 60m through-lane on western approach.

The following is proposed for the access on Road D2649 as well as the access road to the railway yard:

Intersection: D2649 and Access Road (Figure 10A and alternative 10B)

- 60m passing lane on Road D2649.

Access road

Based on the estimated traffic volumes this road can carry ±297 vehicles per day of which an estimated 56 trips can be truck trips. Based on the traffic volumes the upgrading of this road is proposed from the Afguns Road (D2649) to the railway yard.

From a traffic impact point of view the application can be supported.

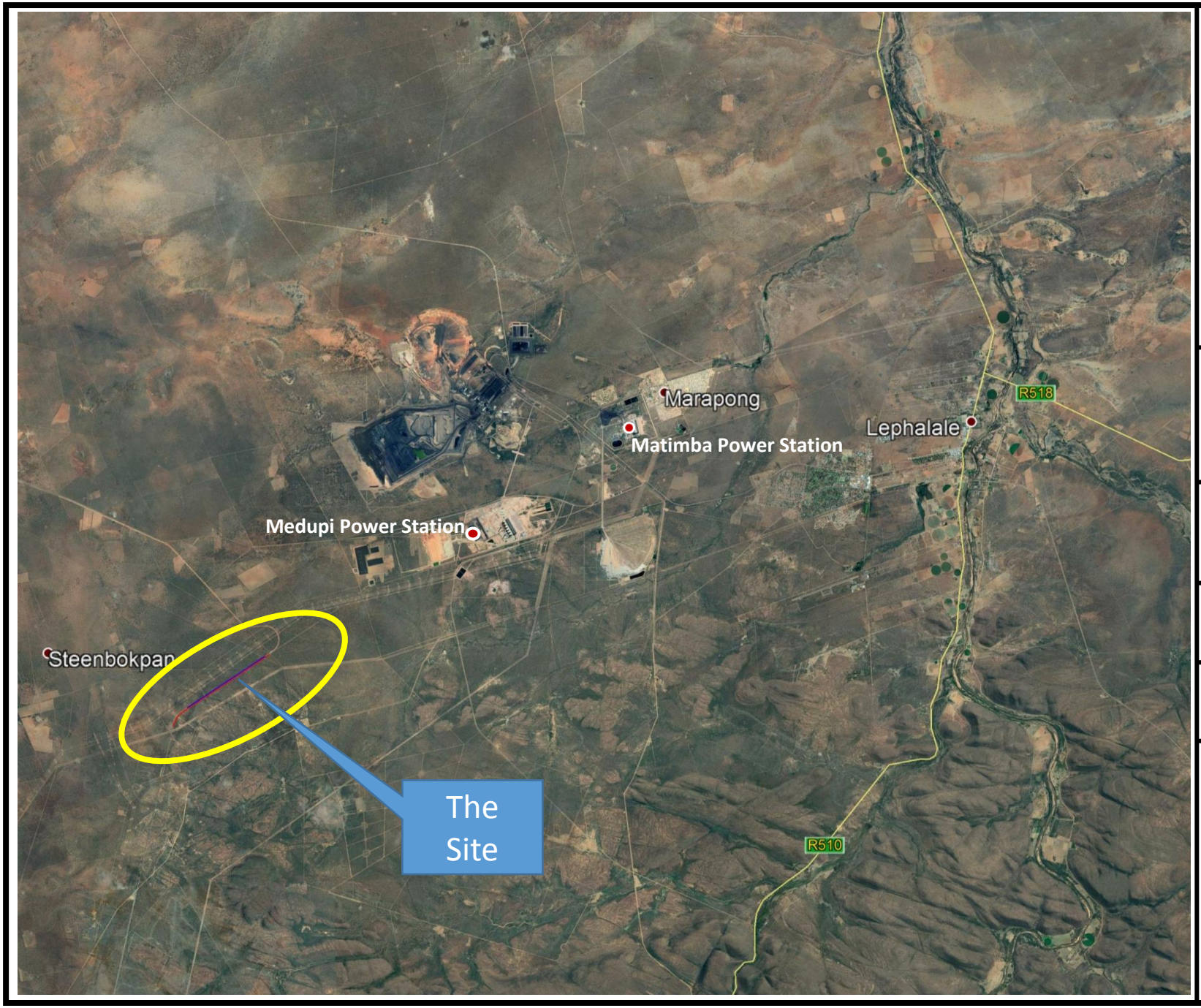
16. REFERENCES

(1) COTO, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, TMH 16 Volume 1 and 2, February 2014

(2) COTO, South African Trip Data Manual Version 1.01, September 2012.

(3) PTV Group, PTV Vistro 7, PTV AG. Haid-und-Neu-Str. 15, D-76131 Karlsruhe, Deutschland.

ANNEXURE



NORTH

TRAFFIC IMPACT ASSESSMENT

LEPHALALE RAILWAY YARD

FIGURE 1:
SITE LOCATION PLAN

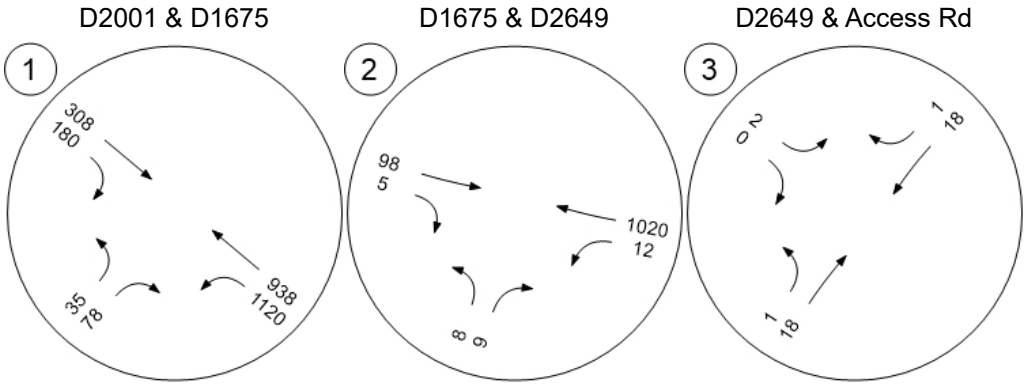
SCALE: N/A

OUR REF: PP21516

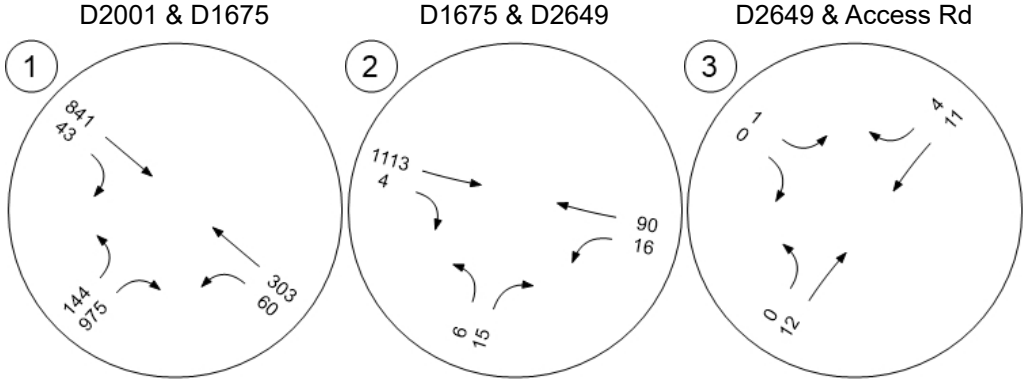
CORLI HAVENGA
VERVOER INGENIEURS
TRANSPORTATION ENGINEERS

Existing Peak Hour Traffic Demand - Scenario 1

Scenario 1 - AM

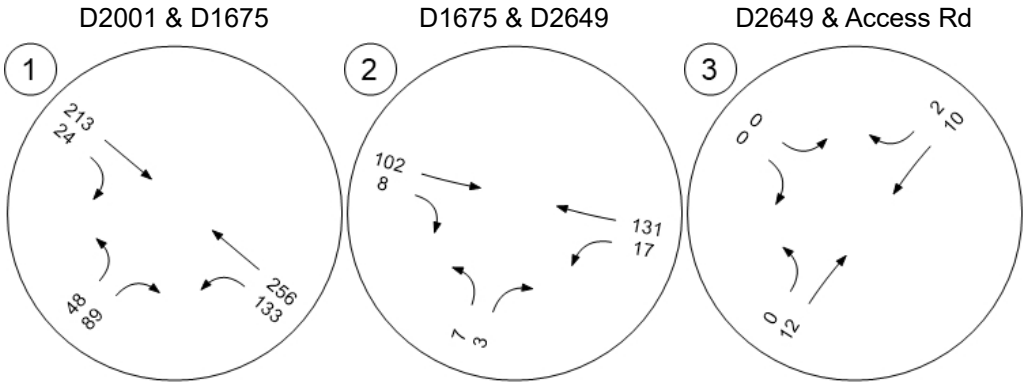


Scenario 1 - PM



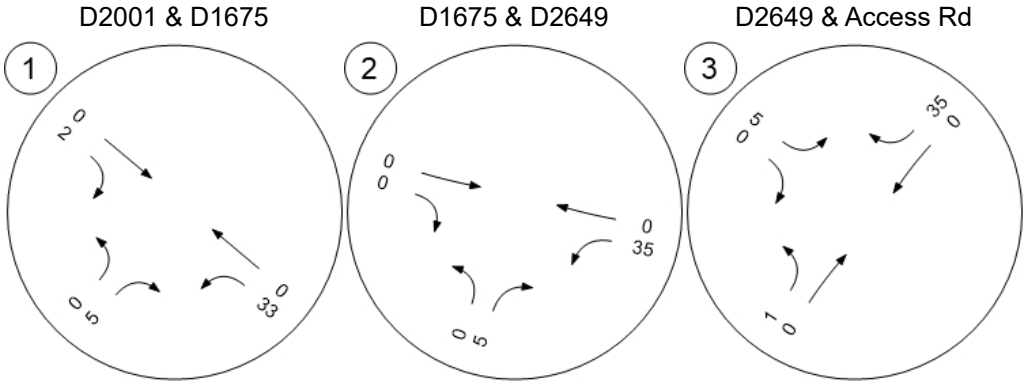
Expeced Midday Peak Hour Traffic Demand - Scenario 1

Scenario 1 - Midday

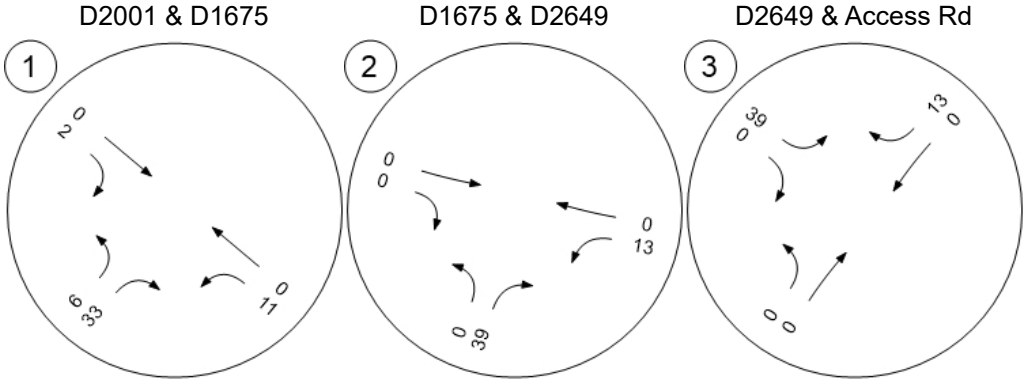


Expected Peak Hour Trip Assignment

Trip Assignment - AM

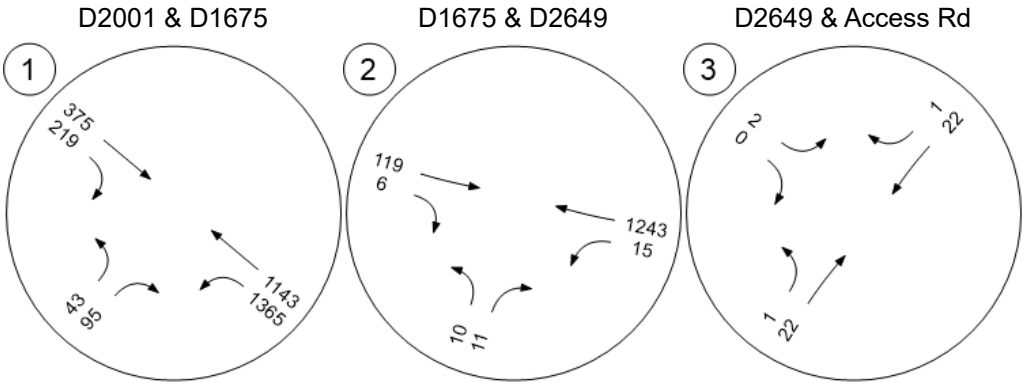


Trip Assignment - PM

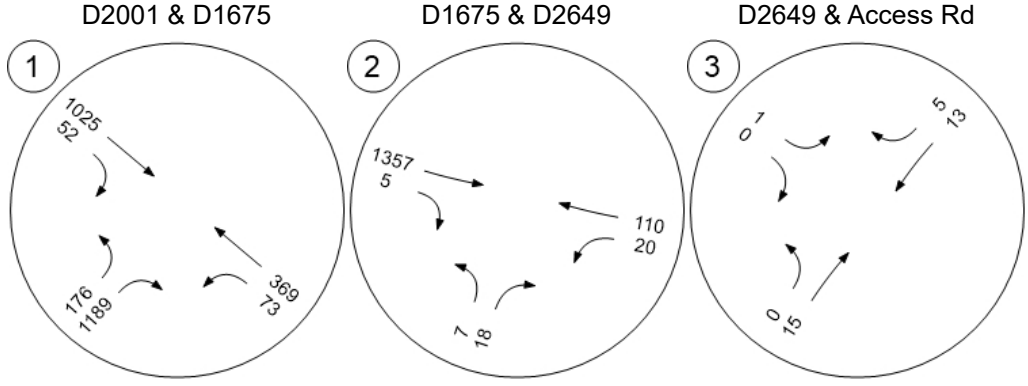


Expected Peak Hour Traffic Demand - Scenario 2

Scenario 2 - AM

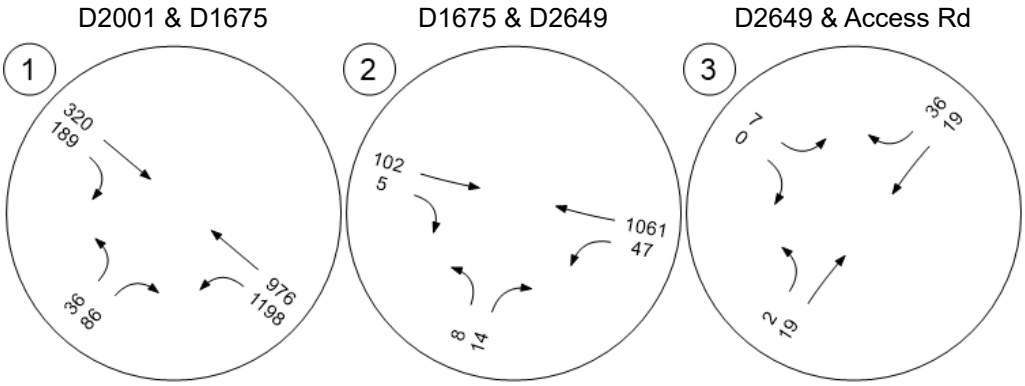


Scenario 2 - PM

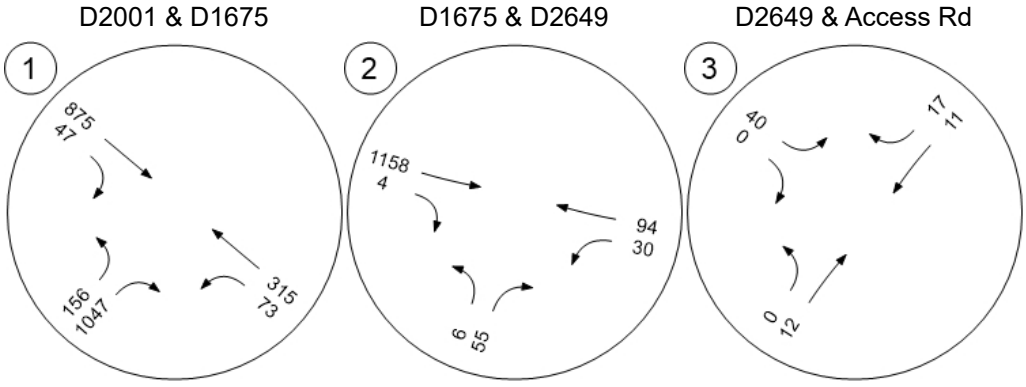


Expected Peal Hour Traffic Demand - Scenario 3

Scenario 3 - AM

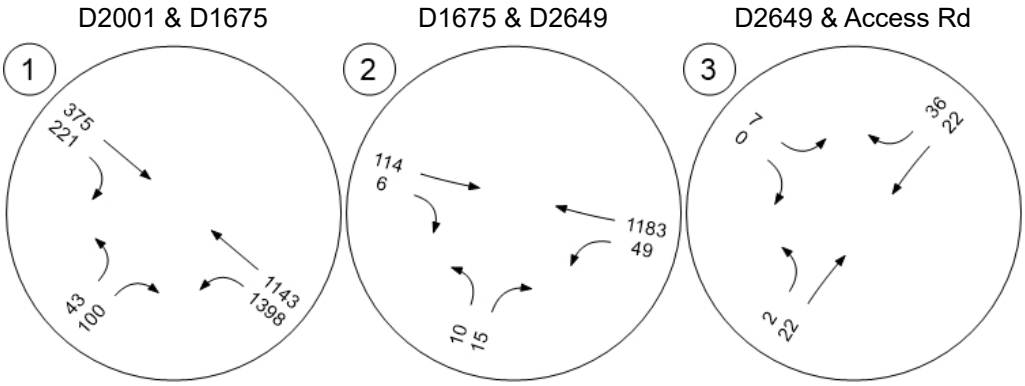


Scenario 3 - PM

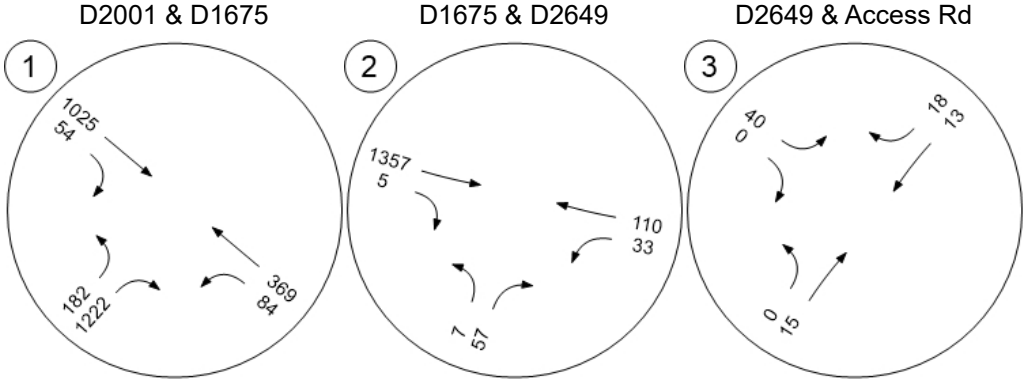


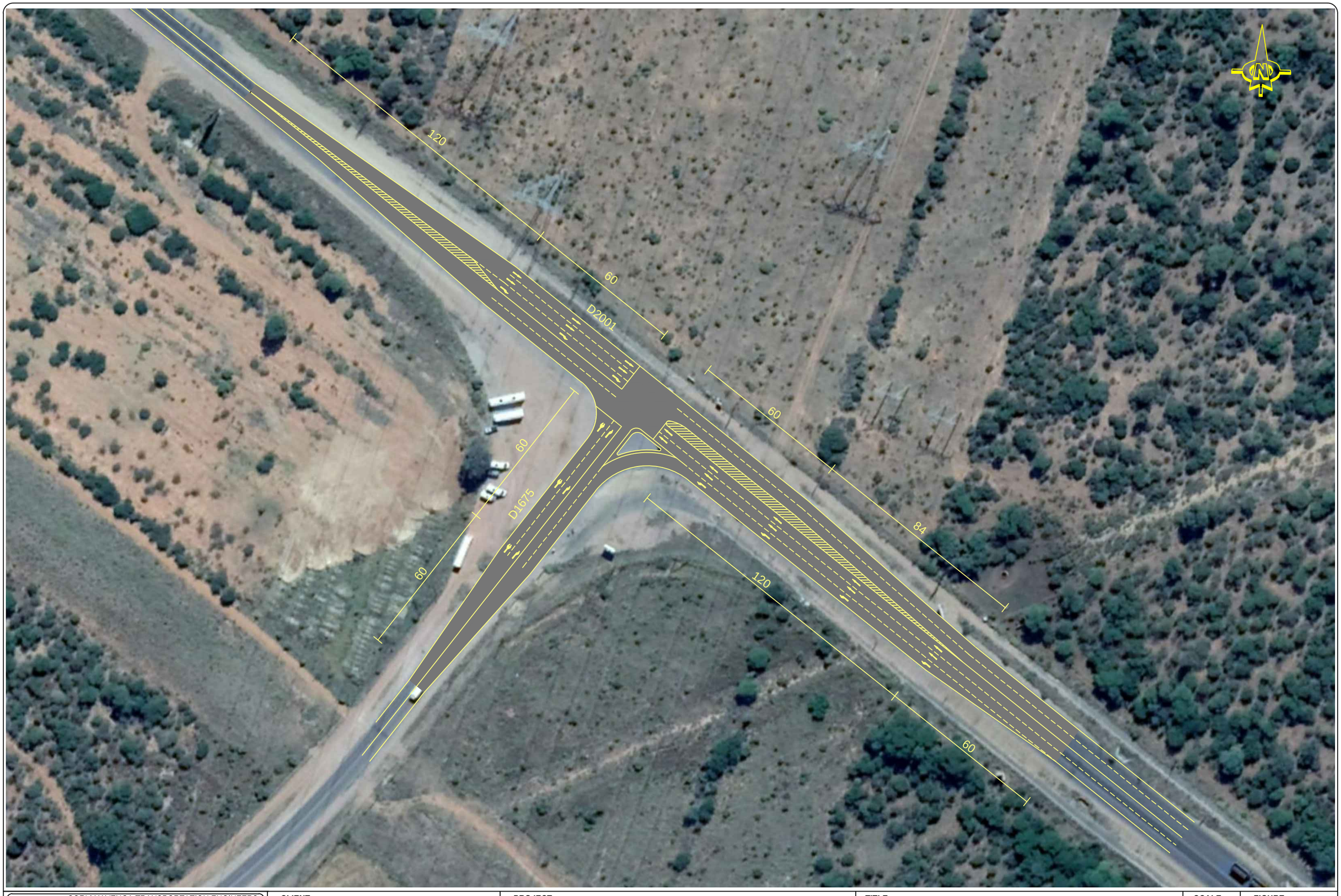
Expected Peak Hour Traffic Demand - Scenario 4

Scenario 4 - AM



Scenario 4 - PM





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CLIENT:	PROJECT:	TITLE:	SCALE	FIGURE
NALEDZI GROUP (PTY) LTD	TRAFFIC IMPACT ASSESSMENT LEPHALALE RAILWAY YARD	CONCEPTUAL INTERSECTION LAYOUT ROAD D2001 AND D1675	NA	8

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NALEDZI GROUP (PTY) LTD

PROJECT:
TRAFFIC IMPACT ASSESSMENT
LEPHALALE RAILWAY YARD

TITLE:
CONCEPTUAL INTERSECTION LAYOUT
ROAD D1675 AND D2649

SCALE
NA

FIGURE
9

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CLIENT:	PROJECT:	TITLE:	SCALE	FIGURE
NALEDZI GROUP (PTY) LTD	**TRAFFIC IMPACT ASSESSMENT LEPHALALE RAILWAY YARD**	**CONCEPTUAL INTERSECTION LAYOUT ROAD D2649 AND ACCESS ROAD**	**NA**	**10A**

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CLIENT:
NALEDZI GROUP (PTY) LTD

PROJECT:
TRAFFIC IMPACT ASSESSMENT
LEPHALALE RAILWAY YARD

TITLE:
CONCEPTUAL INTERSECTION LAYOUT
ROAD D2649 AND ACCESS ROAD
(ALTERNATIVE LAYOUT)

SCALE
NA

FIGURE
10B