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Transport Impact Assessment

Noblesfontein WEF Basic Assessment

Victoria West, Northern Cape

May 2021

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Report Type	Transport Impact Assessment
Title	Noblesfontein WEF Basic Assessment
Client	Terramanzi Group (Pty) Ltd
Location	Victoria West, Northern Cape
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Report Status	Final
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This transport impact study was prepared in accordance with the South African Traffic Impact and Site Traffic Assessment Manual (TMH 16, COTO, Aug 2012), by a suitably qualified and registered professional traffic engineer. Details of any of the calculations on which the results in this report are based will be made available on request.

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Abbreviations

AASHTO - American Association of State Highway and Transportation Officials (Standards)

AMG – Access Management Guidelines (Western Cape Government)

CM – Critical Movement

DR – Divisional Road

HCM – Highway Capacity Manual

LOS – Level of Service

MOE – Measures of Efficiency

MR – Provincial Main Road

OP – Minor Road (Ondergeskikte Pad)

RAP&G – Road Access Policy and Guidelines

SATGR – South African Trip Generation Rates

SDP – Site Development Plan

SSD – Shoulder Sight Distance

TIA – Traffic Impact Assessment

UTG – Department of Transport Urban Transport Guideline

1.0 INTRODUCTION

The Noblesfontein Wind Energy Facility (WEF) was approved for a total of 44 turbines. Only 41 turbines were installed. The currently installed turbines have a 2MW generation capacity. It is now proposed to install two additional turbines with a technical specification upgrade of between 4MW and 5.6MW. The two additional turbines will be larger than the turbines currently installed hence the requirement for a Basic Assessment process. The two additional turbines will be installed within the previously approved development footprint. This report summarises an investigation of the transport impact related to the construction phase and operational phase of the amended wind farm layout and provides mitigation measures where necessary.

2.0 LOCALITY

The Wind Energy Facility is located to the east of the N12 near the Biesiespoort railway station in the Northern Cape. The site is also located approximately 35 kilometres to the south of the town Victoria West. Refer to **Figure 1** in Appendix A for a Locality Plan.

3.0 PROPOSED DEVELOPMENT

The existing Noblesfontein WEF currently consist of 41 turbines and it is now proposed to install two additional turbines within the previously approved development footprint. The proposed new turbines will be mounted on cylindrical steel towers with a maximum hub height of 137.5 metres. Each turbine rotor has three blades with a maximum rotor diameter of up to 165 metres. The proposed site layout is illustrated in **Figure 2**.

Components to be imported can be shipped to Coega, Saldanha or Cape Town harbours and then transported by road over a distance of between 640 km (Saldanha – Site) and 420 km (Coega – Site) depending on the different load restrictions. Specialized high lifting and heavy load capacity cranes will be utilized to erect the turbines. The two wind turbines will be constructed in one phase, with a total construction period of between 2 to 4 months.

Refer to **Figure 2** in Appendix A for a Site Layout Plan.

4.0 TRAFFIC ANALYSIS SCOPE

This report evaluates the expected traffic impact of the proposed development during the construction phase and during the operational phase. The report will identify the possible access routes to the site, comment on the condition of the existing roads in the site vicinity, identify possible access points to the site and recommend road improvements to the surrounding road network.

The report is based on existing available information on the road network, road condition information obtained during site visits and an assessment of the expected traffic volumes generated by the construction and operational phases of the proposed Noblesfontein WEF.

5.0 EXISTING CONDITIONS

Roads included in this study are the National Roads (N1 & N12), the R63 and other Provincial roads in the site vicinity. The existing roadway characteristics are summarised in **Table 1**.

Table 1: Existing Roadway Facilities

Roadway	Type of Road	Posted Speed (km/h)	Road Surface
N1	National Road	120	Paved/Tar
N12	National Road	120	Paved/Tar
R63	Provincial Trunk Road	120	Paved/Tar
Biesiespoort Road	Provincial Divisional Road	Not posted Assumed 60	Gravel

5.1 Existing Cross Sections and Surface Conditions

In the vicinity of the proposed development, the N1 and the N12 have a typical rural formation of a National Road, paved with one lane per direction of travel with paved shoulders along both sides of the road. The lanes are 3.7m wide with 2m wide shoulders. The typical cross section for the R63 is 3.4m wide lanes with gravel shoulders. All paved (tarred) roads in the site vicinity have good surface conditions. Biesiespoort Road is a 8 metre wide gravel road and the gravel surface is in fair condition with some poor sections. The typical cross-section of the roads in the site vicinity are shown in **Photos 1** to **4** in Appendix B.

5.2 Existing Traffic Volumes

The existing traffic conditions are based on the traffic volumes extracted from the SANRAL Comprehensive Traffic Observation (CTO) Stations and Provincial count stations in the area. The table below illustrates the current annual average daily traffic volumes (AADT), the annual daily truck traffic volumes and the peak hour volumes on the road network in the wind farm site vicinity.

Table 2: Existing Traffic Volumes

Roadway	AADT	ADTT	Peak Hour Volume	% Heavy Vehicles
N1	3 724	1 805	271	49%
N12	755	325	135	43%
R63	118	30	10	25%
Biesiespoort Road	<50	<10	<10	30%

The existing traffic volumes along the surrounding road network are low and the existing traffic volumes will not be any reason for concern in terms of the expected transport impact associated with the proposed development.

6.0 SITE ACCESS

Construction access to the wind turbine locations will be via existing access roads off the Biesiespoort Road as illustrated on the proposed Site Layout Plan **Figure 2** in Appendix A.

The public road network in the site vicinity should be maintained during the construction period and once the construction phase is completed any damage to the surrounding Provincial Road Network should be repaired to an acceptable standard.

7.0 TRANSPORT ROUTE

Based on the abnormal load requirements, preliminary routes as outlined in **Figure 3A-3C** are proposed for transporting the large equipment from the Coega, Saldanha or Cape Town harbours to the site. The Coega route (Figure 3A) follows the R334 to Uitenhage and then following the R75 to Graff-Reinet, then via the R63 past Murraysburg to the N1, then south along the N1 to the Biesiespoort Road and then via the Biesiespoort Road to the site. The Saldanha route (Figure 3B) follows the R45 and then the R311 to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River, then via the N1 to the N12 at Three Sisters and via the N12 to the Biesiespoort Road. The Cape Town route (Figure 3C) follows the R27 to Melkbosstrand and then the via the Melkbosstrand Road to the N1, then via the N1 to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River, then via the N1 to the N12 at Three Sisters and via the N12 to the Biesiespoort Road.

The final route will have to be checked for compliance during the final design stages of the project. Permits will need to be obtained from the relevant road authorities for all abnormal loads and the specific route will be specified based on the characteristics of each load type.

8.0 TRAFFIC IMPACT ANALYSIS

The expected effects of traffic that would be generated by the proposed development during peak hours were analysed as follows:

- The **background traffic** volumes were determined for the study network in the vicinity of the site. These are the traffic volumes that would be on the road network in the absence of the proposed development (No go Alternative);
- A growth factor was applied to account for regional growth
- Construction Phase Traffic
- **Site-generated trips** were estimated for the proposed development;
- The construction phase traffic and the assigned site-generated traffic from the proposed development were added to the **background traffic** volumes to determine the **total traffic** conditions during the construction phase and with the development completed.

8.1 Year 2026 Background Traffic Conditions (No go alternative)

For the purposes of this study, year 2025 background traffic volumes were developed by applying a 3.0 *percent annual traffic growth rate* to the existing traffic volumes on the major links. This estimated growth rate was assumed to allow for the additional traffic volumes that will be generated by other in-process and future developments in the vicinity of the proposed development.

Due to the low traffic volumes along the surrounding road network, it is expected that the road network will continue to operate at acceptable levels-of-service during the background conditions. The roads in the site vicinity are in a fair condition and no major maintenance will be required in the near future.

8.2 Construction Phase

A large amount of traffic will be generated during the construction phase. The following activities will probably occur during the construction phase:

- Construction of the internal access roads,
- Stripping and stockpiling of topsoil,
- Excavation and construction of the foundations for the wind turbines,
- Construction of the operations building,
- Erection/Assembly and disassembly of the cranes
- Assembly of the towers, nacelles and blades,
- Trenching for cabling and
- Reinstatement of the site.

The internal access roads to the two turbines will be constructed mainly of local materials sourced on site if the material is suitable, otherwise material will be imported from commercial sites. These roads will be retained and used for inspection and maintenance of the wind turbines.

The tower foundations are large reinforced concrete footings. It is assumed that the material removed during excavation will be utilised within the site to create hardstand areas for the cranes and in reinstating the site after construction. It is assumed that the concrete will be mixed on site and the raw materials will be transported to the site via the existing road network. It is assumed that up to 75 truckloads will be required for each foundation.

Approximately 20 heavy truck loads are required on site to assemble and disassemble the cranes. The components of the wind turbines will be transported to the site from Coega, Saldanha or Cape Town harbours and approximately 12 abnormal truck loads are required per wind turbine.

8.2.1 Trip Generation

Estimates of the peak hour vehicle trips for new developments are typically based on empirical observations at similar land uses. The estimates summarised in **Table 3** are based on information sourced from other similar projects and it is also based on the assumption that the proposed maximum of 36 wind turbines will be constructed over the 4-month period. These assumptions are considered a possible worst-case scenario.

Table 3: Expected Generated Truck Trips during the Construction Phase

Material	Approximate Number of Trucks loads required
Foundations	150
Construction Cranes	20
Tower Sections	8
Nacelles	2
Blades	6
Switch Cabinets	2
TOTAL	**188**

Although the construction period can be between 2 to 4 months, for the purposes of this study it is assumed that most the construction work can be completed within a 3-month period to represent a possible worst-case scenario. It is expected that approximately 188 trucks loads will be required during the 3-month construction period, working approximately 66 days during the construction period. This means that on average approximately 3 trucks will visit the site per day which equates to approximately 6 truck trips spread over an eight-hour day.

Based on information sourced from other similar projects it is assumed that approximately 50 construction workers could be employed during the peak construction period. It can be expected that the bulk of these workers will commute to/from the construction site via bus or minibus taxis. If 70 percent of the construction staff travels with minibus taxis with an average occupancy of 12 passengers per vehicle it equates to approximately 3 mini buses visiting the site in the morning and afternoon peak hours. If the remaining 30 percent travel with private vehicles, it equates to approximately 42 motor vehicle and truck trips during the average week day with approximately 21 trips during the a.m. and p.m. peak hours when workers are dropped off or picked up.

8.2.2 Trip Distribution and Assignment

It is expected that most of the trips to/from the proposed Wind Farm will travel via the N12 from direction Beaufort West and Victoria West. The trucks delivering the components and equipment will come via the N1. Most of the trucks delivering raw material for foundations and road construction material will probably come from commercial sources in Victoria West and Beaufort West.

8.2.3 Proposed Road Network Upgrades

Based on the expected number of construction trips generated by the proposed development the existing road network has sufficient capacity to accommodate the additional trips from an operational perspective. During construction it is expected that road surfaces of the gravel roads might require maintenance to prevent damage to the road structure.

Once construction is completed the Provincial roads should be inspected and repaired where necessary. The day-to-day operation of the proposed Wind Farm will generate relatively low traffic volumes, which can easily be accommodated by the surrounding road network.

8.3 Operational Phase

The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site. It is not expected that the two additional wind turbines will require additional permanent staff on site. Hence the two additional wind turbines will not result in additional site traffic during the operational phase.

8.4 Decommissioning Phase

If the wind farm is not upgraded at the end of the typical lifespan (20 to 25 years from the date of commissioning) the site will be decommissioned. The decommissioning of the complete Noblesfontien WEF is expected to take between 6 to 12 months. The modular components would be removed and recycled and all disturbed areas will have to be appropriately rehabilitated.

The expected transport impact on the road network during the decommissioning phase will be similar or less than the transport impact during the construction phase and the surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

8.5 Alternative Development Proposals

No other feasible site alternatives have been proposed for the establishment of the two additional wind turbines. Therefore, no site alternatives are evaluated in this report.

8.6 Traffic Management and Transportation Plan

During the construction phase there will be an increase in truck traffic along the roads in the site vicinity, compared to the current truck traffic along these roads. However, the expected total traffic volumes along these roads will still be well within the function of the roads and no operational or safety issues are expected. Due to the rural nature of the area around the development site the daily traffic distribution profile along the roads in the site vicinity is random with no specific peak during the day.

It is recommended that construction and abnormal load traffic should be limited to outside the

typical traffic peaks in build-up areas and through towns. Provincial and Local traffic officials should assist abnormal load vehicles through the towns. No significant road safety issues are expected in terms of possible vehicle and pedestrian conflicts. The construction traffic will have an impact on road users and pedestrians along the surrounding road network, but with effective traffic management the impact can be minimised.

Most of the equipment and construction material will be delivered to the site with heavy vehicles. The turbine components will be transported by abnormal load vehicles. It is expected that the delivery of the equipment will occur over a 3-month period and the impact of the delivery vehicles on the existing traffic along the road network in the site vicinity will be acceptable. All deliveries with abnormal loads will operate under an approved transportation plan with the necessary traffic routes and traffic accommodation plans in place.

9.0 CONCLUSIONS AND RECOMMENDATIONS

This transport impact assessment was prepared for the proposed Noblesfontein WEF to the south of Victoria West. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development on the surrounding transportation system.

This traffic impact analysis resulted in the following conclusions and recommendations.

Existing Traffic Conditions

- The current demand on the existing road network in the site vicinity is low and the road network and intersections operate at acceptable levels of service.

2026 Background Traffic Conditions

- A growth rate of 3 percent per annum was applied to the existing traffic volumes to determine the 2026 background traffic conditions.
- All the intersections and roadways will continue to operate at acceptable levels-of-service in the future during the worst peak hours of the year without the proposed development.

Construction Phase

- It is expected that the construction phase of the proposed development could generate up to 42 vehicular trips during the average weekday of which approximately 14 percent will be heavy truck traffic.
- Access to the site is proposed via existing accesses off the Biesiespoort Road.

Operational Phase

- The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site. No additional permanent staff will be required for the two additional wind turbines. Hence the two additional wind turbines will not result in any additional site traffic during the operational phase.

Development Alternatives

- No Feasible site alternatives have been identified for the two additional wind turbines. Therefore, no site alternatives are evaluated in this report.

Decommissioning Phase

- If the wind farm is not upgraded at the end of the typical lifespan (20 to 25 years) the site will be decommissioned. The decommissioning of the full Noblesfontein WEF is expected to take between 6 to 12 months. The expected transport impact on the road network during the decommissioning phase will be similar to the transport impact during the construction phase. The surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

Traffic Management and Transportation Plan

- During the construction phase there will be an increase in truck traffic along the roads in the site vicinity, compared to the current truck traffic along these roads. However, the expected total traffic volumes along these roads will still be well within the function of the roads and no operational or safety issues are expected.
- It is recommended that construction and abnormal load traffic should be limited to outside the typical traffic peaks in build-up areas and through towns.
- Most of the equipment and construction material will be delivered to the site with heavy vehicles. The turbine components will be transported by abnormal load vehicles. It is expected that the delivery of the equipment can occur over a 3-month period and the impact of the delivery vehicles on the existing traffic along the road network in the site vicinity will be acceptable. All deliveries with abnormal loads will operate under an approved transportation plan with the necessary traffic routes and traffic accommodation plans in place.

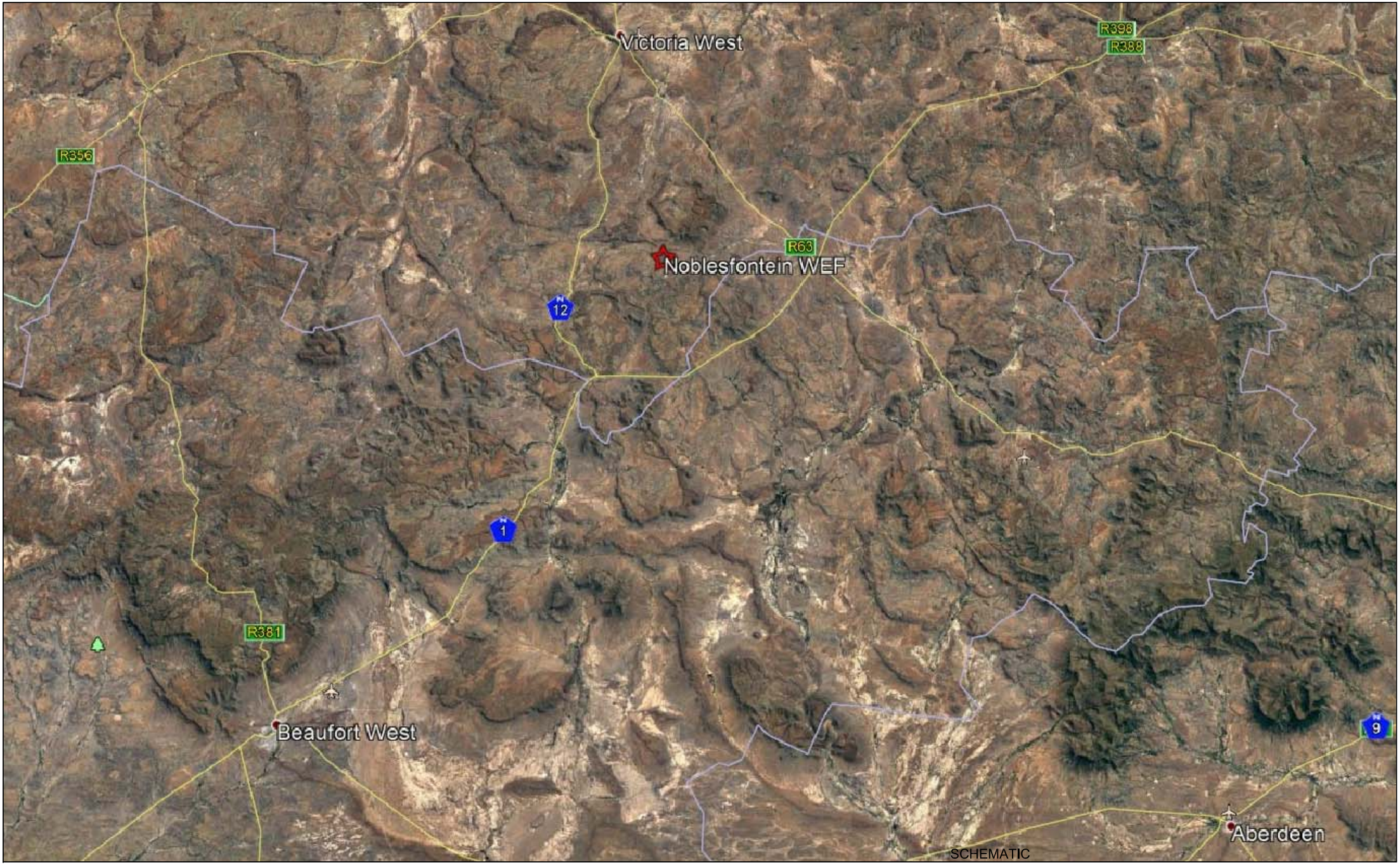
Based on the evaluation as discussed in this report the existing road network has sufficient spare capacity to accommodate the proposed two additional wind turbines without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Noblesfontein WEF Basic Assessment be approved from a transport impact perspective.

REFERENCES

1. Highway Capacity Manual (HCM).
2. Western Cape Government, Access Management Guidelines. 2020
3. Transportation Research Board Highway Capacity Manual, Special Report No. 209. 2000
4. Committee of Transport Officials, South African Trip Data Manual, TMH 17, September 2017
5. Committee of Transport Officials, South African Impact and Site Traffic Assessment Manual, TMH 16 Volume 1, August 2012.

Appendix A

Figures



PROJECT:	FIGURE:	NUMBER:
NOBLESFONTEIN WIND ENERGY FACILITY PART 2 AMENDMENT APPLICATION	LOCALITY PLAN	1

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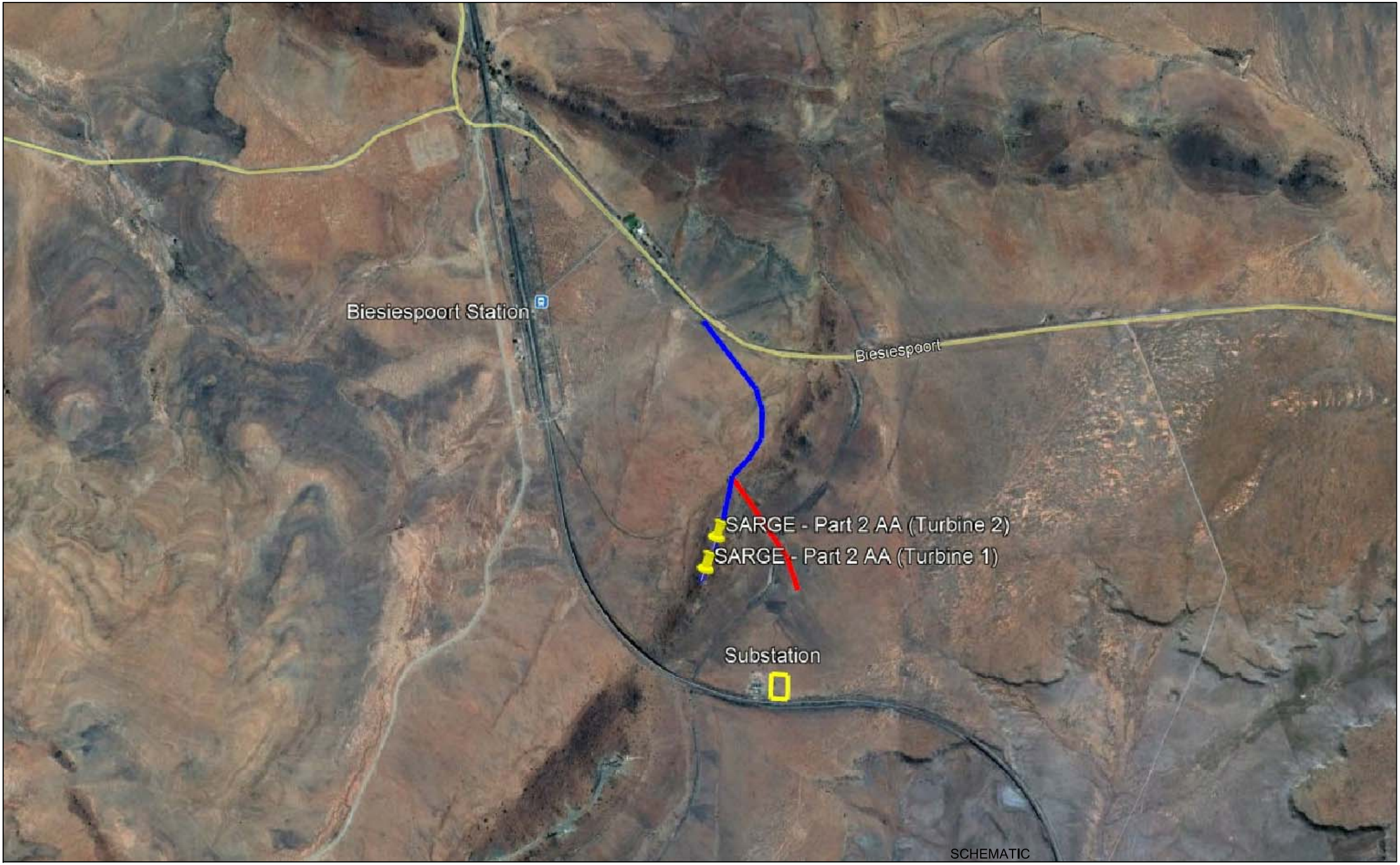

PROJECT:	FIGURE:	NUMBER:
NOBLESFONTEIN WIND ENERGY FACILITY PART 2 AMENDMENT APPLICATION	SITE LAYOUT PLAN	2

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PROJECT:	FIGURE:	NUMBER:
NOBLESFONTEIN WIND ENERGY FACILITY PART 2 AMENDMENT	RECOMMENDED ROUTE FOR ABNORMAL LOADS COEGA HARBOR TO SITE	3A

PROJECT:	FIGURE:	NUMBER:
NOBLESFONTEIN WIND ENERGY FACILITY PART 2 AMENDMENT	RECOMMENDED ROUTE FOR ABNORMAL LOADS SALDANHA HARBOR TO SITE	3B

PROJECT:	FIGURE:	NUMBER:
NOBLESFONTEIN WIND ENERGY FACILITY PART 2 AMENDMENT	RECOMMENDED ROUTE FOR ABNORMAL LOADS CAPE TOWN HARBOR TO SITE	3C

Appendix B

Photographs

Photo 1: Northbound view along the N1 towards the R63 intersection

Photo 2: Northbound view along the N12 towards the Biesiespoort Rd

Photo 3: Northbound view along R63 towards the N1

Photo 4: Southbound view along Biesiespoort Road (DR2405)

Appendix C

Traffic Information

Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00	18	64	2	4
05-06h00	22	88	3	2
Sub-Totals	**40**	**152**	**5**	**6**
06-07h00	56	120	1	2
07-08h00	44	83	3	0
08-09h00	59	115	3	1
09-10h00	96	121	1	0
10-11h00	108	123	0	0
11-12h00	89	86	1	1
12-13h00	100	78	0	1
13-14h00	103	108	7	5
14-15h00	88	121	7	1
15-16h00	112	54	2	1
16-17h00	84	100	1	4
17-18h00	61	105	3	3
Sub-Totals	**1000**	**1214**	**29**	**19**
18-19h00	63	92	4	7
19-20h00	35	85	3	4
20-21h00	41	84	3	3
21-22h00	25	73	4	5
22-23h00				
23-24h00				
Sub-Totals	**164**	**334**	**14**	**19**
Totals	**1204**	**1700**	**48**	**44**

Station AADT's

Light	Heavy	Taxis	Buses
1361	**1921**	**54**	**50**

Total **3386**

Station Data

Station No	**2765B**
Road No	**NR00108**
Km Distance	**62.00**
Count Date	**15/09/2016**
Hours Counted	**18**
Day Counted	**Thursday**
Counted by	**C**
Expansion Factor	**1.13**
Night Factor	
Stratum	**RA**
Peak Hour Ratio	**0.00**
Total AADT	**3385**

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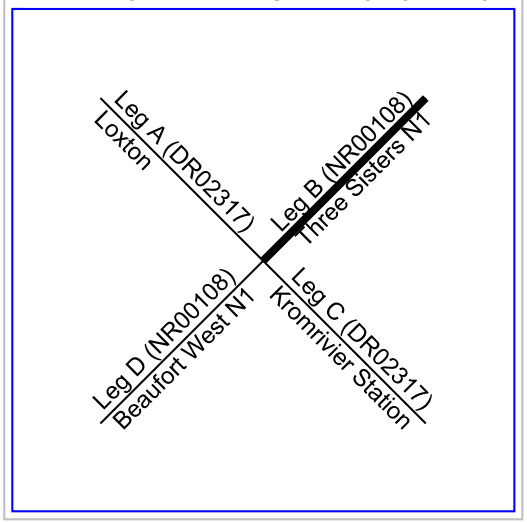


Print

Print

Intersection

Diagram

Growth Rate

Growth Rate Chart

Historical Data 1 of 4

< 2016/09/15 >

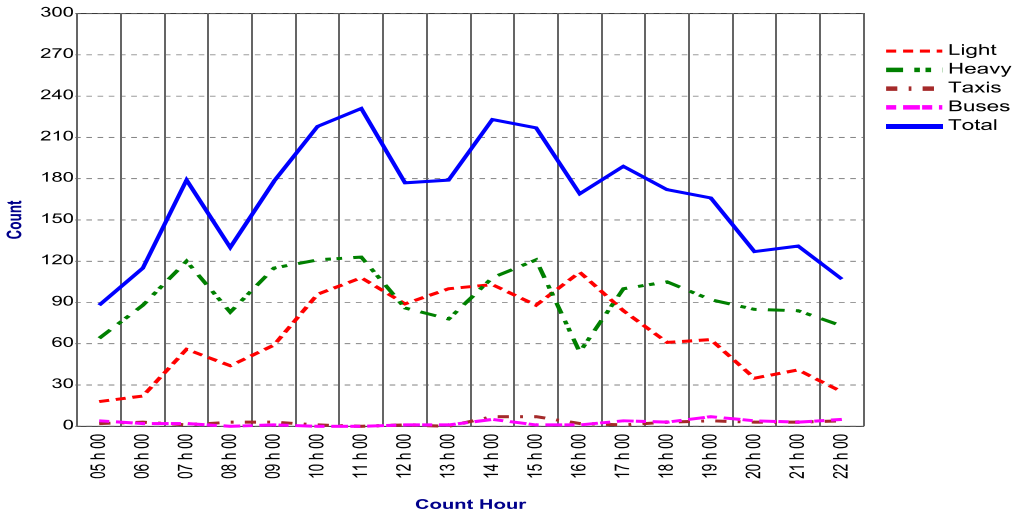
Exit

Station Data

Station Counts Chart

☑ Light ☑ Heavy ☑ Taxis ☑ Buses ☑ Total

Stratum Pattern



Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00	0	0	0	0
05-06h00	4	2	0	0
Sub-Totals	**4**	**2**	**0**	**0**
06-07h00	0	0	0	0
07-08h00	5	2	0	0
08-09h00	4	1	0	0
09-10h00	2	0	0	0
10-11h00	4	2	0	0
11-12h00	4	1	1	0
12-13h00	7	1	0	0
13-14h00	4	2	0	0
14-15h00	4	1	0	0
15-16h00	5	3	0	0
16-17h00	6	0	0	0
17-18h00	2	1	0	0
Sub-Totals	**47**	**14**	**1**	**0**
18-19h00	1	2	0	0
19-20h00	4	1	0	0
20-21h00	3	2	0	0
21-22h00	3	0	0	0
22-23h00				
23-24h00				
Sub-Totals	**11**	**5**	**0**	**0**
Totals	**62**	**21**	**1**	**0**

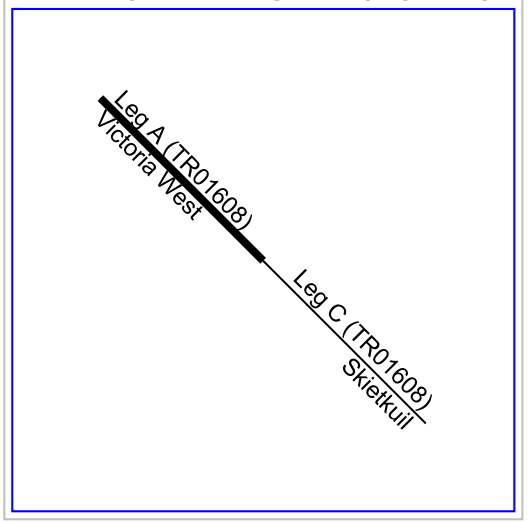
Station AADT's

	Light	Heavy	Taxis	Buses
	73	**25**	**1**	**0**
Total	**99**			

Station Data

Station No	**2047A**
Road No	**TR01608**
Km Distance	**43.48**
Count Date	**21/09/2016**
Hours Counted	**18**
Day Counted	**Wednesday**
Counted by	**C**
Expansion Factor	**1.17**
Night Factor	
Stratum	**GA**
Peak Hour Ratio	**0.00**
Total AADT	**98**

Sketch (Click on Leg to Display Data)



Print

Print

Intersection

Diagram

Growth Rate

Growth Rate Chart

Historical Data 1 of 5

< 2016/09/21 >

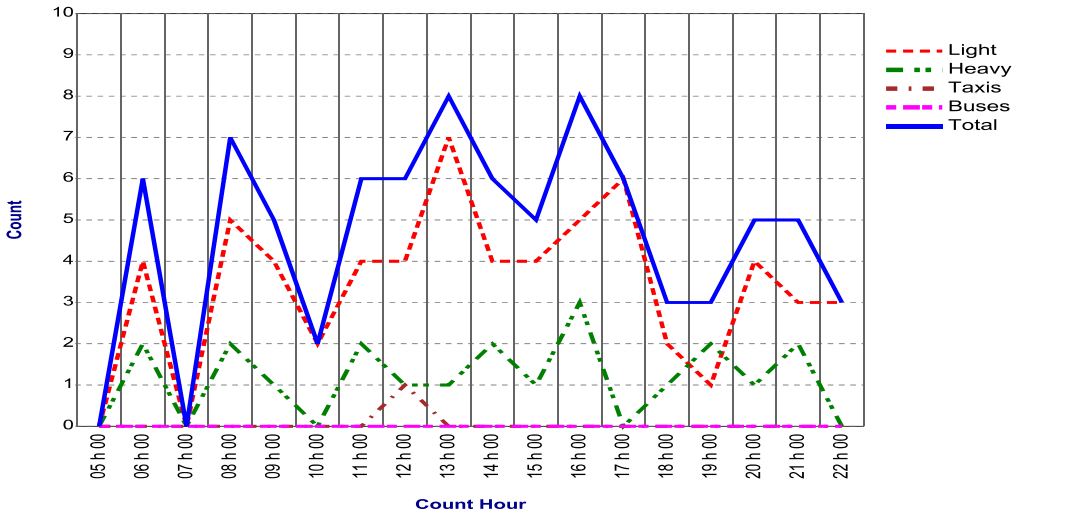
Exit

Station Data

Station Counts Chart

☑ Light ☑ Heavy ☑ Taxis ☑ Buses ☑ Total

Stratum Pattern



Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00				
05-06h00				
06-07h00	0	0	0	0
07-08h00	2	0	0	0
08-09h00	1	0	0	0
09-10h00	0	0	0	0
10-11h00	3	2	0	0
11-12h00	2	0	0	0
12-13h00	0	0	0	0
13-14h00	0	0	0	0
14-15h00	1	0	0	0
15-16h00	0	0	0	0
16-17h00	1	1	0	0
17-18h00	1	1	0	0
Sub-Totals	**11**	**4**	**0**	**0**
18-19h00				
19-20h00				
20-21h00				
21-22h00				
22-23h00				
23-24h00				
Sub-Totals	**0**	**0**	**0**	**0**
Totals	**11**	**4**	**0**	**0**

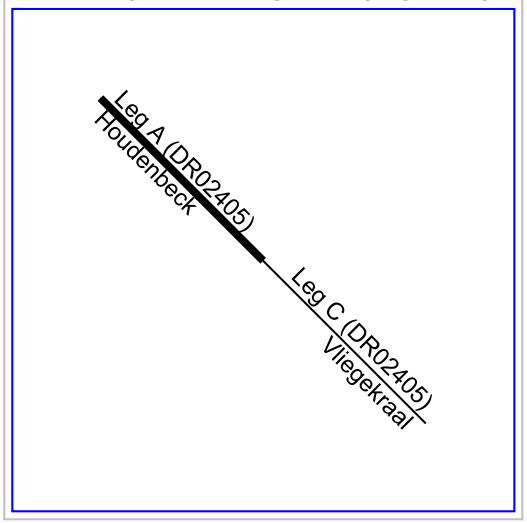
Station AADT's

	Light	Heavy	Taxis	Buses
	15	6	0	0
Total	21			

Station Data

Station No	**2784A**
Road No	**DR02405**
Km Distance	**25.25**
Count Date	**21/09/2016**
Hours Counted	**12**
Day Counted	**Wednesday**
Counted by	**C**
Expansion Factor	**1.38**
Night Factor	
Stratum	**GA**
Peak Hour Ratio	**0.00**
Total AADT	**21**

Sketch (Click on Leg to Display Data)



Print

Print

Intersection

Diagram

Growth Rate

Growth Rate Chart

Historical Data 1 of 4

< 2016/09/21 >

Exit

Station Data

Station Counts Chart

Light Heavy Taxis Buses Total

Stratum Pattern