INNOVATIVE
TRANSPORT
SOLUTIONS

Transport Impact Assessment

Modderfontein WEF Part 2 Amendment Application

Beaufort West, Northern Cape

June 2021

5th Floor, Imperial Terraces

Carl Cronje Drive

Tyger Waterfront

Bellville, 7530

Tel: +27 (021) 914 6211

E-mail: westerncape@itsglobal.co.za

Report Type	Transport Impact Assessment
Title	Modderfontein WEF Part 2 Amendment Application
Client	Terramanzi Group (Pty) Ltd
Location	Beaufort West, Northern Cape
Project Team	Christoff Krogscheepers, Pr. Eng Pieter Arangie Theodore Neels
Project Number	ITS 4312
Date	June 2021
Report Status	First Draft
File Name:	G:\4312 TIS Modderfontein WEF\12 Reports\Issued\4312 TIA Modderfontein WEF_Part2_AA_FirstDraft_PA_2021-06-22.docx

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.

Table of Contents

1.0 INTRODUCTION 1
2.0 LOCALITY 1
3.0 PROPOSED DEVELOPMENT 1
4.0 TRAFFIC ANALYSIS SCOPE 1
5.0 EXISTING CONDITIONS 2
5.1 Existing Cross Sections and Surface Conditions 2
5.2 Existing Traffic Volumes 2
6.0 SITE ACCESS 3
7.0 TRANSPORT ROUTE 3
8.0 TRAFFIC IMPACT ANALYSIS 3
8.1 Year 2026 Background Traffic Conditions 4
8.2 Construction Phase 4
8.2.1 Trip Generation 5
8.2.2 Trip Distribution and Assignment 5
8.3 Transport Impact Assessment 6
8.3.1 Definitions of terminology 6
8.3.2 Scoring System for Impact Assessment Ratings 6
8.3.3 Construction Phase 7
8.4 Operational Phase 9
8.5 Decommissioning Phase 10
8.6 Traffic Management and Transportation Plan 12
9.0 CONCLUSIONS AND RECOMMENDATIONS 12

List of Figures

Figure 1: Locality Map

Figure 2: Site Layout

Figure 3: Abnormal Load Transport Route

List of Tables

Table 1: Existing Roadway Facilities 2
Table 2: Existing Traffic Volumes 2
Table 3: Expected Generated Truck Trips during the Construction Phase (Preferred Alternative) 5
Table 4: Definitions of terminology 6
Table 5: Scoring System 7
Table 6: Increased Traffic Volumes during Construction Period 8
Table 7: Traffic Impact significance of Heavy Loads during the construction phase 9
Table 8: Traffic Impact significance of Heavy Loads during the decommissioning phase 11
Table 8: Summary of overall Significance 11

Abbreviations

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)

SDP – Site Development Plan

SSD – Shoulder Sight Distance

TIA – Traffic Impact Assessment

1.0 INTRODUCTION

The Modderfontein Wind Energy Facility (WEF) was approved for up to 67 turbines with a total generating capacity of 201MW using turbines with a generation capacity of up to 3MW. It is now proposed to change the layout to up to 34 turbines with a total generating capacity of 190.4MW. The turbines will have a generating capacity of up to 5.6MW. This proposed new layout will result in a 50% reduction in the turbine density. 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, to the north of the N1 and to the south of Biesiespoort Road 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 Modderfontein WEF was approved with up to 67 turbines. It is now proposed to reduce the number of turbines to up to 34 by increasing the generating capacity per turbine from 3MW to up to 5.6MW. The proposed new layout will consist of two clusters, Cluster 1 with up to 25 turbines with a total of 140MW and Cluster 2 with up to 9 turbines with a total of 50.4MW. 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 total construction period is expected to be between 18 to 30 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 Modderfontein 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

For the purposes of this study, year 2026 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 100 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 34 wind turbines will be constructed over an 18-month period. These assumptions are considered a possible worst-case scenario.

Table 3: Expected Generated Truck Trips during the Construction Phase (Preferred Alternative)

Material	Approximate Number of Trucks loads required
Foundations	2 550
Construction Cranes	100
Tower Sections	170
Nacelles	34
Blades	102
Switch Cabinets	68
TOTAL	**3 024**

Although the construction period can be between 18 to 30 months, for the purposes of this study it is assumed that most the construction work can be completed within an 18-month period to represent a possible worst-case scenario. It is expected that approximately 3 024 trucks loads will be required during the 18-month construction period, working approximately 450 days during the construction period. This means that on average approximately 7 trucks will visit the site per day which equates to approximately 14 truck trips spread over an eight-hour day.

Based on information sourced from other similar projects it is assumed that approximately 200 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 12 mini buses visiting the site in the morning and afternoon peak hours. If the remaining 30 percent travel with private vehicles, it equates to 182 motor vehicle and truck trips during the average week day with approximately 85 trips during the a.m. and p.m. peak hours when workers are dropped off or picked up.

The approved layout for the Modderfontein wind energy facility has double the number of wind turbines, which means that the trip generation for the approved layout will be higher than that of the preferred layout and the construction period for the approved layout will also be longer.

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.

8.3 Transport Impact Assessment

8.3.1 Definitions of terminology

Table 4: Definitions of terminology

ITEM	DEFINITION
EXTENT	
Local	Extending only as far as the boundaries of the activity, limited to the site and its immediate surroundings
Regional	Impact on the broader region
National	Will have an impact on a national scale or across international borders
DURATION	
Short-term	0-5 years
Medium- Term	5-15 years
Long-Term	>15 years, where the impact will cease after the operational life of the activity
Permanent	Where mitigation, either by natural process or human intervention, will not occur in such a way or in such a time span that the impact can be considered transient.
MAGNITUDE OR INTENSITY	
Low	Where the receiving natural, cultural or social function/environment is negligibly affected or where the impact is so low that remedial action is not required.
Medium	Where the affected environment is altered, but not severely and the impact can be mitigated successfully and natural, cultural or social functions and processes can continue, albeit in a modified way.
High	Where natural, cultural or social functions or processes are substantially altered to a very large degree. If a negative impact, then this could lead to unacceptable consequences for the cultural and/or social functions and/or irreplaceable loss of biodiversity to the extent that natural, cultural or social functions could temporarily or permanently cease.
PROBABILITY	
Improbable	Where the possibility of the impact materialising is very low, either because of design or historic experience
Probable	Where there is a distinct possibility that the impact will occur
Highly Probable	Where it is most likely that the impact will occur
Definite	Where the impact will undoubtedly occur, regardless of any prevention measures
SIGNIFICANCE	
Low	Where a potential impact will have a negligible effect on natural, cultural or social environments and the effect on the decision is negligible. This will not require special design considerations for the project
Medium	Where it would have, or there would be a moderate risk to natural, cultural or social environments and should influence the decision. The project will require modification or mitigation measures to be included in the design
High	Where it would have, or there would be a high risk of, a large effect on natural, cultural or social environments. These impacts should have a major influence on decision making.
Very High	Where it would have, or there would be a high risk of, an irreversible negative impact on biodiversity and irreplaceable loss of natural capital that could result in the project being environmentally unacceptable, even with mitigation. Alternatively, it could lead to a major positive effect. Impacts of this nature must be a central factor in decision making.
STATUS OF IMPACT	
Whether the impact is positive (a benefit), negative (a cost) or neutral (status quo maintained)	
DEGREE OF CONFIDENCE IN PREDICTIONS	
The degree of confidence in the predictions is based on the availability of information and specialist knowledge (e.g. low, medium or high)	
MITIGATION	
Mechanisms used to control, minimise and or eliminate negative impacts on the environment and to enhance project benefits Mitigation measures should be considered in terms of the following hierarchy: (1) avoidance, (2) minimisation, (3) restoration and (4) off-sets.	

8.3.2 Scoring System for Impact Assessment Ratings

To comparatively rank the impacts, each impact has been assigned a score using the scoring system outlined in the **Table 5** below. This scoring system allows for a comparative, accountable assessment of the indicative cumulative positive or negative impacts of each aspect assessed.

Table 5: Scoring System

IMPACT PARAMETER	SCORE	
Extent (A)	**Rating**	
Local	1	
Regional	2	
National	3	
Duration (B)	**Rating**	
Short term	1	
Medium Term	2	
Long Term	3	
Permanent	4	
Probability (C)	**Rating**	
Improbable	1	
Probable	2	
Highly Probable	3	
Definite	4	
IMPACT PARAMETER	**NEGATIVE IMPACT SCORE**	**POSITIVE IMPACT SCORE**
Magnitude/Intensity (D)	**Rating**	**Rating**
Low	-1	1
Medium	-2	2
High	-3	3
SIGNIFICANCE RATING (F) = (A*B*D)*C	**Rating**	**Rating**
Low	0 to - 40	0 to 40
Medium	- 41 to - 80	41 to 80
High	- 81 to - 120	81 to 120
Very High	> - 120	> 120

8.3.3 Construction Phase

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.

Table 6 below summarises the transport impacts identified and expected as a result of the increase in traffic volumes during the construction phase

Table 6: Increased Traffic Volumes during Construction Period

IMPACT NATURE	Increase in traffic volumes on the surrounding road network as a result of construction traffic		STATUS	NEGATIVE
Impact Description	During the construction phase there will be an increase in traffic volumes on the surrounding road network that will impact on the general road users.			
Impact Source(s)	Construction Traffic			
Receptor(s)	General public/Road users			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-1	Preferred Alternative:	-1
	No-Go Alternative:	-1	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	**-3**	Preferred Alternative:	**-2**
	No-Go Alternative:	**-3**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Abnormal and heavy load vehicles should not be allowed on the public road network during the typical weekday a.m. and p.m. peak hours. • Abnormal load vehicles should be escorted by traffic officials to control traffic and limit possible conflicts at intersections. • These measures will be included in the Transport Management Plan			

The expected trip generation for the approved Modderfontein WEF is slightly higher and the construction period will be longer than that of the preferred alternative. This means that the approved development with the 67 turbines will have a higher transport impact than the preferred layout with only 34 turbines. However, in terms of the higher construction traffic volumes and the longer construction period the higher transport impact associated with the approved layout is of low negative significance.

Table 6 below summarises the transport impacts identified and expected as a result of accommodating heavy loads during the construction phase.

Table 7: Traffic Impact significance of Heavy Loads during the construction phase

IMPACT NATURE	**Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the construction phase.**		**STATUS**	**NEGATIVE**
Impact Description	During the construction phase there will be gravel loss and possible damage to the road layer works along Biesiespoort Road as a result of additional truck traffic and heavy load truck traffic delivering equipment to the site.			
Impact Source(s)	Construction Traffic			
Receptor(s)	General public/Road users			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	-1
	No-Go Alternative:	-2	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	**-6**	Preferred Alternative:	**-2**
	No-Go Alternative:	**-6**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Resurfacing of sections along Biesiespoort Road, where required and regular road maintenance i.e. grading of the road once every two weeks during the construction phase. • The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.			

8.4 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. The number of permanent staff on site is not expected to be more than 40 people and therefore no additional upgrades are required to accommodate the operational site traffic.

Table 6 below summarises the transport impacts identified and expected during the operational phase.

IMPACT NATURE	Increase in traffic volumes on the surrounding road network.		STATUS	NEGATIVE
Impact Description	During the operational phase there will be a slight increase in traffic volumes on the surrounding road network that might impact on the general road users and result in gravel loss along Biesiespoort Road.			
Impact Source(s)	Operational Traffic			
Receptor(s)	General public/Road users			
PARAMETER	WITHOUT MITIGATION	SCORE	WITH MITIGATION	SCORE
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-1	Preferred Alternative:	-1
	No-Go Alternative:	-1	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	**-3**	Preferred Alternative:	**-2**
	No-Go Alternative:	**-3**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Routine road maintenance by the relevant Roads Authority.			

8.5 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 Modderfontein 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.

Table 8 below summarises transport impacts identified and expected during decommissioning phase of the project.

Table 8: Traffic Impact significance of Heavy Loads during the decommissioning phase

IMPACT NATURE	**Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase.**		**STATUS**	**NEGATIVE**
Impact Description	During the decommissioning phase there will be gravel loss and possible damage to the road layer works along Biesiespoort Road as a result of additional truck traffic and heavy load truck traffic removing equipment from the site.			
Impact Source(s)	Construction Traffic			
Receptor(s)	General public/Road users			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	-1
	No-Go Alternative:	-2	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative:	**-6**	Preferred Alternative:	**-2**
	No-Go Alternative:	**-6**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Resurfacing of sections along Biesiespoort Road, where required and regular road maintenance i.e. grading of the road once every two weeks during the decommissioning phase. • The road can also be sprayed with water (grey water if available) once a day to limit dust pollution and gravel loss.			

Table 9: Summary of overall Significance

DESCRIPTION OF IMPACT	**Overall Significance (With Mitigation)**	
	No-Go Alternative	**Preferred Alternative**
Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low	Low
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the construction phase	Low	Low
Increase in traffic volumes on the surrounding road network	Low	Low

DESCRIPTION OF IMPACT	Overall Significance (With Mitigation)	
	No-Go Alternative	Preferred Alternative
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low	Low

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 an 18-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 Modderfontein 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 182 vehicular trips during the average weekday of which approximately 8 percent will be heavy truck traffic.
- Access to the site is proposed via existing farm 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. The number of permanent staff on site is not expected to be more than 40 people and therefore no additional upgrades are required to accommodate the operational site traffic.

Development Alternatives

- The approved layout with 67 turbines were evaluated as an alternative. The approved layout will generate more trips and have a longer construction period than the preferred alternative. This means that the approved development with the 67 turbines will have a higher transport impact than the preferred layout with only 34 turbines. However, in terms of the higher construction traffic volumes and the longer construction period the higher transport impact associated with the approved layout is of low negative significance.

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 Modderfontein 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 18-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 amendment to the Modderfontein Wind Energy Facility without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Modderfontein WEF Part 2 Amendment Application be approved from a transport impact perspective.

REFERENCES

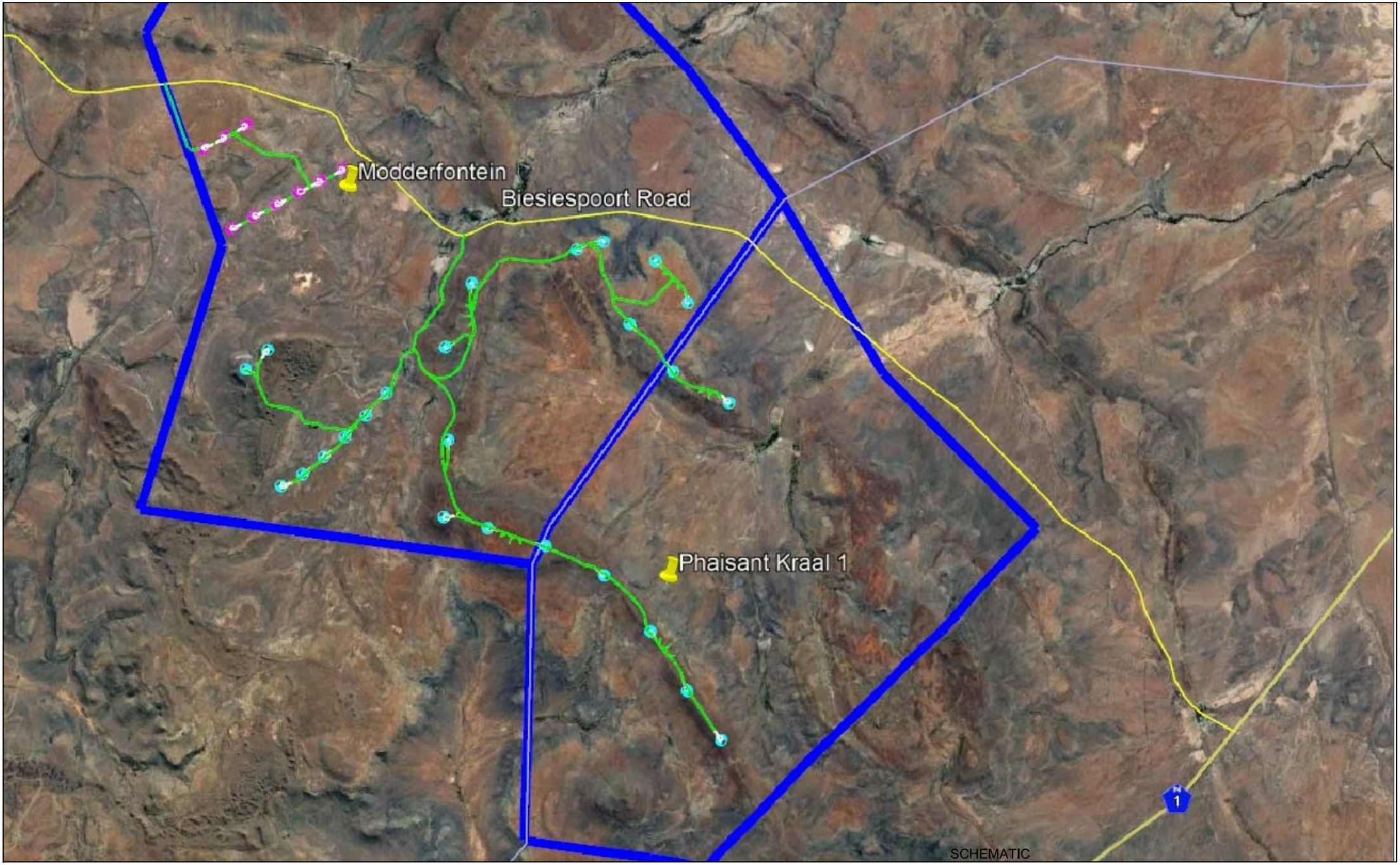
1. Highway Capacity Manual (HCM).
2. Western Cape Government, Access Management Guidelines. 2020
3. Transportation Research Board Highway Capacity Manual, Special Report No. 209. 2000
4. Committee of Transport Officials, South African Trip Data Manual, TMH 17, September 2017
5. Committee of Transport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

Appendix A

Figures

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

G:\4312 TIS Modderfontein WEF\11 Drawings, Figures & GIS\CAD\4312 Modderfontein WEF_LP&SiteLayout_PA_2021-06-21.dwg



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

G:\4312 TIS Modderfontein WEF\11 Drawings, Figures & GIS\CAD\4312 Modderfontein WEF_LP&SiteLayout_PA_2021-06-21.dwg

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

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

PROJECT:	FIGURE:	NUMBER:
MODDERFONTEIN 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

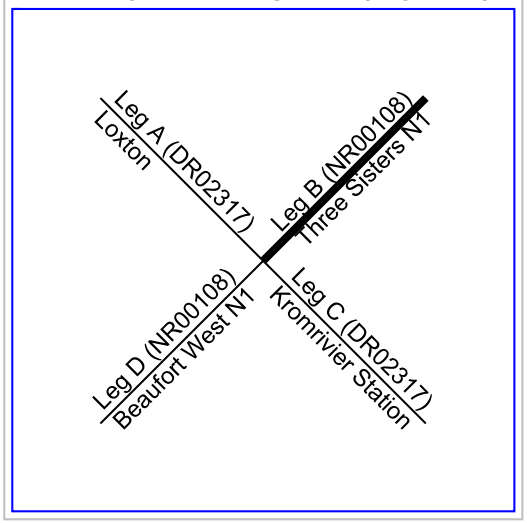
Light	Heavy	Taxis	Buses
1361	**1921**	**54**	**50**

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**

Sketch (Click on Leg to Display Data)



Print

Print

Intersection

Diagram

Growth Rate

Growth Rate Chart

Historical Data 1 of 4

< 2016/09/15 >

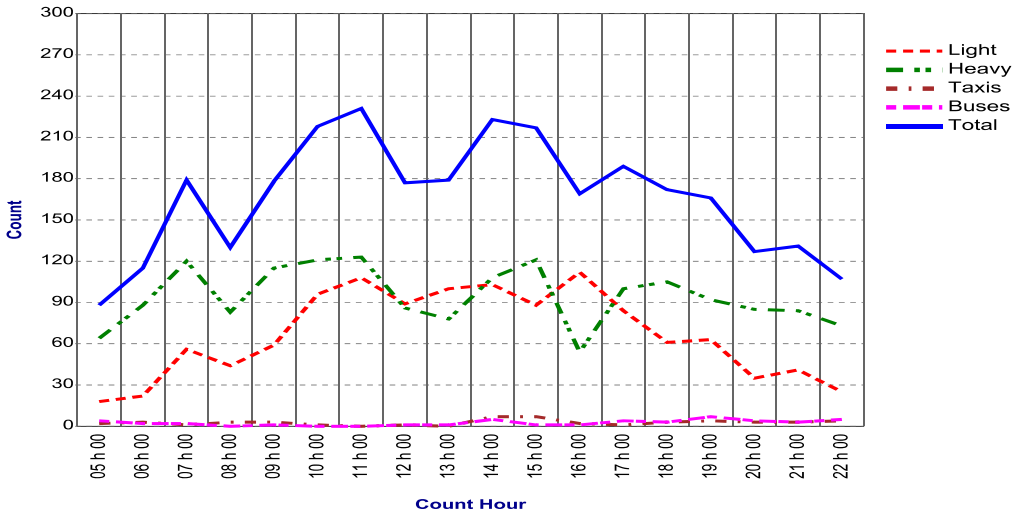
Exit

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**

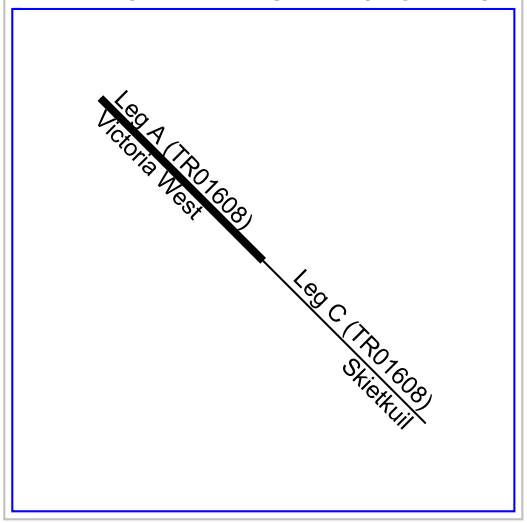
Station AADT's

	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 >

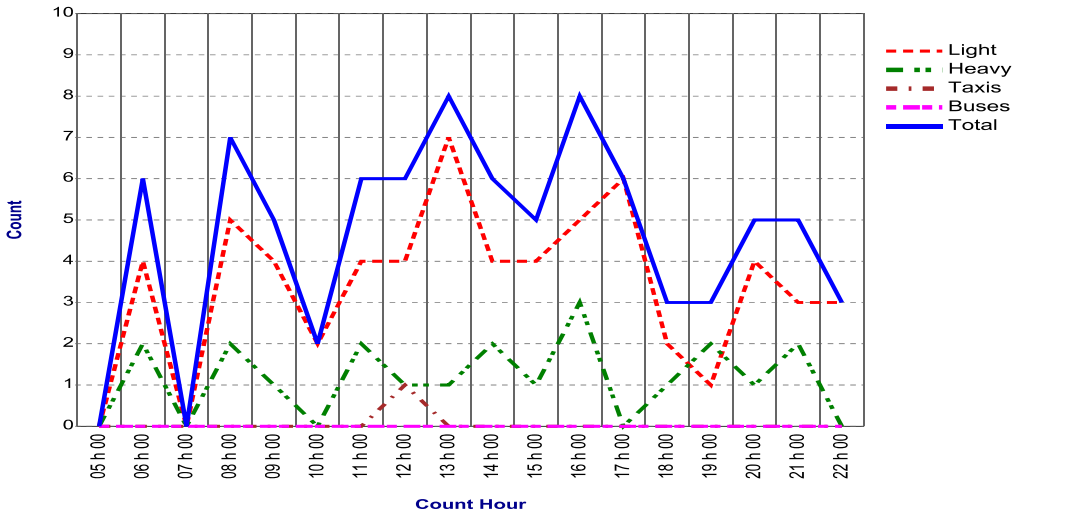
Exit

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**

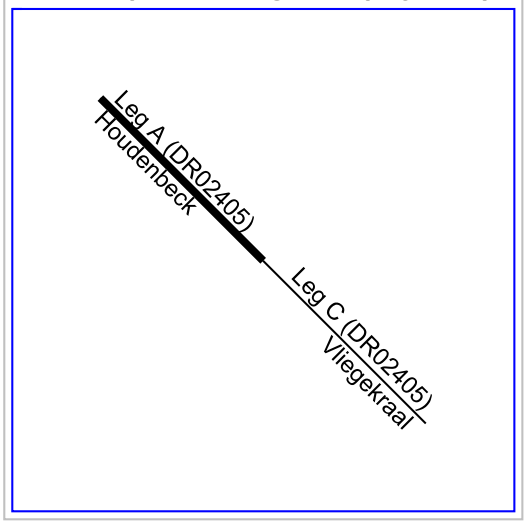
Station AADT's

	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