Mobile: Sam - 072 437 1742
Mobile: Luke - 083 784 1997
Email: info@enviro-insight.co.za
Website: www.enviro-insight.co.za

Appendix D10:
Transport Impact Assessment

INNOVATIVE
TRANSPORT
SOLUTIONS

Transport Impact Assessment

Botterblom Wind Energy Facility

Loeriesfontein, Northern Cape

January 2022

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	Botterblom Wind Energy Facility
Client	Enviro-insight CC
Location	Loeriesfontein, Northern Cape
Project Team	Christoff Krogscheepers, Pr. Eng Pieter Arangie Tarshia Williams
Project Number	ITS 4393
Date	January 2022
Report Status	First Draft
File Name:	G:\4393 TIA Botterblom TIA Loeriesfontein\12 Reports\Issued\4393 TIA Botterblom WEF_FirstDraft_PA_2022-01-05.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

List of Figures

List of Tables

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

It is proposed to develop the Botterblom Wind Energy Facility (WEF) on a farm to the north of Loeriesfontein. This report summarises an investigation of the transport impact related to the construction phase and operational phase of the proposed wind farm and provides mitigation measures where necessary.

2.0 LOCALITY

The Botterblom WEF is located approximately 53km north of the town Loeriesfontein, 87 km west of Brandvlei and 146km south of Pofadder in the Northern Cape. The site can be reached via a gravel Road, Granaatboskolk / Zout Dwaggas Road, which branches off the R357 just outside Loeriesfontein. The wind farm is spread over an area of approximately 5 736 hectares (ha) and will be located on a Portion of the Remainder of the Farm Sous 226. Refer to **Figure 1** in Appendix A for a Locality Plan.

3.0 PROPOSED DEVELOPMENT

The preferred Alternative3 of the Botterblom WEF will consist of up to 54 turbines. The turbines will have a generation capacity of up to 6.5MW each, with a hub height of up to 150m and a rotor diameter of up to 175m. During the screening proses and scoping phase of the project two other alternatives were also evaluated. Alternative 1 have 32 turbines and Alternative 2 have 30 turbines.

Additional ancillary infrastructure to the WEF would include cabling between project components, onsite substation/s, foundations to support turbine towers, internal/ access roads (up to 10 m in width) linking the wind turbines and other infrastructure on the site, and permanent workshop area and office for control, maintenance, and storage. As far as possible, existing roads will be utilised and upgraded (where needed) with the relevant stormwater infrastructure and gates constructed as required. The perimeter of the proposed WEF may be enclosed with suitable fencing. A formal laydown area for the construction period, containing a temporary maintenance and storage building along with a guard cabin will also be established.

Additionally, the Applicant is proposing to construct the associated on-site substation and power line, both with a capacity of up to 132kV. This would feed into the existing national electricity grid at the Helios Main Transmission Substation (MTS) located within the property itself. This associated electrical infrastructure will require a separate Environmental Authorisation and is being conducted as a part of a separate Basic Assessment (BA) process.

The proposed site layouts are illustrated in **Figure 2A, 2B & 2C**.

Components to be imported can be shipped to Coega or Saldanha harbours and then transported by road over between 736 km (Saldanha – Site) and 918 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.

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 Botterblom WEF.

5.0 EXISTING CONDITIONS

Roads included in this study are the National Roads (N1), the R355 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
R27	Provincial Road	120	Paved/Tar
R354/R356	Provincial Road	100	Paved/Tar
R355	Provincial Road	100	Paved/Tar
R357	Provincial Road	100	Paved/Tar
Granaatboskolk / Zout Dwaggas Road	Provincial Road	Not posted Assumed 60	Gravel

5.1 Existing Cross Sections and Surface Conditions

The section of the N1 at the R354 intersection has a typical rural formation of a National Road, paved with one lane per direction of travel and paved shoulders along both sides of the road. The lanes are 3.7m wide with 2m wide shoulders. The typical cross section for the R27, R354 & R356, R355 and the R357 is 3.4m wide lanes with gravel shoulders. The surface condition of the public roads in the site vicinity should be inspected prior to the construction phase and a maintenance agreement should be reached between the developer and the relevant roads authorities to maintain the public roads during the construction phase. 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 volumes along the public roads in the site vicinity are low and well within the capacity of the surrounding road network. The existing traffic volumes will not be any reason for concern in terms of network and intersection capacity.

6.0 SITE ACCESS

Access to the wind turbine locations will be via existing accesses off the Granaatboskolk / Zout Dwaggas Road, as illustrated on the proposed Site Layout Plan **Figure 2** in Appendix A.

The available shoulder sight distances (SSD) along the Granaatboskolk / Zout Dwaggas Road from the different access positions is sufficient. The internal access roads are also illustrated on the proposed Site Layout Plan **Figure 2** in Appendix A.

7.0 TRANSPORT ROUTE

Based on the abnormal load requirements, preliminary routes as outlined in **Figure 3A-3E** are proposed for transporting the large equipment from Coega, Saldanha Bay and Cape Town harbours or the Atlantis industrial area to the site. The Coega route (Figure 3A) is approximately 1 033 km in length, it follows the R334 to Uitenhage and then following the R75 to Kleinpoort, then via the R329 past Mount Stewart, then via R61 to Beaufort West , then south along the N1 pass Laingsburg to the R354, then north via the R354 via Sutherland to Calvinia, then via the R355 passing Calvina to Loeriesfontein and via the grave road, Granaatboskolk / Zout Dwaggas, to the site. A possible alternative to this route is shown in **Figure 3D,** where the route follows the N1 from Beaufort West up to Three Sisters, then north via the N10 to Victoria West and then west along the R63 via Loxton to Carnavon and then west along the R63 to Calvinia. The alternative route via Victoria West is approximately 25km longer than via Laingsburg and Suthrland.

The Saldanha route (**Figure 3B**) is approximately 724 km in length, it follows the R45 and then the R311 to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Wolseley to the N1 at Worcester, then via the N1 to the R354 at Matjiesfontein and then north via the R354 via Sutherland to Calvinia, then via the R355 passing Calvina to Loeriesfontein and via the grave road, Granaatboskolk / Zout Dwaggas, to the site.

The Cape Town route (**Figure 3C**) is approximately 751 km in length, it follows the R27 to Melkbosstrand and then the via the Melkbosstrand Road to the N1, then via the to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Wolseley to the N1 at Worcester, then via the N1 to the R354 at Matjiesfontein and then north via the R354 via Sutherland to Calvinia, then via the R355 passing Calvina to Loeriesfontein and via the grave road, Granaatboskolk / Zout Dwaggas, to the site.

Some tower components can also be manufactured in Atlantis. An alternative route to the Cape Town and Saldanha Bay harbour routes is illustrated in **Figure 3E**. This route follows he R27 north to Langebaan and then 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 Touwsriver, then via the N1 to the R354 at Matjiesfontein and then north via the R354 via Sutherland to Calvinia, then via the R355 passing Calvina to Loeriesfontein and via the grave road, Granaatboskolk / Zout Dwaggas, to the site.

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 2025 Background Traffic Conditions

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 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 44 truckloads will be required for each foundation.

Approximately 100 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 9 abnormal truck loads are required per wind turbine.

8.2.1 Trip Generation

Preferred Alternative 3

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 50 wind turbines will be constructed over an 18-month period. These assumptions are considered a possible worst-case scenario.

Table 2: Expected Generated Truck Trips during the Construction Phase (Preferred Alternative3)

Material	Approximate Number of Trucks loads required
Foundations	2 376
Construction Cranes	100
Tower Sections	162
Nacelles	54
Blades	162
Switch Cabinets	54
TOTAL	**2 908**

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 2 908 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 weekday with approximately 84 trips during the a.m. and p.m. peak hours when workers are dropped off or picked up.

Alternatives 1 & 2

Although the number of turbines is less for Alternative 1 & 2, it is expected that the number of construction staff will be similar for all three alternatives. Based on the number of turbines both Alternative 1 and Alternative 2 can generate approximately 176 motor vehicle and truck trips during the average weekday with approximately 84 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 R354 from the N1. 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 the larger Loeriesfontein and Calvinia area.

8.3 Transport Impact Assessment

8.3.1 Definitions of terminology

Table 3: 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 4** below. This scoring system allows for a comparative, accountable assessment of the indicative cumulative positive or negative impacts of each aspect assessed.

Table 4: 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 will require maintenance to prevent damage to the road structure.

It is recommended that a maintenance agreement is negotiated with the roads authority once the construction time frames has been confirmed and a transport contractor has been appointed. Once construction is completed the Provincial roads should be inspected and repaired where necessary.

The expected trip generation for the preferred Alternative 3 is slightly higher and the construction period might be longer than that of Alternatives 1 & 2. This means that the preferred Alternative 3 will have a higher transport impact than Alternatives 1 & 2. However, in

terms of the higher construction traffic volumes and the longer construction period the slightly higher transport impact associated with Alternative 3 is of low negative significance.

Table 5 below summarises the transport impacts identified and expected as a result of the increase in traffic volumes during the construction phase.

Table 5: Increased Traffic Volumes during Construction Period

IMPACT NATURE	**Increase in traffic volumes on the surrounding road network because 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 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative 3:	3	Preferred Alternative 3:	2
	Alternative 1	3	Alternative 1	2
	Alternative 2	3	Alternative 2	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative 3:	-1	Preferred Alternative 3:	-1
	Alternative 1	-1	Alternative 1	-1
	Alternative 2	-1	Alternative 2	-1
	No-Go Alternative:	-1	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative 3:	**-3**	Preferred Alternative 3:	**-2**
	Alternative 1	**-3**	Alternative 1	**-2**
	Alternative 2	**-3**	Alternative 2	**-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			

Table 5 below summarises the transport impacts identified and expected as a result of accommodating heavy loads during the construction phase.

Table 6: Traffic Impact significance of Heavy Loads during the construction phase

IMPACT NATURE	**Gravel loss and possible damage to the road layer works. because 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 Granaatboskolk / Zout Dwaggas 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 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative 3:	3	Preferred Alternative 3:	2
	Alternative 1	3	Alternative 1	2
	Alternative 2	3	Alternative 2	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative 3:	-2	Preferred Alternative 3:	-1
	Alternative 1	-2	Alternative 1	-1
	Alternative 2	-2	Alternative 2	-1
	No-Go Alternative:	-2	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative 3:	**-6**	Preferred Alternative 3:	**-2**
	Alternative 1	**-6**	Alternative 1	**-2**
	Alternative 2	**-6**	Alternative 2	**-2**
	No-Go Alternative:	**-6**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Resurfacing of sections along Granaatboskolk / Zout Dwaggas, 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 50 people and no additional upgrades are required to accommodate the operational site traffic. **Table 7** summarises the transport impacts identified and expected during the operational phase.

Table 7: Increased Traffic Volumes 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 Granaatboskolk / Zout Dwaggas Road.			
Impact Source(s)	Operational Traffic			
Receptor(s)	General public/Road users			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative 3:	3	Preferred Alternative 3:	2
	Alternative 1	3	Alternative 1	2
	Alternative 2	3	Alternative 2	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative 3:	-1	Preferred Alternative 3:	-1
	Alternative 1	-1	Alternative 1	-1
	Alternative 2	-1	Alternative 2	-1
	No-Go Alternative:	-1	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative 3:	**-3**	Preferred Alternative 3:	**-2**
	Alternative 1	**-3**	Alternative 1	**-2**
	Alternative 2	**-3**	Alternative 2	**-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 Botterblom 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 Granaatboskolk / Zout Dwaggas 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 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative 3:	1	Preferred Alternative 3:	1
	Alternative 1	1	Alternative 1	1
	Alternative 2	1	Alternative 2	1
	No-Go Alternative:	1	No-Go Alternative:	1
PROBABILITY (C)	Preferred Alternative 3:	3	Preferred Alternative 3:	2
	Alternative 1	3	Alternative 1	2
	Alternative 2	3	Alternative 2	2
	No-Go Alternative:	3	No-Go Alternative:	2
INTENSITY OR	Preferred Alternative 3:	-2	Preferred Alternative 3:	-1

MAGNITUDE (D)	Alternative 1	-2	Alternative 1	-1
	Alternative 2	-2	Alternative 2	-1
	No-Go Alternative:	-2	No-Go Alternative:	-1
SIGNIFICANCE RATING (F) = (A*B*D)*C	Preferred Alternative 3:	**-6**	Preferred Alternative 3:	**-2**
	Alternative 1	**-6**	Alternative 1	**-2**
	Alternative 2	**-6**	Alternative 2	**-2**
	No-Go Alternative:	**-6**	No-Go Alternative:	**-2**
CUMULATIVE IMPACTS	Low			
CONFIDENCE	High			
MITIGATION MEASURES	• Resurfacing of sections along Granaatboskolk / Zout Dwaggas 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	**Alternative 1**	**Alternative 2**	**Preferred Alternative 3**
Increase in traffic volumes on the surrounding road network as a result of construction traffic	Low	Low	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	Low	Low
Increase in traffic volumes on the surrounding road network during the operational phase	Low	Low	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 decommissioning phase	Low	Low	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 Botterblom WEF to the north of the town Loeriesfontein. 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.

2025 Background Traffic Conditions

- A growth rate of 3 percent per annum was applied to the existing traffic volumes to determine the 2025 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 for the preferred Alternative 3 could generate up to 182 vehicular trips during the average weekday.

- The expected trip generation for Alternatives 1 & 2 is 176 vehicles per day.
- Access to the site is proposed via existing accesses off the Granaatboskolk / Zout Dwaggas Road.
- It is recommended that a maintenance agreement is negotiated with the roads authority once the construction time frames has been confirmed and a transport contractor has been appointed.
- Once construction is completed the Provincial roads should be inspected and repaired where necessary

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 50 people and therefore no additional upgrades are required to accommodate the operational site traffic.

Development Alternatives

- Alternative 1 has 32 turbines and Alternative 2 has 30 turbines. The expected trip generation for the preferred Alternative 3 is slightly higher and the construction period might be longer than that of Alternatives 1 & 2. This means that the preferred Alternative 3 will have a higher transport impact than Alternatives 1 & 2. However, in terms of the higher construction traffic volumes and the longer construction period the slightly higher transport impact associated with Alternative 3 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 Botterblom 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 proposed Botterblom Wind Energy Facility, without any road upgrades required to the existing road infrastructure. It is recommended that the proposed Botterblom Wind Energy Facility 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:
TIA BOTTERBLOM WEF	LOCALITY PLAN	1

G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_LP&SiteLayout_PA_2021-12-07.dwg

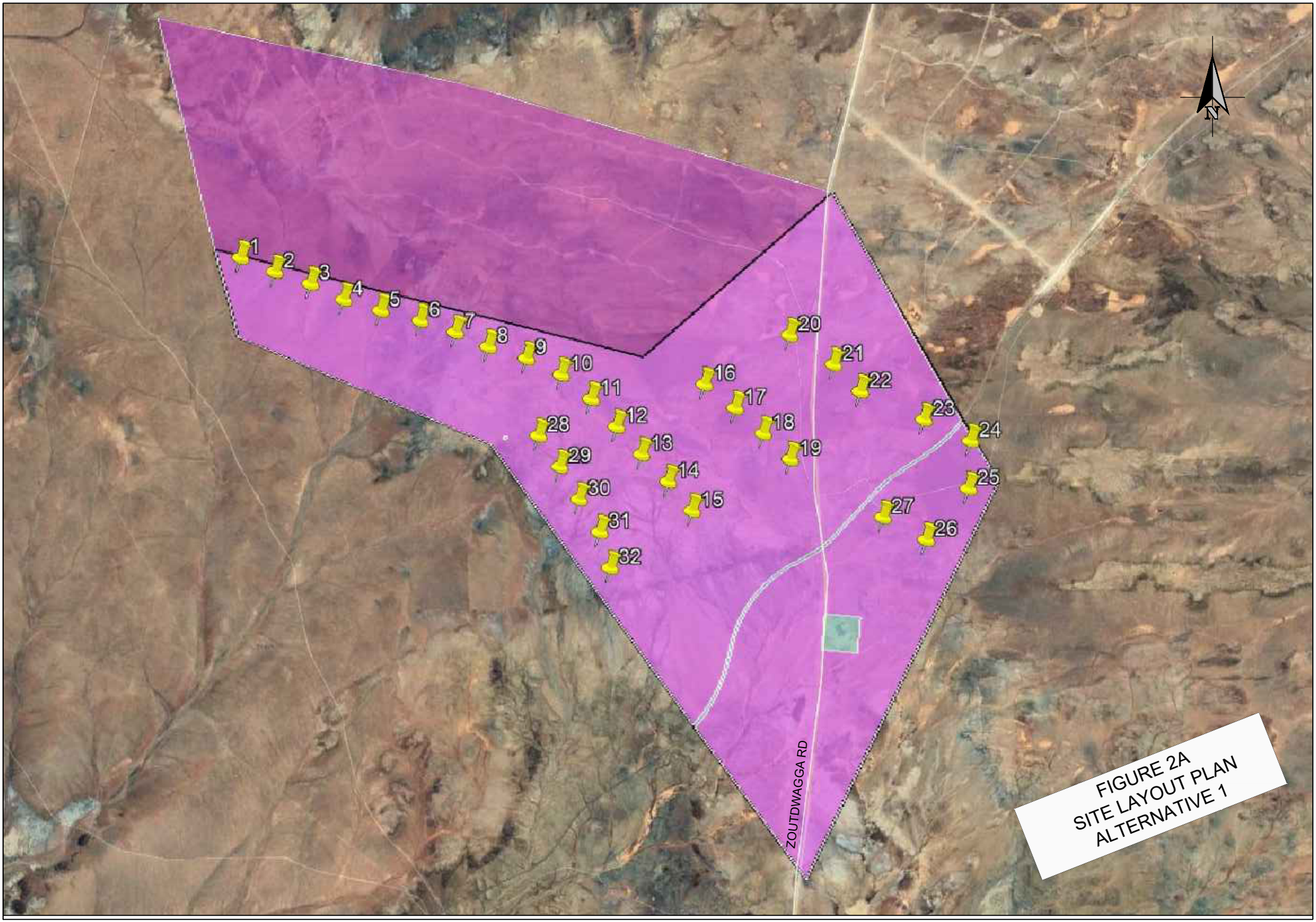
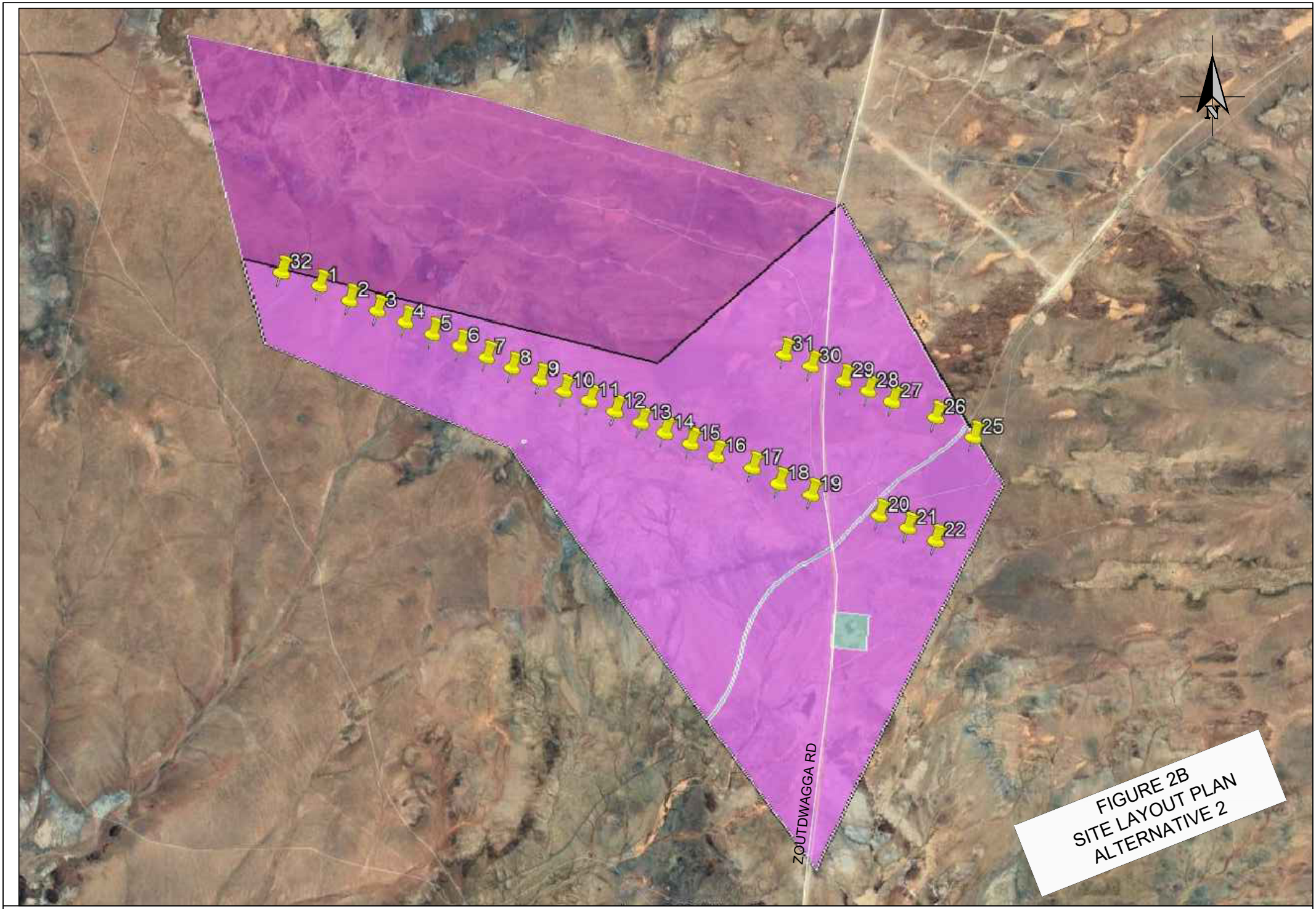
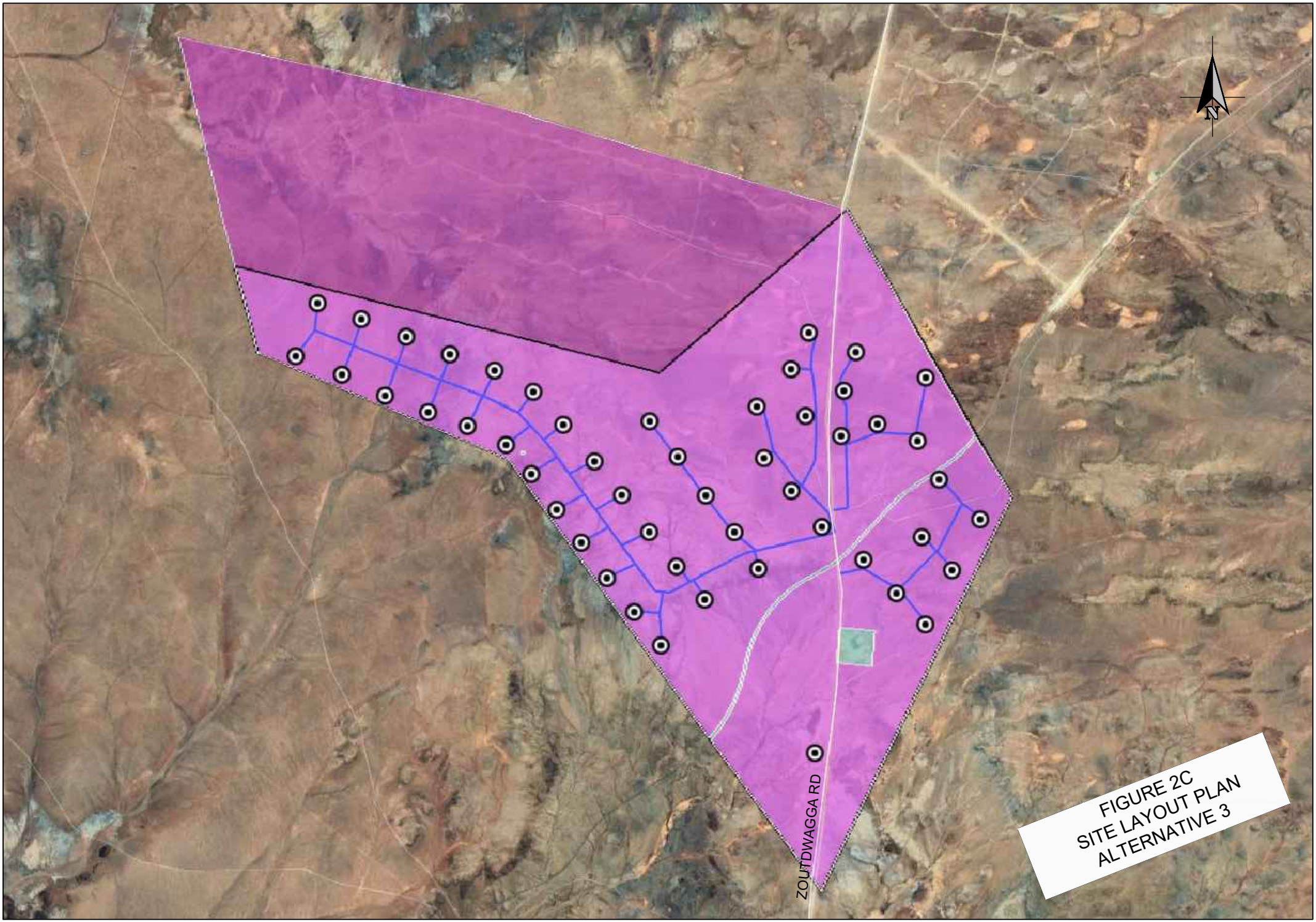


FIGURE 2A
SITE LAYOUT PLAN
ALTERNATIVE 1


32
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
25
26
27
28
29
30
31
N
ZOUTDWAGGA RD
FIGURE 2B
SITE LAYOUT PLAN
ALTERNATIVE 2


N
ZOUTDWAGGA RD
FIGURE 2C
SITE LAYOUT PLAN
ALTERNATIVE 3

PROJECT:	FIGURE:	NUMBER:
LOERIESFONTEIN WEF	RECOMMENDED ABNORMAL LOAD ROUTE COEGA HARBOR TO SITE	3A

G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_AbnormalRoute_PA_2021-12-07.dwg

PROJECT:	FIGURE:	NUMBER:
TIA BOTTERBLOM WEF	RECOMMENDED ABNORMAL LOAD ROUTE SALDANHA BAY HARBOR TO SITE	3B

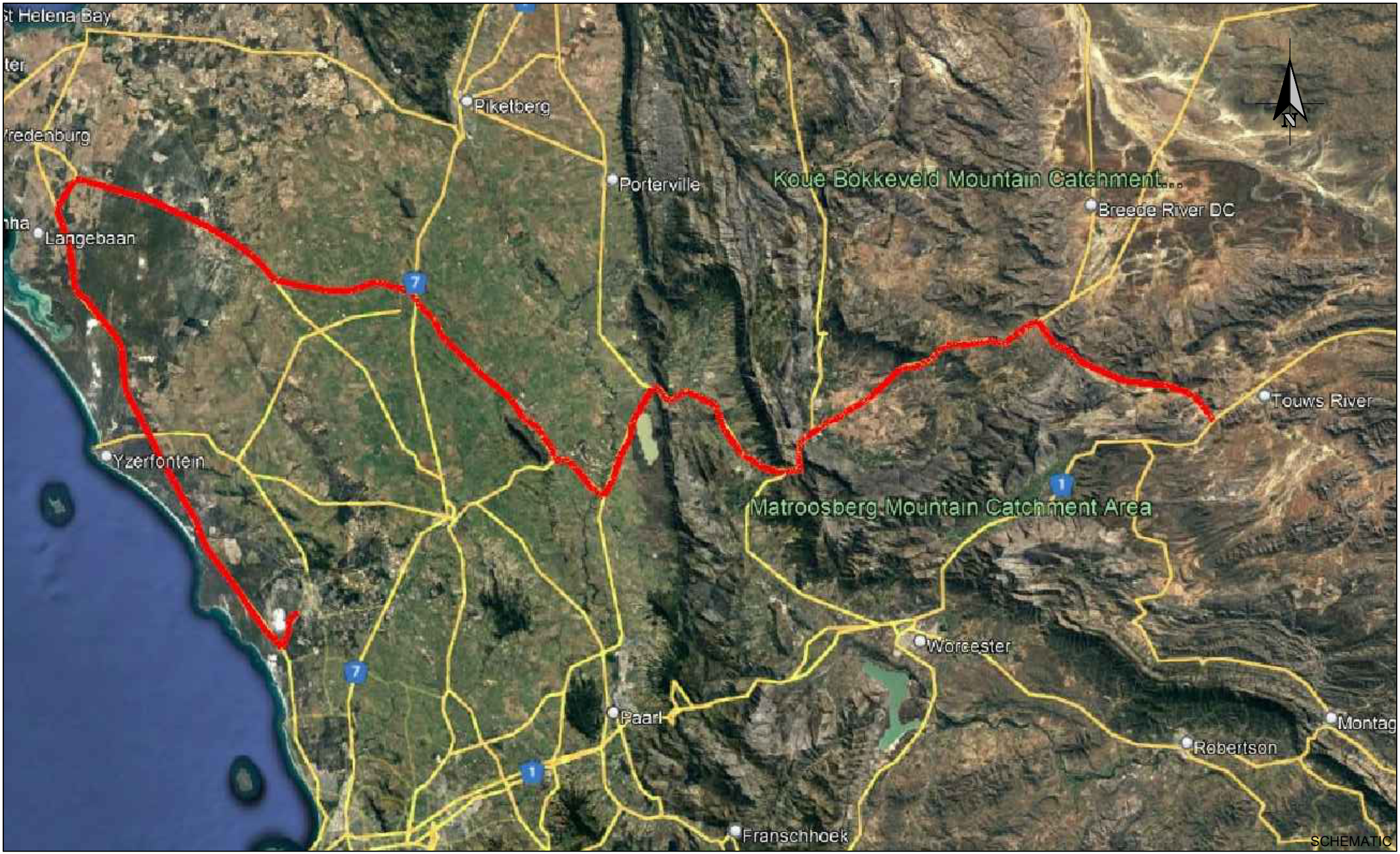
G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_AbnormalRoute_PA_2021-12-07.dwg

PROJECT:	FIGURE:	NUMBER:
TIA BOTTERBLOM WEF	RECOMMENDED ABNORMAL LOAD ROUTE CAPE TOWN HARBOR TO SITE	3C

G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_AbnormalRoute_PA_2021-12-07.dwg

PROJECT:	FIGURE:	NUMBER:
TIA BOTTERBLOM WEF	ABNORMAL LOAD ROUTE VICTORIA WEST ALTERNATIVE	3**D**

G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_AbnormalRoute_PA_2021-12-07.dwg



PROJECT:	FIGURE:	NUMBER:
TIA BOTTERBLOM WEF	ABNORMAL LOAD ROUTE CERES ALTERNATIVE	3**E**

G:\4393 TIA Loeriesfontein WEF\11 Drawings, Figures & GIS\CAD\4393 LOERIESFONTEIN WEF_AbnormalRoute_PA_2021-12-07.dwg

Appendix B

Photographs

Photo 1: Eastbound view along the N1 towards the R354 intersection

Photo 2: Northbound view along the R354 towards Sutherland

Photo 3: Westbound view along R355 towards the Loeriesfontein

Photo 4: Northbound view along Granaatboskolk / Zout Dwaggas Road towards the Site