

## MEMORANDUM

# TRAFFIC IMPACT ASSESSMENT

## PROPOSED SCAFELL CLUSTER SOLAR PV FACILITIES AND GRID CONNECTIONS NEAR SASOLBURG, FREE STATE PROVINCE



**AUGUST 2021**

**Prepared for:**

**SLR Consulting (South Africa) (Pty) Ltd**

**P O Box 1596**

**Cramerview**

**2060**

**SLR Reference: 720.13101.00003**



**Prepared by:**

**Siyazi Gauteng Consulting Services (Pty) Ltd**

**P O Box 71333**

**Willows**

**Gauteng Province**

**0041**

**Siyazi Reference: 20100**




<b>NEMA Regulations (2014) (as amended) - Appendix 6</b>	<b>Relevant section in report</b>
Details of the specialist who prepared the report.	Refer to page IV and attached curriculum vitae.
The expertise of that person to compile a specialist report including a curriculum vitae.	
A declaration that the person is independent in a form as may be specified by the competent authority.	Refer to page III.
An indication of the scope of, and the purpose for which, the report was prepared.	Sections 1.2 to 1.5, Page 4.
An indication of the quality and age of base data used for the specialist report.	Section 5, Page 15.
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change.	Section 6.
The duration date and season of the site investigation and the relevance of the season to the outcome of the assessment.	05 February 2021.
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used.	Section 1.5, Page 5.
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternative.	Section 5.1.4, Page 25.
An identification of any areas to be avoided, including buffers.	Section 5.1.4, Page 25.
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Section 5.1.4, Page 25.
A description of any assumptions made and any uncertainties or gaps in knowledge.	Section 1.6, Page 6.
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	Section 7, Page 70.
Any mitigation measures for inclusion in the EMPr.	Section 7, Page 70.
Any conditions for inclusion in the environmental authorisation.	Section 7, Page 70.
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	None.
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and regarding the acceptability of the proposed activity or activities.	Section 7, Page 70.
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan.	Section 7, Page 70.
A description of any consultation process that was undertaken during the course of preparing the specialist report.	Not relevant.
A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	None.

<b>NEMA Regulations (2014) (as amended) - Appendix 6</b>	<b>Relevant section in report</b>
Any other information requested by the competent authority.	Not relevant.

## Declaration of Independence


I, Leon Roets, hereby declare that Siyazi Gauteng Consulting Services (Pty) Ltd, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

Consultant name: Leon Roets

Signature: 

Date: 12 August 2021

**VERIFICATION PAGE**

<b>PROJECT NAME:</b>	PROPOSED SCAFELL CLUSTER SOLAR PV FACILITIES AND GRID CONNECTIONS NEAR PARYS, FREE STATE PROVINCE	
<b><u>Project No:</u></b> 20100	<b><u>Date:</u></b> August 2021	<b><u>Report Status:</u></b> Final F1-0
<b><u>Prepared by:</u></b>  Siyazi Gauteng Consulting Services (Pty) Ltd. P O BOX 71333 Willows Gauteng Province 0041		<b><u>Commissioned by:</u></b>  SLR Consulting (South Africa) (Pty) Ltd P O Box 1596 Cramerview 2060
<b><u>Author:</u></b>  Paul van der Westhuizen		<b><u>Report reviewed by and compiled under the supervision of:</u></b>  Leon Roets (Pr Eng) Professional Number: 960547
<b><u>Contact information:</u></b> Cell: +27 79 690 8069 Email: paul@siyazi.co.za		<b><u>Contact information:</u></b> Cell: +27 82 371 0253 Email: leon@siyazi.co.za
<b><u>Declaration by registered professional:</u></b>		
The undersigned has been appointed as the registered professional for this Traffic Impact Assessment and has applied due diligence to the content of this report and endeavoured to ensure that the TIS is free of technical errors and takes full responsibility for its contents.		
<b>Name:</b>	Leon Roets	
<b>Address:</b>	Plot 22 Doornbult, Polokwane, Limpopo Province	
<b>Contact Details:</b>	Cell: +27 82 371 0253 Email: leon@siyazi.co.za	
<b>Qualifications:</b>	B Eng (Civil Eng.)	
<b>ECSA Registration Number:</b>	960547 (Attached to report)	
<b>Signature:</b>		

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	XV
<b>1. INTRODUCTION TO THE PROPOSED DEVELOPMENT.....</b>	<b>2</b>
1.1 INTRODUCTION TO THE PROPOSED DEVELOPMENT.....	2
1.2 STUDY OBJECTIVES .....	4
1.3 SCOPE OF WORK .....	4
1.4 DESCRIPTION OF ANTICIPATED VEHICLE TRAFFIC RELATED ACTIVITIES .....	4
1.5 APPROACH AND METHODOLOGY.....	4
1.6 LIMITATIONS AND ASSUMPTIONS .....	6
<b>2. APPLICABLE LEGAL FRAMEWORK.....</b>	<b>6</b>
<b>3. GENERAL PROJECT DESCRIPTION .....</b>	<b>7</b>
<b>4. PROJECT SITE SPECIFIC BASELINE DESCRIPTION AND DETAILED INFORMATION RELATED TO DATA COLLECTED .....</b>	<b>4</b>
4.1 SCAFELL BASELINE DESCRIPTION.....	4
4.1.1 Scafell solar PV Facility.....	4
4.1.2 Scafell solar PV Grid Connection.....	4
4.2 DAMLAAGTE BASELINE DESCRIPTION .....	9
4.2.1 Damlaagte solar PV Facility.....	9
4.2.2 Damlaagte solar PV Grid Connection .....	9
4.3 VLAKFONTEIN BASELINE DESCRIPTION .....	11
4.3.1 Vlakfontein solar PV Facility.....	11
4.3.2 Vlakfontein solar PV Grid Connection.....	11
4.4 ILIKWA BASELINE DESCRIPTION .....	13
4.4.1 Ilikwa solar PV Facility.....	13
4.4.2 Ilikwa solar PV Grid Connection.....	13
<b>5. DETAILED INFORMATION RELATED TO DATA COLLECTED AND INVESTIGATIONS RELEVANT TO THE PROPOSED DEVELOPMENT .....</b>	<b>15</b>
5.1.1 STATUS QUO OF LAND USE, AS WELL AS ROAD NETWORK CHARACTERISTICS .....	15
5.1.2 FUTURE LAND USE AND ROAD CHARACTERISTICS .....	22
5.1.3 Access to and from the Proposed Development.....	23
5.1.4 Sensitive road sections and intersections related to existing and future conditions .....	25
5.1.5 Information requested by relevant road authority .....	30
5.1.6 Other traffic-related matters .....	30
<b>6. TRAFFIC IMPACT ASSESSMENT .....</b>	<b>33</b>
6.1 TRAFFIC IMPACT RELATED ASSESSMENT WITHOUT THE PROPOSED DEVELOPMENT (SCENARIOS 1 AND 2).....	36
6.1.1 Approved latent developments included as part of assessment.....	36
6.1.2 Total traffic expected at the relevant intersections as part of background traffic and proposed latent developments .....	36
6.1.3 Determination of the Levels of Service at the relevant intersections as part of background traffic and proposed latent developments .....	36
6.1.4 Summary of recommended intersection improvements (mitigating measures) as part of background traffic and proposed latent developments .....	37

6.2	TRAFFIC IMPACT RELATED ASSESSMENT FOR THE PROPOSED SOLAR PV FACILITIES AND GRID CONNECTIONS INDIVIDUALLY (SCENARIOS 3 AND 4).....	40
6.2.1	<i>DETERMINATION OF VEHICLE TRIPS EXPECTED TO BE GENERATED DUE TO THE PROPOSED SOLAR PV FACILITIES AND GRID CONNECTIONS INDIVIDUALLY .....</i>	<i>40</i>
6.2.2	<i>DETERMINATION OF THE TOTAL TRAFFIC EXPECTED TO BE GENERATED AT THE RELEVANT INTERSECTIONS AS PART OF EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY .....</i>	<i>43</i>
6.2.3	<i>DETERMINATION OF THE LEVELS OF SERVICE AT THE RELEVANT INTERSECTIONS AS PART OF EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY .....</i>	<i>43</i>
6.2.4	<i>SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS (MITIGATING MEASURES) RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY .....</i>	<i>47</i>
6.2.5	<i>IMPACT SIGNIFICANCE RATINGS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY .....</i>	<i>52</i>
6.3	TRAFFIC IMPACT RELATED ASSESSMENT FOR THE PROPOSED DEVELOPMENT (ALL SITES CUMALITIVELY (SCENARIOS 5 AND 6).....	55
6.3.1	<i>Determination of vehicle trips expected to be generated due to the Proposed Development and Grid Connections cumulatively .....</i>	<i>55</i>
6.3.2	<i>Determination of the total traffic expected to be generated at the relevant intersections as part of the Proposed Development and Grid Connections cumulatively.....</i>	<i>58</i>
6.3.3	<i>Determination of the levels of service at the relevant intersections as part of the Proposed Development and Grid Connections cumulatively .....</i>	<i>58</i>
6.3.4	<i>Summary of recommended intersection improvements (mitigating measures) as part of the Proposed Development and Grid Connections cumulatively .....</i>	<i>62</i>
6.3.4	<i>IMPACT SIGNIFICANCE RATINGS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY.....</i>	<i>67</i>
<b>7.</b>	<b>SUMMARY OF FINDINGS AND RECOMMENDATIONS.....</b>	<b>70</b>
7.1	FINDINGS .....	70
7.1.1	<i>Traffic impact during the respective phases .....</i>	<i>70</i>
7.1.2	<i>Site accessibility.....</i>	<i>71</i>
7.1.3	<i>Sensitive road sections as without and with the Proposed Development and Grid Connections....</i>	<i>73</i>
7.2	RECOMMENDATIONS .....	73
7.2.1	<i>Summary of recommended intersection improvements (mitigating measures) as part of background traffic and proposed latent developments .....</i>	<i>73</i>
7.2.2	<i>Summary of recommended intersection improvements (mitigating measures) relevant to each Solar PV Facility and Grid Connection individually .....</i>	<i>76</i>
7.2.3	<i>Summary of recommended intersection improvements (mitigating measures) as part of the Proposed Development and Grid Connections cumulatively .....</i>	<i>82</i>
7.3	INSTITUTIONAL ARRANGEMENTS .....	87
7.4	CONCLUSION AND REASONED OPINION FOR AUTHORISATION.....	87
7.5	REFERENCES.....	87

## **APPENDICES**

- APPENDIX A:** INFORMATION RELATED TO STATUS QUO
- APPENDIX B:** TRIP INFORMATION RELATED TO THE EXISTING TRAFFIC
- APPENDIX C:** SIDRA CALCULATION RESULTS
- APPENDIX D:** LEVEL OF SERVICE CRITERIA
- APPENDIX E:** IMPACT RATING CRITERIA
- APPENDIX F:** SITE INSPECTION CONDITION OF SECONDARY ROAD S171
- APPENDIX G:** PROFESSIONAL REGISTRATION AND CURRICULUM VITAE

## **LIST OF ASSUMPTIONS**

**SECTION 1.6, PAGE 6:**      LIMITATIONS AND ASSUMPTIONS



## **LIST OF FIGURES**

- FIGURE 1.1:** LOCALITY OF THE PROPOSED DEVELOPMENT AND RELEVANT INTERSECTIONS UNDER INVESTIGATION
- FIGURE 4.1:** GRAPHICAL PRESENTATION OF THE RELEVANT PROPOSED SCAFELL PV FACILITY, GRID CONNECTION, AND RELEVANT BROADER ROAD NETWORK FROM WHERE ACCESS IS PROPOSED
- FIGURE 4.2:** GRAPHICAL PRESENTATION OF THE RELEVANT PROPOSED DAMLAAGTE PV FACILITY, GRID CONNECTION, AND RELEVANT BROADER ROAD NETWORK FROM WHERE ACCESS IS PROPOSED
- FIGURE 4.3:** GRAPHICAL PRESENTATION OF THE RELEVANT PROPOSED VLAKFONTEIN PV FACILITY, GRID CONNECTION, AND RELEVANT BROADER ROAD NETWORK FROM WHERE ACCESS IS PROPOSED
- FIGURE 4.4:** GRAPHICAL PRESENTATION OF THE RELEVANT PROPOSED ILIKWA PV FACILITY, GRID CONNECTION, AND RELEVANT BROADER ROAD NETWORK FROM WHERE ACCESS IS PROPOSED
- FIGURE 5.1:** EXISTING ROAD NETWORK LAYOUT
- FIGURE 5.2:** HOURLY TRAFFIC PATTERN PER 15-MINUTE INTERVAL FOR ALL MODES OF VEHICLES (06:00 to 18:00)
- FIGURE 5.3:** GRAPHICAL PRESENTATION OF THE RELEVANT SECTION OF ROAD S171 FROM WHERE ACCESS TO AND FROM THE PROPOSED DEVELOPMENT WAS DEEMED ACCEPTABLE
- FIGURE 5.4:** SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED DEVELOPMENT WITHOUT BACKGROUND MITIGATION MEASURES
- FIGURE 5.4:** SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED DEVELOPMENT WITH BACKGROUND MITIGATION MEASURES
- FIGURE 5.5:** SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITH THE PROPOSED DEVELOPMENT WITH BACKGROUND MITIGATION MEASURES
- FIGURE 6.1:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND TRAFFIC AND APPROVED LATENT DEVELOPMENTS
- FIGURE 6.2:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)
- FIGURE 6.3:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)

- FIGURE 6.4:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)
- FIGURE 6.5:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 2)
- FIGURE 7.1:** GRAPHICAL PRESENTATION OF THE RELEVANT SECTION OF ROAD S171 FROM WHERE ACCESS TO AND FROM THE PROPOSED DEVELOPMENT WAS DEEMED ACCEPTABLE
- FIGURE 7.2:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND TRAFFIC AND APPROVED LATENT DEVELOPMENTS
- FIGURE 7.3:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)
- FIGURE 7.4:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)
- FIGURE 7.5:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)
- FIGURE 7.6:** GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 2)
- FIGURE A-1:** RELEVANT MOVEMENTS RELATED TO TRAFFIC COUNTS
- FIGURE B-1:** 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT
- FIGURE B-2:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITHOUT THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT
- FIGURE B-3:** PROJECTED 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) WITH THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT **(SCENARIO 1)**
- FIGURE B-4:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC WITH GROWTH FACTOR APPLIED) WITH THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT **(SCENARIO 2)**
- FIGURE B-5:** ANTICIPATED VEHICLE TRIP DISTRIBUTION RELEVANT TO ALL SITES OF THE PROPOSED DEVELOPMENT (ACCESS ALTERNATIVE 1)
- FIGURE B-6:** ANTICIPATED VEHICLE TRIP DISTRIBUTION RELEVANT TO ALL SITES OF THE PROPOSED DEVELOPMENT (ACCESS ALTERNATIVE 2)

- FIGURE B-7:** ANTICIPATED VEHICLE TRIPS TO BE GENERATED RELEVANT TO EACH SITE INDIVIDUALLY OF THE PROPOSED DEVELOPMENT (ACCESS ALTERNATIVE 1)
- FIGURE B-8:** ANTICIPATED VEHICLE TRIPS TO BE GENERATED RELEVANT TO EACH SITE INDIVIDUALLY OF THE PROPOSED DEVELOPMENT (ACCESS ALTERNATIVE 2)
- FIGURE B-9:** PROJECTED 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 3-1**) (ACCESS ALTERNATIVE 1)
- FIGURE B-10:** PROJECTED 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 3-2**) (ACCESS ALTERNATIVE 2)
- FIGURE B-11:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 4-1**) (ACCESS ALTERNATIVE 1)
- FIGURE B-12:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 4-2**) (ACCESS ALTERNATIVE 2)
- FIGURE B-13:** ANTICIPATED VEHICLE TRIPS TO BE GENERATED RELEVANT TO THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)
- FIGURE B-14:** ANTICIPATED VEHICLE TRIPS TO BE GENERATED RELEVANT TO THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 2)
- FIGURE B-15:** PROJECTED 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (CONSTRUCTION PHASE) (**SCENARIO 5-1**) (ACCESS ALTERNATIVE 1)
- FIGURE B-16:** PROJECTED 2021 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (CONSTRUCTION PHASE) (**SCENARIO 5-2**) (ACCESS ALTERNATIVE 2)
- FIGURE B-17:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (CONSTRUCTION PHASE) (**SCENARIO 6-1**) (ACCESS ALTERNATIVE 1)
- FIGURE B-18:** PROJECTED 2026 PEAK HOUR TRAFFIC (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (CONSTRUCTION PHASE) (**SCENARIO 6-2**) (ACCESS ALTERNATIVE 2)

## LIST OF TABLES

<b>TABLE 3.1:</b>	SCAFELL CLUSTER PROJECT TECHNICAL DETAILS FOR THE SOLAR PV FACILITIES
<b>TABLE 3.2:</b>	SCAFELL CLUSTER PROJECT TECHNICAL DETAILS FOR THE GRID CONNECTION INFRASTRUCTURE
<b>TABLE 5.1:</b>	SUMMARY OF INTERSECTION CONTROL AT INTERSECTIONS UNDER INVESTIGATION
<b>TABLE 5.2:</b>	SUMMARY OF ROAD CHARACTERISTICS
<b>TABLE 5.3.1:</b>	RURAL FUNCTIONAL ROAD CLASSIFICATION (COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)
<b>TABLE 5.3.2:</b>	RURAL ACCESS MANAGEMENT REQUIREMENTS AND FEATURES (COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)
<b>TABLE 5.4</b>	PEAK HOUR PERIODS AT THE RELEVANT INTERSECTION
<b>TABLE 5.5:</b>	DETAILED INFORMATION RELATED TO SENSITIVITY OF RELEVANT ROAD SECTIONS AND INTERSECTIONS
<b>TABLE 5.6:</b>	SUMMARY OF OTHER TRAFFIC-RELATED MATTERS
<b>TABLE 6.1:</b>	SUMMARY OF THE RELEVANT TRAFFIC RELATED INFORMATION FOR EACH PROPOSED SITE
<b>TABLE 6.2:</b>	NUMBER OF VEHICLE TRIPS WHICH ARE ANTICIPATED TO BE GENERATED BY THE PROPOSED PURE SOURCE MINE
<b>TABLE 6.3:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND VEHICLE TRAFFIC AND APPROVED LATENT DEVELOPMENTS (SCENARIOS 1 AND 2)
<b>TABLE 6.4:</b>	ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED CONSTRUCTION ACTIVITIES ASSOCIATED WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY
<b>TABLE 6.5:</b>	ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED OPERATIONAL ACTIVITIES ASSOCIATED WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY
<b>TABLE 6.6:</b>	AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (UTILISING ACCESS ALTERNATIVE 1)
<b>TABLE 6.7:</b>	AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (UTILISING ACCESS ALTERNATIVE 2)
<b>TABLE 6.8:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)

<b>TABLE 6.9:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)
<b>TABLE 6.10:</b>	IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITHOUT EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY
<b>TABLE 6.11:</b>	IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (WITH BACKGROUND MITIGATION MEASURES AND RECOMMENDED INTERSECTION GEOMETRY IMPROVEMENTS AT POINTS B AND C)
<b>TABLE 6.12:</b>	ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY
<b>TABLE 6.13:</b>	ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED OPERATIONAL ACTIVITIES ASSOCIATED WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY
<b>TABLE 6.14:</b>	AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS AS PART OF THE DAMLAAGTE SOLAR PV FACILITY (ACCESS ALTERNATIVE 1)
<b>TABLE 6.15:</b>	AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS AS PART OF THE DAMLAAGTE SOLAR PV FACILITY (ACCESS ALTERNATIVE 2)
<b>TABLE 6.16:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)
<b>TABLE 6.17:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 2)
<b>TABLE 6.18:</b>	IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS
<b>TABLE 6.19:</b>	IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (WITH BACKGROUND MITIGATION MEASURES AND RECOMMENDED INTERSECTION GEOMETRY IMPROVEMENTS AT POINTS B AND C)
<b>TABLE 7.1:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND VEHICLE TRAFFIC AND APPROVED LATENT DEVELOPMENTS (SCENARIOS 1 AND 2)
<b>TABLE 7.2:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)
<b>TABLE 7.3:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)
<b>TABLE 7.4:</b>	RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE

PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)

- TABLE 7.5:** RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 2)
- TABLE C-1.1:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITHOUT** THE PROPOSED DEVELOPMENT (**SCENARIO 1**)
- TABLE C-1.2:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITHOUT** THE PROPOSED DEVELOPMENT (**SCENARIO 2**)
- TABLE C-2.1:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 3-1**)
- TABLE C-2.2:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 3-2**)
- TABLE C-2.3:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 4-1**)
- TABLE C-2.4:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** ONE OF THE PROPOSED SITES (CONSTRUCTION PHASE) (RELEVANT TO ALL SITES INDIVIDUALLY) (**SCENARIO 4-2**)
- TABLE C-3.1:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (**SCENARIO 5-1**)
- TABLE C-3.2:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2021 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (**SCENARIO 5-2**)
- TABLE C-3.3:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (**SCENARIO 6-1**)
- TABLE C-3.4:** LEVELS OF SERVICE FOR VARIOUS APPROACHES FOR THE YEAR 2026 (BACKGROUND TRAFFIC) **WITH** THE PROPOSED PURE SOURCE MINE **WITH** THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (**SCENARIO 6-2**)

## EXECUTIVE SUMMARY

The purpose of the traffic impact assessment for the Proposed Scafell Cluster Solar PV Facilities and Grid Connections is to determine the potential impact of vehicle traffic that could be generated by the Proposed Development on the existing adjacent road network and other intersections that could be affected by the potential vehicle traffic, and to determine measures required and to make recommendations in order to mitigate the impact that the potential vehicle traffic could have on the existing road network.

In order to determine the status quo of the existing adjacent road network and intersections in terms of vehicle traffic volumes and road safety, data was collected by means of manual vehicle traffic counts at potentially affected intersections as well as a visual inspection of the existing relevant road network and potential affected intersections by means of a site visit. Furthermore, data was gathered with regards to the potential staff compliment, timeline, and phases of the Proposed Development which in turn was used to determine the potential vehicle traffic that could be generated during existing peak vehicle traffic times.

Ultimately all the gathered information as mentioned above, and presented in this report, was evaluated from a traffic engineering point of view to determine requirements and recommendations to mitigate the potential impact on the adjacent road network and intersections due to potential vehicle traffic generated by the Proposed Development.

The following findings came out of the study:

- a) Safe and reliable access from the public road network (Road S171 and Boundary Road) can be provided to and from the Proposed Development via a proposed access intersection on either Road S171 and/or Boundary Road.
- b) The relevant road network and intersections potentially affected is currently operating at acceptable levels of service and would remain acceptable with the operations of the Proposed Development as long as the required and recommended mitigation measures as presented in this report are implemented.
- c) Vehicle capacity on relevant road network is available and would be able to accommodate the potential vehicle traffic to be generated by the Proposed Development.

In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd. is of the opinion that the Proposed Development and Grid Connections would have a manageable impact on the relevant roads network, regardless of whether one site is constructed and operated at a time or all sites are constructed and operated at the same time, as long as the mitigation measures are implemented as recommended in this report. In this case it is therefore recommended that authorisation be granted.

Recommended mitigation measures as part of the existing road network not related to the Proposed Development are as follows:

- a) Geometric upgrading at **Point A** (Intersection of Boundary Road and Road S171) would be required from a road safety perspective, regardless of latent approved developments (Pure Source Mine) or the Proposed Development, with specific reference to a dedicated right-turn lane on the northern approach of Boundary Road.
- b) No further geometric upgrading would be required at the relevant intersections under investigation from an intersection capacity point of view.
- c) All relevant intersections investigated as part of this study are currently operating at acceptable levels of service and would remain so without any development in the area and a steady growth in background vehicle traffic of 3% per annum.
- d) Road S171 would require repairing and rehabilitation in order to mitigate the existing deteriorating roadway and the impact that the deteriorating roadway has on all existing developments and any future developments within the area, regardless of the proposed Pure Source Mine and the Proposed Development.

Recommended mitigation measures as part of the Proposed Development are as follows:

- a) No additional geometric upgrading at **Point A** would be required as long as the recommended dedicated right-turn lane is provided, which is recommended as part of the scenarios without the Proposed Development (Scenarios 1 and 2).
- b) The intersection of Road S171 and the Proposed Development Access Road 1 (**Point B**), should this proposed access point be utilised, would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- c) The intersection of Boundary Road and the Proposed Development Access Road 2 (**Point C**), should this proposed access point be utilised, would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- d) Reserve capacity is available at the relevant intersections on the existing road network.
- e) The anticipated vehicle traffic to be generated by the Proposed Development and Grid Connections during the construction phase would have a manageable impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.
- f) The anticipated vehicle traffic to be generated by the Proposed Development for each proposed site individually or cumulatively would have an insignificant impact on the existing road network with reference to road capacity, road safety and intersection performance for the operational phase.



## 1. INTRODUCTION TO THE PROPOSED DEVELOPMENT

Section 1 provides a broad introduction to the Proposed Development, study objectives, scope of work, description of vehicle related traffic anticipated to be generated by the Proposed Development, approach and methodology, and any limitations and assumptions.

The following sections elaborate on the last mentioned.

### 1.1 INTRODUCTION TO THE PROPOSED DEVELOPMENT

Siyazi Gauteng Consulting Services (Pty) Ltd. was appointed by SLR Consulting (South Africa) (Pty) Ltd. to conduct a Traffic Impact Assessment (TIA) for four proposed renewable energy facility projects and the associated grid connections (collectively referred to as the “Scafell Cluster”). The proposed Scafell Cluster, hereafter as part of this report referred to as the Proposed Development, is proposed to be situated near Sasolburg within the Ngwathe Local Municipality, Free State Province. The Proposed Development entails the construction and operation of renewable energy facilities, which comprise of three separate 150 MW and one 100 MW solar photovoltaic (PV) facilities and associated grid connection infrastructure. The Proposed Development will thus have a total generating capacity of up to 550 MW, and the grid connection infrastructure for each solar PV facility will have a capacity of up to 33 / 132 kV. The grid connection infrastructure will comprise of an overhead double circuit transmission line and switching station that will facilitate the grid connection between each solar PV facility and the ESKOM Scafell Main Transmission Substation (MTS) – the grid connection point for the Proposed Development. The proposed four facilities would individually be known as:

- a) Damlaagte Solar PV Facility.
- b) Scafell Solar PV Facility.
- c) Vlakfontein Solar PV Facility.
- d) Ilikwa Solar PV Facility.

The project site of the Proposed Development is within the Central Strategic Transmission Corridor – a node for the development and expansion of large-scale electricity / grid connection infrastructure, i.e., power lines and substations, etc. Existing grid connection infrastructure within the vicinity of the project site of the Proposed Development include the following:

- a) Scafell Main Transmission Substation.
- b) Mercury – Zeus 765 kV Power Line.
- c) Olympus – Scafell 1 275 kV Power Line.
- d) Scafell – Snowdon 1 275 kV Power Line.
- e) Makalu – Scafell 1 275 kV Power Line.

All the above-mentioned power lines connect to the ESKOM Scafell MTS located 2 km south – east of the project site of the Proposed Development. The grid connection infrastructure associated with the proposed project would either be a direct connection or loop in / loop out connections into existing transmission lines where possible. Thus, each of the solar energy projects and the associated grid connections will consist of the following infrastructure components:

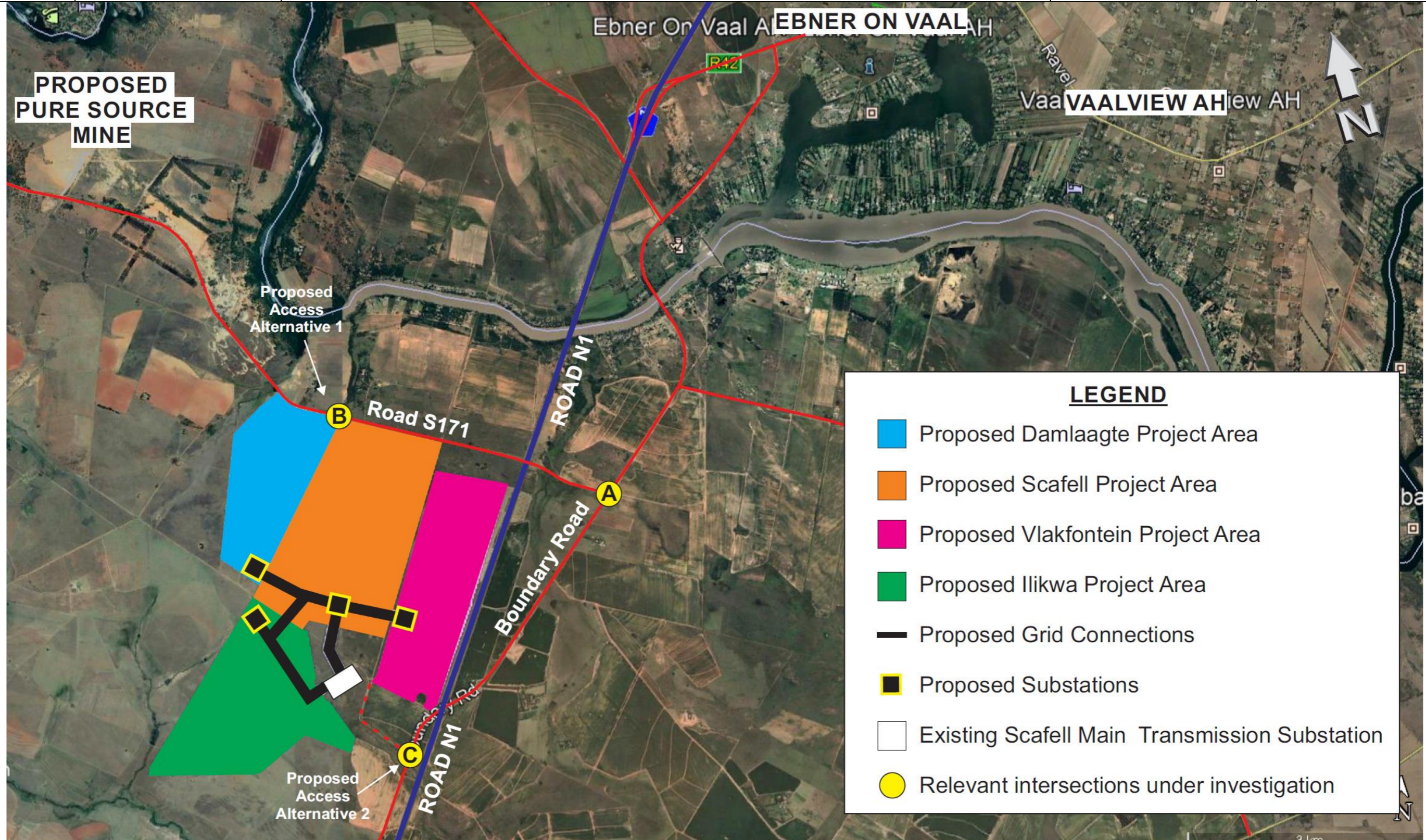
- Bifacial / monofacial photovoltaic modules (mono-crystalline, poly-crystalline, or thin-film modules).
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations.
- Inverters and transformers that will be housed with an inverter station located within the array field.
- Internal cabling and string boxes.
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers.
- Medium voltage receiving station(s).
- Workshops & warehouses.
- One on-site high-voltage substation with high-voltage power transformers.
- Up to four (4) 132 kV circuits and associated transmission lines from the various facility substations to the Eskom Scafell MTS located nearby.
- A battery storage facility (comprising Lithium-ion, or Redox flow batteries) may be constructed.
- Electrical system and UPS (Uninterruptible Power Supply) devices.
- Lighting system.
- Grounding system.
- Internal roads.
- Fencing of the site and alarm and video-surveillance system.

The purpose of this study is to assess the implications of the vehicular traffic that could potentially be generated due to the Proposed Development, for each proposed facility and grid connection individually, and all four proposed facilities and grid connections collectively. The assessment would therefore also determine:

- a) The traffic impact that the change in land use would have on the road and transport-related infrastructure.
- b) Whether it is possible to accommodate the Proposed Development within acceptable norms from a traffic-engineering point of view.
- c) The mitigating measures required to accommodate the Proposed Development within acceptable traffic-engineering norms.

**Figure 1.1** provides the locality of the Proposed Development in relation to other activities in the vicinity, including the location of the intersections under investigation as part of this study.

POINT	INTERSECTION STATUS	INTERSECTION	GPS CO-ORDINATES	
			LATITUDE	LONGITUDE
A	Existing	Boundary Road and Road S171	S 26°47'30.07"	E 27°40'16.73"
B	Proposed	Road S171 and Proposed Development Access Road 1 (Access Alternative 1)	To be determined as part of detail design phase	
C	Proposed / Existing	Boundary Road and Proposed Development Access Road 2 (Access Alternative 2)	S 26°49'13.66"	E 27°38'48.23"



**FIGURE 1.1: LOCALITY OF THE PROPOSED DEVELOPMENT AND RELEVANT INTERSECTIONS UNDER INVESTIGATION**

## 1.2 STUDY OBJECTIVES

The purpose of this study is to undertake an assessment of the implications of the vehicular traffic that could potentially be generated due to the Proposed Development for each site individually and all sites cumulatively and determine:

- a) The traffic impact that the change in land use would have on road- and transport-related infrastructure.
- b) Whether it is possible to accommodate the Proposed Development within acceptable norms from a traffic engineering point of view.
- c) The mitigation measures required to accommodate the Proposed Development within acceptable traffic engineering norms.

## 1.3 SCOPE OF WORK

The scope of work for the Proposed Development included the following:

- a) Gather all vehicle traffic related data for identified intersections that could potentially be affected by the Proposed Development.
- b) Gather all information for the Proposed Development in terms of potential heavy vehicle delivering construction materials, staff compliment, timeline, and relevant phases.
- c) Investigate existing road network adjacent the Proposed Development by means of a site visit.
- d) Conduct calculations to determine the potential number of vehicle trips anticipated to be generated by the Proposed Development for each individual site and all sites cumulatively during vehicle peak times.
- e) Conduct detailed intersection performance evaluations for determined intersections (Micro simulation).
- f) Determine mitigation measures in order to mitigate the potential impact of the Proposed Development on the adjacent roads network.

## 1.4 DESCRIPTION OF ANTICIPATED VEHICLE TRAFFIC RELATED ACTIVITIES

The following vehicle traffic related activities are anticipated by the Proposed Development:

- a) Delivery of construction materials during the construction phase.
- b) Transportation of waste materials created due to construction off site to registered waste disposal sites.
- c) Delivery of consumables during the construction and operational phases.
- d) Transport of workers to and from the Proposed Development via taxi or private transport during the construction and operational phases.

## 1.5 APPROACH AND METHODOLOGY

In order to determine the status quo of the existing adjacent road network and intersections in terms of vehicle traffic volumes and road safety, data was collected by means of manual vehicle traffic counts at potentially affected intersections and visual inspection of the existing relevant road network and potential affected intersections by means of a site visit, which was conducted on 5 February 2021.

Furthermore, data was gathered with regards to the potential construction activities, staff compliment, timeline, and relevant phases of the Proposed Development which in turn was used to determine the potential vehicle traffic that could be generated during existing vehicle traffic peak times. Ultimately all the gathered information, as presented in this report, was evaluated from a traffic engineering point of view to determine requirements and recommendations to mitigate the potential impact on the adjacent road network and intersections potentially affected by the Proposed Development.

For the purpose of this study the following intersections were investigated:

- a) **Point A**: Intersection of Boundary Road and Road S171.
- b) **Point B**: Intersection of Road S171 and the Proposed Development Access Road (Access Alternative 1).
- c) **Point C**: Intersection of Boundary Road and the Proposed Development Access Road (Access Alternative 2).

The following scenarios were investigated as part of the traffic impact assessment:

- a) **Scenario 1**: 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **without** the Proposed Development.
- b) **Scenario 2**: Projected 2026 peak hour traffic (background traffic with growth factor applied) **with** the proposed Pure Source Mine **without** the Proposed Development.
- c) **Scenario 3-1**: Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with access from the Proposed Access Alternative 1 (**Point B**) (Construction Phase) (Relevant to all sites individually).
- d) **Scenario 3-2**: Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with access from the Proposed Access Alternative 2 (**Point C**) (Construction Phase) (Relevant to all sites individually).
- e) **Scenario 4-1**: Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with access from the Proposed Access Alternative 1 (**Point B**) (Construction Phase) (Relevant to all sites individually).
- f) **Scenario 4-2**: Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with access from the Proposed Access Alternative 2 (**Point C**) (Construction Phase) (Relevant to all sites individually).

- g) **Scenario 5-1:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with access from the Proposed Access Alternative 1 (**Point B**) (Construction Phase) (All sites Cumulatively).
- h) **Scenario 5-2:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with access from the Proposed Access Alternative 2 (**Point C**) (Construction Phase) (All sites Cumulatively).
- i) **Scenario 6-1:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with access from the Proposed Access Alternative 1 (**Point B**) (Construction Phase) (All sites Cumulatively).
- j) **Scenario 6-2:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with access from the Proposed Access Alternative 2 (**Point C**) (Construction Phase) (All sites Cumulatively).

## 1.6 LIMITATIONS AND ASSUMPTIONS

The relevant road sections and intersections investigated as part of the Proposed Development were limited to the road network adjacent the Proposed Development site where intersections could be affected. As part of the traffic impact assessment, it was assumed that:

- a) Vehicle traffic growth related to non-proposed development related vehicle traffic (background vehicle traffic) would be 3% per annum between 2021 and 2026.
- b) Maximum vertical clearances for abnormal loads would be assessed by the relevant transportation company for the relevant routes to be travelled.
- c) The transportation of the imported elements will occur on surfaced national and provincial roads, or on existing gravel roads (where possible).
- d) Where possible, construction materials will be sourced locally.

## 2. APPLICABLE LEGAL FRAMEWORK

The Committee of Transport Officials (COTO) provides guidelines on the traffic related requirements which have been adopted by all relevant road authorities and municipalities. The Traffic Impact Assessment was prepared according to the guidelines as far as practically possible. The Proposed Development would gain access from and to public roads via a proposed new access intersection and it would therefore be required to obtain approval for all new intersections from the Free State Department of Police, Roads and Transport as part of the detailed design phase and it would also be required that approval be obtained for any work that might be conducted within road reserves.

As part of the transportation of components that are classified as abnormal loads, the relevant permits as stipulated by the Department of Transport would need to be obtained by the relevant transport company.

### 3. GENERAL PROJECT DESCRIPTION

The proposed projects entail the construction and operation of four (4) solar photovoltaic (PV) facilities and associated grid connections within the Ngwathe Local Municipality of the Free State Province. The proposed solar energy projects consist of the following:

- a) Scaffell Solar PV Facility located on Portion 3 of the Farm Willow Grange 246.
- b) Damlaagte Solar PV Facility located on the Remaining Extent of the Farm Damlaagte 229.
- c) Vlakfontein Solar PV Facility located on Portion 6 of the Farm Vlakfontein 161.
- d) Ilikwa Solar PV Facility located on Portion 5 of the Farm Proceederfontein 100.

Each of the project sites are located adjacent to one another and are situated approximately 19 km west of Sasolburg and 22 km north-east of Parys. Each project will require a Battery Energy Storage System (BESS) and grid connection infrastructure (i.e. power line and collector substation, etc.) in order to facilitate the grid connection between each solar PV facility and the Scaffell Substation.

**TABLE 3.2** and Error! Reference source not found. include technical information associated with the Proposed Development. The anticipated operational life of the proposed development is approximately 20 years. Beyond this period, the Proposed Development may continue to operate subject to further approvals or be decommissioned.

**TABLE 3.2: SCAFELL CLUSTER PROJECT TECHNICAL DETAILS FOR THE SOLAR PV FACILITIES**

Component	Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
Farm name & portion number:	Damlaagte 229 Remaining Extent	Willow Grange 246 Portion 3	Vlakfontein 161 Portion 6	Proceederfontein 100 Portion 5
Property size:	282.22 ha	521.05 ha	299.95 ha	276.86 ha
Project Site size:	173 ha	361 ha	255 ha	195 ha
Development footprint size:	166 ha	257 ha	203 ha	180 ha
Centre coordinates of site:	26°47'29.47"S 27°37'43.58"E	26°47'46.97"S 27°38'20.00"E	26°48'10.41"S 27°39'0.92"E	26°48'55.45"S 27°37'35.52"E
Capacity	Up to 150 MW <sub>ac</sub>	Up to 150 MW <sub>ac</sub>	Up to 150 MW <sub>ac</sub>	Up to 100 MW <sub>ac</sub>
Installed PV panel height	Up to 3 m			
Number of PV panels	Up to 304 452	Up to 304 252	Up to 304 252	Up to 154 440
IPP Substation capacity	Up to 33 kV / 132 kV			
Substation footprint	Up to 2.5 ha			
Grid Connection	<ul style="list-style-type: none"> <li>132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell ESKOM MTS</li> </ul>	<ul style="list-style-type: none"> <li>132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS</li> </ul>	<ul style="list-style-type: none"> <li>132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS</li> </ul>	<ul style="list-style-type: none"> <li>132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS</li> </ul>
Grid Connection Corridor Length & Width	<ul style="list-style-type: none"> <li>Up to 2.5 km long and 150 m (and up to 500 m wide at the footprint of each Switching Station)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 2.2 km long and 150 m (and up to 500 m wide at the footprint of each Switching Station)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 3.0 km long and 150 m (and up to 500 m wide at the footprint of each Switching Station)</li> </ul>	<ul style="list-style-type: none"> <li>Up to 2.3 km long and 150 m (and up to 500 m wide at the footprint of each Switching Station)</li> </ul>
BESS footprint	Up to 2 ha			
BESS technology	Lithium-ion or Redox Flow Batteries			
Size of laydown area	Up to 3 ha			
Operation and maintenance buildings	<ul style="list-style-type: none"> <li>Offices</li> <li>Operations and Control Centre</li> <li>Operation and Maintenance Area / Warehouse / Workshop</li> <li>Ablution Facilities</li> <li>Security and Guard House</li> </ul>			
Main access road	Gravel, 2.5 km long and up to 12 m wide			
Internal access road	Gravel, 12 km long and 5 m wide			



**TABLE 3.2: SCAFELL CLUSTER PROJECT TECHNICAL DETAILS FOR THE GRID CONNECTION INFRASTRUCTURE**

Component	Damlaagte Solar PV Facility Grid Connection	Scafell Solar PV Facility Grid Connection	Vlakfontein Solar PV Facility Grid Connection	Ilikwa Solar PV Facility Grid Connection
<b>Property details:</b>	Damlaagte 229 Remaining Extent Willow Grange 246 Portion 3 Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Willow Grange 246 Portion 3 Damlaagte 229 Remaining Extent Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Vlakfontein 161 Portion 6 Willow Grange 246 Portion 3 Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Proceederfontein 100 Portion 5 Willow Grange 246 Portion 3 Scafell 448 Remaining Extent
<b>Grid connection corridor length and width:</b>	<b>Alternative 1 (Preferred):</b> 150 m wide and up to 2.0 km long  <b>Alternative 2:</b> 150 m wide and up to 2.5 km long	<b>Alternative 1 (Preferred):</b> 150 m wide and up to 0.9 km long  <b>Alternative 2:</b> 150 m wide and up to 5 km long	<b>Alternative 1 (Preferred):</b> 150 m wide and up to 2.0 km long  <b>Alternative 2:</b> 150 m wide and up to 3.0 km long	<b>Alternative 1 (Preferred):</b> 150 m wide and up to 2.3 km long  <b>Alternative 2:</b> 150 m wide and up to 1.4 km long
<b>Servitude width:</b>	Up to 31 m			
<b>Switching Station capacity:</b>	33 / 132 kV			
<b>Transmission Line capacity:</b>	Up to 132 kV			
<b>Transmission Line length:</b>	Up to 2 km	Up to 0.9 km	Up to 2.0 km	Up to 2.3 km
<b>Transmission Line pylons:</b>	Monopole or Lattice pylons, or a combination of both where required.			
<b>Transmission line pylon height:</b>	Up to 40 m			
<b>Access to transmission servitude:</b>	A 12 m wide jeep track will be required and constructed during the construction phase of the proposed Project. Existing roads and jeep tracks within existing servitudes in the study area will be used as far as possible to gain access to the grid connection corridor during the construction and operation phase of the proposed Project.			

## 4. PROJECT SITE SPECIFIC BASELINE DESCRIPTION AND DETAILED INFORMATION RELATED TO DATA COLLECTED

### 4.1 SCAFELL BASELINE DESCRIPTION

#### 4.1.1 Scafell solar PV Facility

The proposed Scafell solar PV Facility is proposed to be located on Portion 3 of the Farm Willow Grange 246 which is located on the central portion of the overall proposed Scafell Cluster development and would preferably gain access from Boundary Road by means of an existing access intersection (**Point C**), Access Alternative 2. The preferred access to the proposed Scafell solar PV Facility is envisaged to also provide access to the proposed Damlaagte solar PV Facility, although a worst-case approach was adopted where it might be that all four proposed facilities would share the proposed Access Alternative 1 (**Point B**) along Road S171, or the potential access, Access Alternative 2, along Boundary Road (**Point C**).

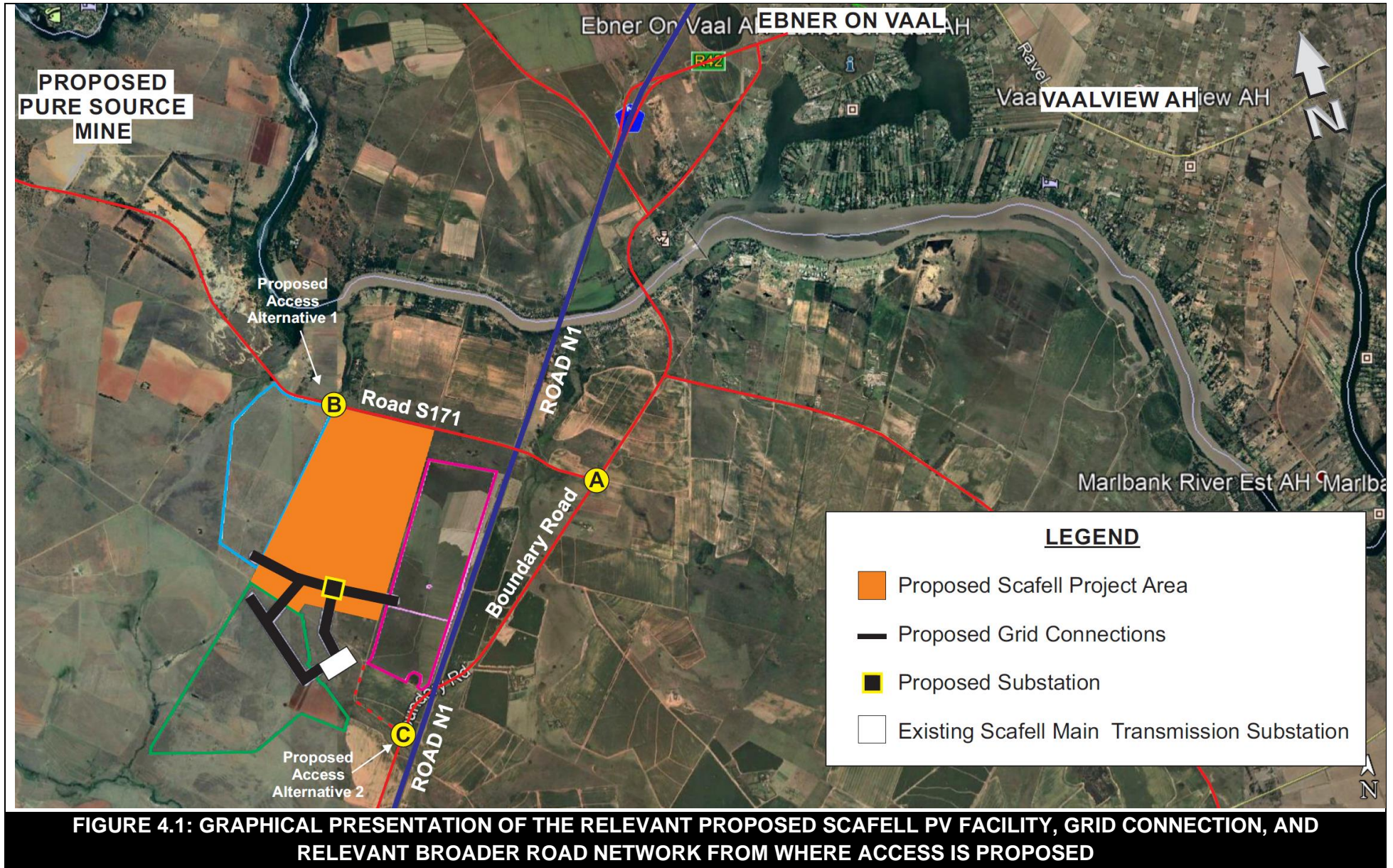
#### 4.1.2 Scafell Solar PV Grid Connection

The proposed Scafell solar PV Facility Grid Connection is proposed to comprise of either 132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS. Refer to TABLE 3.2 for the details of the two (2) alternatives proposed for the grid connection.

During the construction phase of the proposed Scafell Solar PV Facility and Grid Connection, it is estimated that approximately 230 workers will be employed which would range from unskilled to skilled workers. No workers will be housed on site and will be accommodated in nearby towns. During the construction phase, which is envisaged to be for approximately 12 to 18 months, up to 2 000 heavy vehicles are expected to deliver construction materials, which would be in the region of 10 to 20 deliveries per day. Other activities which are also anticipated to contribute to the generation of heavy vehicle traffic would be the waste management where waste created from construction activities will be trucked off site. It is anticipated that this would result in a maximum of one heavy vehicle per day.

During the operational phase of the proposed Scafell solar PV Facility and Grid Connection, it is estimated that approximately 17 workers will be employed for the maintenance, operations, and safe keeping of the facility.

**Figure 4.1** provides a graphical presentation of the relevant proposed Scafell solar PV Facility, Grid Connection, and relevant broader road network from where access is proposed.



## 4.2 DAMLAAGTE BASELINE DESCRIPTION

### 4.2.1 Damlaagte Solar PV Facility

The proposed Damlaagte solar PV Facility is proposed to be located on the Remaining Extent of the Farm Damlaagte 229 which is located on the western portion of the overall proposed Scafell Cluster development and would preferably gain access from Boundary Road by means of an existing access intersection (**Point C**), Access Alternative 2. The preferred access to the proposed Damlaagte Solar PV Facility is envisaged to also provide access to the proposed Scafell Solar PV Facility, although a worst-case approach was adopted where it might be that all four proposed facilities would share the proposed Access Alternative 1 (**Point B**) along Road S171, or the potential access, Access Alternative 2, along Boundary Road (**Point C**).

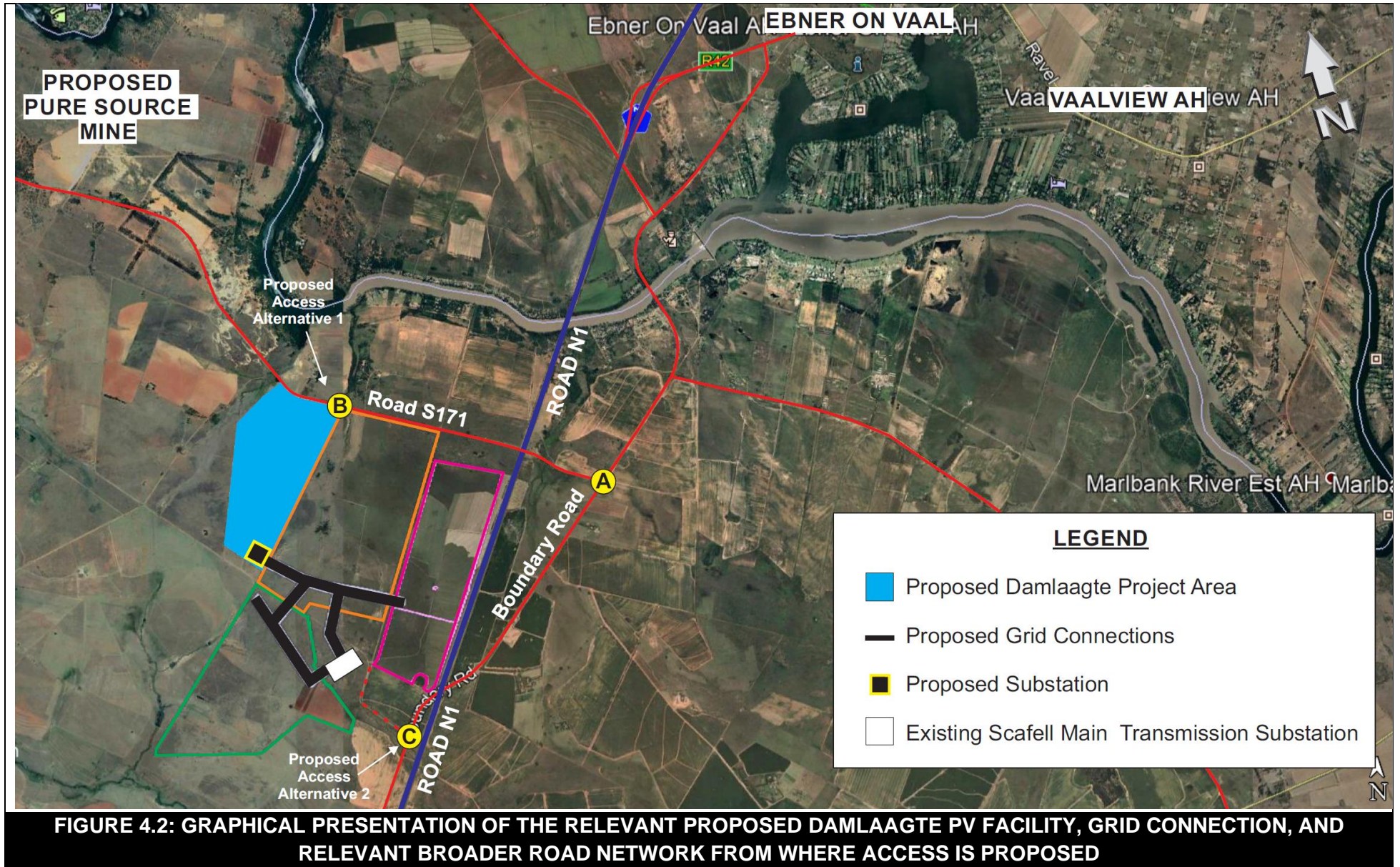
### 4.2.2 Damlaagte Solar PV Grid Connection

The proposed Damlaagte solar PV Facility Grid Connection is proposed to comprise of a 132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS. Refer to TABLE 3.2 for the details of the two (2) alternatives proposed for the grid connection.

During the construction phase of the proposed Damlaagte Solar PV Facility and Grid Connection, it is estimated that approximately 230 workers will be employed which would range from unskilled to skilled workers. No workers will be housed on site and will be accommodated in nearby towns. During the construction phase, which is envisaged to be for approximately 12 to 18 months, up to 2 000 heavy vehicles are expected to deliver construction materials, which would be in the region of 10 to 20 deliveries per day. Other activities which are also anticipated to contribute to the generation of heavy vehicle traffic would be the waste management where waste created from construction activities will be trucked off site. It is anticipated that this would result in a maximum of one heavy vehicle per day.

During the operational phase of the proposed Damlaagte Solar PV Facility and Grid Connection, it is estimated that approximately 17 workers will be employed for the maintenance, operations, and safe keeping of the facility.

**Figure 4.2** provides a graphical presentation of the relevant proposed Damlaagte solar PV Facility, Grid Connection, and relevant broader road network from where access is proposed.



## 4.3 VLAKFONTEIN BASELINE DESCRIPTION

### 4.3.1 Vlakfontein Solar PV Facility

The proposed Vlakfontein solar PV Facility is proposed to be located on Portion 6 of the Farm Vlakfontein 161 which is located on the eastern portion of the overall proposed Scafell Cluster development and would preferably gain access from Boundary Road by means of an existing intersection (**Point C**), Access Alternative 2, the preferred option for the proposed project. The preferred access to the proposed Vlakfontein Solar PV Facility is envisaged to also provide access to the proposed Ilikwa Solar PV Facility and the Scafell Solar PV Facility, although a worst-case approach was adopted where it might be that all four proposed facilities would share the proposed Access Alternative 2 (**Point C**) along Boundary Road, or another potential access, Access Alternative 1, along Road S171 (**Point B**).

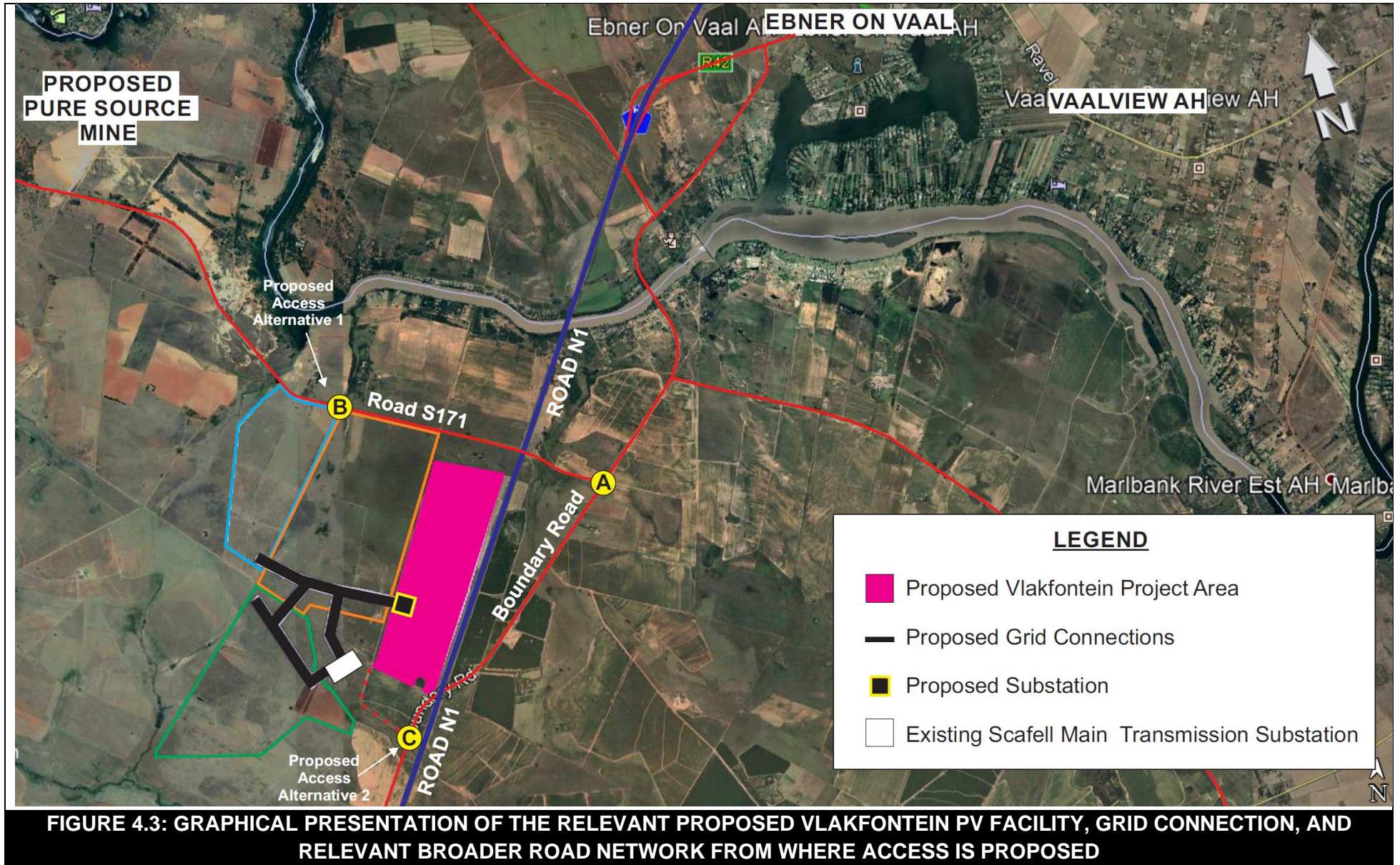
### 4.3.2 Vlakfontein Solar PV Grid Connection

The proposed Vlakfontein solar PV Facility Grid Connection is proposed to comprise of a 132 kV power line from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS. Refer to TABLE 3.2 for the details of the two (2) alternatives proposed for the grid connection.

During the construction phase of the proposed Vlakfontein solar PV Facility and Grid Connection, it is estimated that approximately 230 workers will be employed which would range from unskilled to skilled workers. No workers will be housed on site and will be accommodated in nearby towns. During the construction phase, which is envisaged to be for approximately 12 to 18 months, up to 2 000 heavy vehicles are expected to deliver construction materials, which would be in the region of 10 to 20 deliveries per day. Other activities which are also anticipated to contribute to the generation of heavy vehicle traffic would be the waste management where waste created from construction activities will be trucked off site. It is anticipated that this would result in a maximum of one heavy vehicle per day.

During the operational phase of the proposed Vlakfontein Solar PV Facility and Grid Connection, it is estimated that approximately 17 workers will be employed for the maintenance, operations, and safe keeping of the facility.

**Figure 4.3** provides a graphical presentation of the relevant proposed Vlakfontein solar PV Facility, Grid Connection, and relevant broader road network from where access is proposed.



## 4.4 ILIKWA BASELINE DESCRIPTION

### 4.4.1 Ilikwa Solar PV Facility

The proposed Ilikwa solar PV Facility is proposed to be located on Portion 5 of the Farm Proceedfontein 100 which is located on the southern portion of the overall proposed Scafell Cluster development and would preferably gain access from Boundary Road by means of an existing intersection (**Point C**), Access Alternative 2, the preferred option for the proposed project. The preferred access to the proposed Ilikwa Solar PV Facility is envisaged to also provide access to the proposed Vlakfontein Solar PV Facility and Scafell Solar PV Facility, although a worst-case approach was adopted where it might be that all four proposed facilities would share the proposed Access Alternative 2 (**Point C**) along Boundary Road, or another potential access, Access Alternative 1, along Road S171 (**Point B**).

### 4.4.2 Ilikwa Solar PV Grid Connection

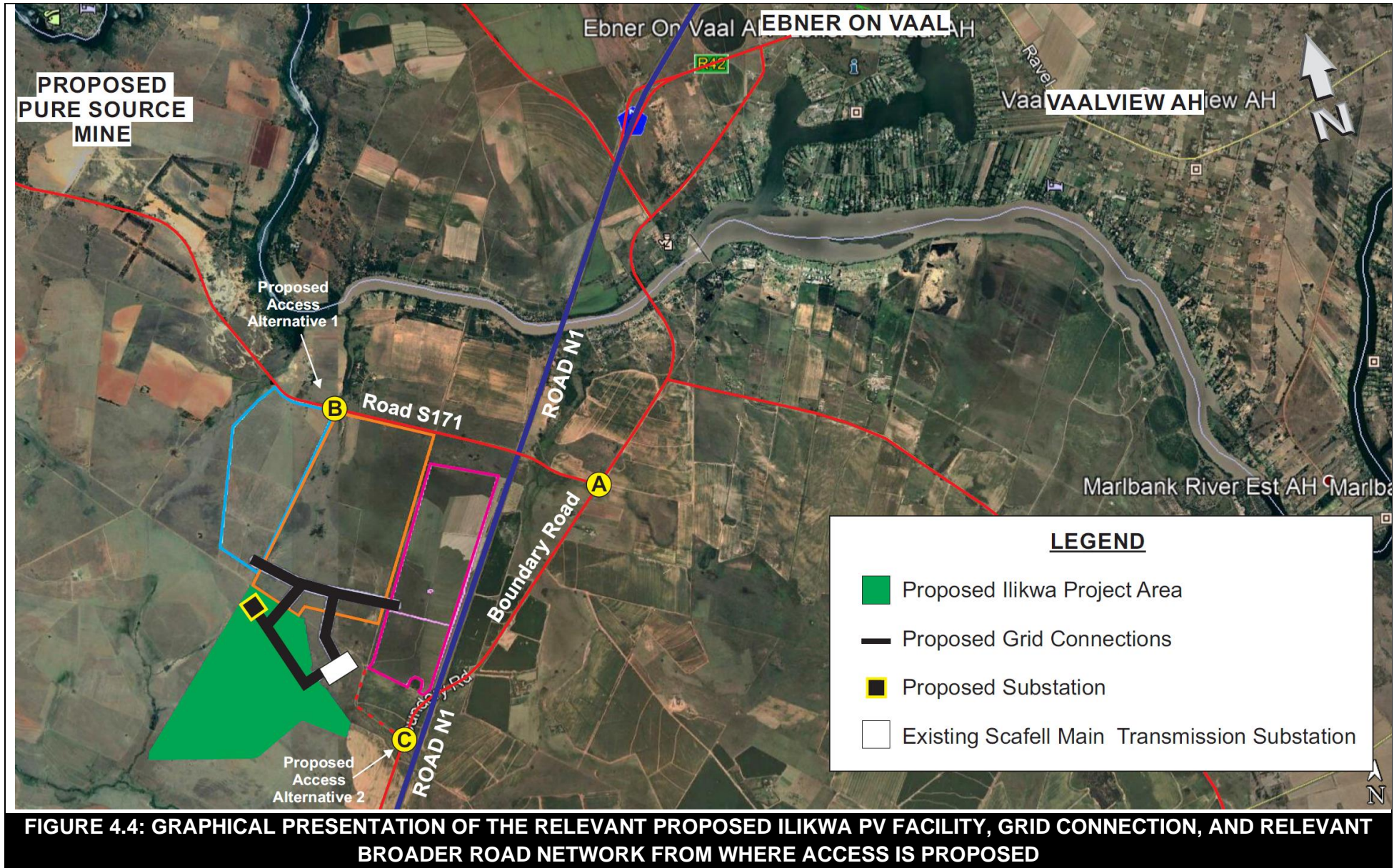
The proposed Ilikwa solar PV Facility Grid Connection is proposed to comprise of a 132 kV power line from the 33 kV / 132 kV from the from the 33 kV / 132 kV from the on-site substation to the ESKOM Scafell MTS. Refer to TABLE 3.2 for the details of the two (2) alternatives proposed for the grid connection.

During the construction phase of the proposed Ilikwa solar PV Facility and Grid Connection, it is estimated that approximately 230 workers will be employed which would range from unskilled to skilled workers. No workers will be housed on site and will be accommodated in nearby towns. During the construction phase, which is envisaged to be for approximately 12 to 18 months, up to 2 000 heavy vehicles are expected to deliver construction materials, which would be in the region of 10 to 20 deliveries per day. Other activities which are also anticipated to contribute to the generation of heavy vehicle traffic would be the waste management where waste created from construction activities will be trucked off site. It is anticipated that this would result in a maximum of one heavy vehicle per day.

During the operational phase of the proposed Ilikwa Solar PV Facility and Grid Connection, it is estimated that approximately 17 workers will be employed for the maintenance, operations, and safe keeping of the facility.

**Figure 4.4** provides a graphical presentation of the relevant proposed Ilikwa solar PV Facility, Grid Connection, and relevant broader road network from where access is proposed.





## 5. DETAILED INFORMATION RELATED TO DATA COLLECTED AND INVESTIGATIONS RELEVANT TO THE PROPOSED DEVELOPMENT

The purpose of **Section 5** is to provide the detailed information related to the data collected and investigations which is relevant to the Proposed Development (Scafell Cluster) and consists of:

- a) The *status quo* of the land use and road network characteristics of roads relevant to the Proposed Development which consists of the following information:
  - i. Existing land use information.
  - ii. Existing road characteristics and modal distribution.
  - iii. Traffic counts as a basis for making traffic-engineering calculations.
- b) The future land use and road network characteristics relevant to the Proposed Development which consists of the following information:
  - i. Future land use information.
  - ii. Information about the expected future modal distribution.
  - iii. Existing and proposed approved future latent developments in the area.
- c) Access to and from the Proposed Development.
- d) Sensitive road sections and intersections related to existing and future conditions.
- e) Information requested by relevant roads authority.
- f) Other traffic-related matters.

### 5.1.1 STATUS QUO OF LAND USE, AS WELL AS ROAD NETWORK CHARACTERISTICS

#### 5.1.1.1 Existing land use information

The relevant properties of the Proposed Development is currently utilised mainly for grazing purposes.




For the purpose of this traffic impact assessment, it is assumed that:

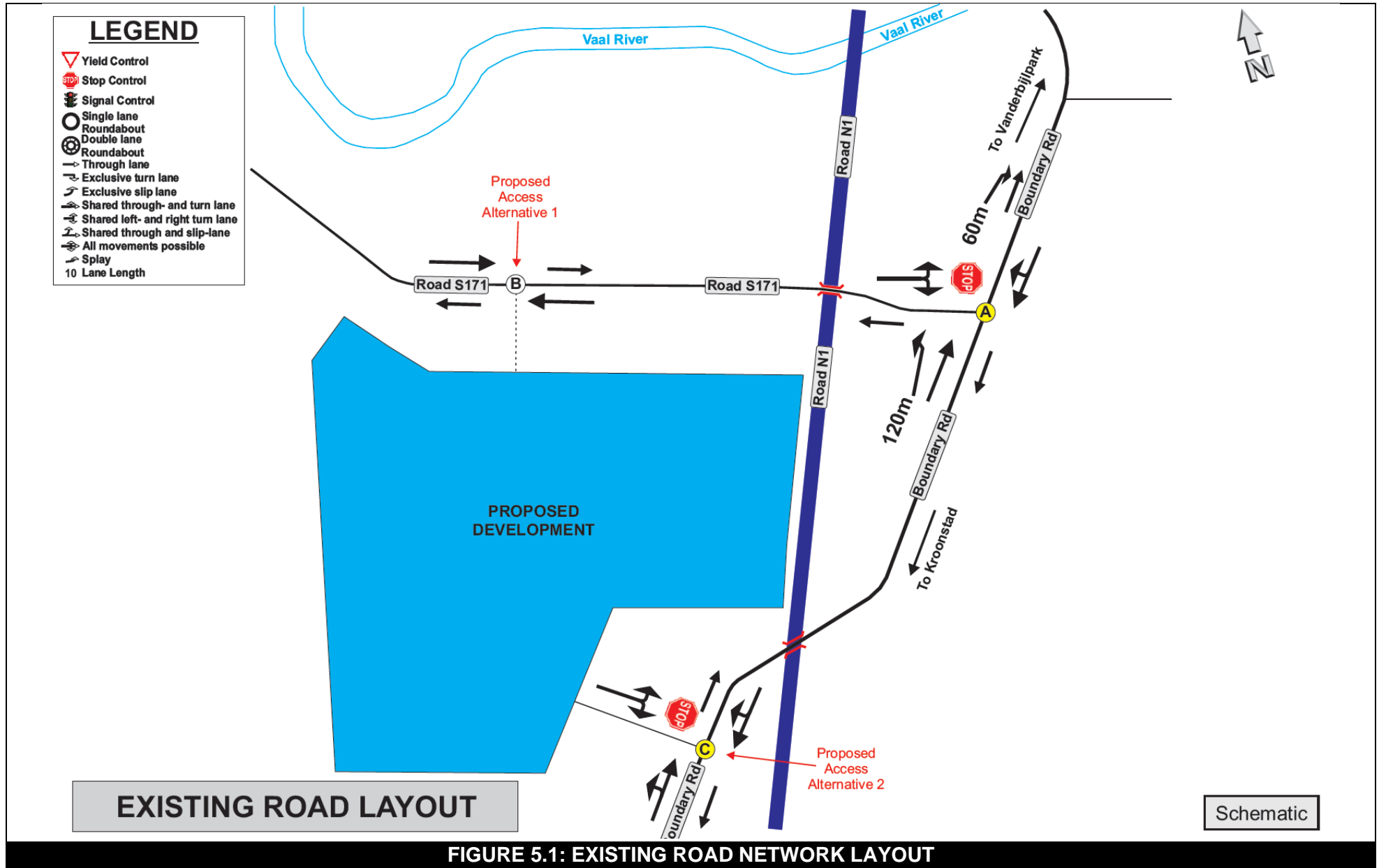
- a) The vehicle traffic absorption rate (rate at which existing developments attract vehicular traffic) by all other types of completed developments will maintain the same status for the next five years.
- b) That the average rate of growth of vehicle traffic in the area under investigation that is not relevant to the Proposed Development (background traffic) between the 2021 to 2026 scenarios was anticipated at 3% per annum.

### 5.1.1.2 Existing road characteristics and modal distribution



The following are relevant as part of this section:

- a) **Table 5.1** contains information related to the existing intersections under investigation.
- b) **Figure 5.1** provides the existing road network layout for the area under investigation.
- c) **Table 5.2** provides information concerning the relevant road sections under investigation and includes the following:
  - i. Relevant road section.
  - ii. Picture of road section.
  - iii. Existing class of road.
  - iv. Proposed class of road.
  - v. Road reserve widths.
  - vi. Lane widths.
  - vii. Median widths.
- d) **Tables 5.3.1** and **5.3.2** provide information on typical road characteristics and access management requirements as per the guideline COTO TRH26 “*South African Road Classification and Access Management Manual, Version 1.0, August 2012*” Rural areas.

<b>TABLE 5.1: SUMMARY OF INTERSECTION CONTROL AT INTERSECTIONS UNDER INVESTIGATION</b>				
<b>POINT</b>	<b>DESCRIPTION</b>	<b>INTERSECTI ON CONTROL</b>	<b>PEDESTRIA N ACTIVITIES</b>	<b>INTERSECTION PHOTO</b>
<b>A</b>	Boundary Road and Road S171	Free flow on Boundary Road	Pedestrian activity observed during surveys	
<b>B</b>	Road S171 and Proposed Development Access Road (Access Alternative 1)	Free flow on Road S171	No Pedestrian activity observed during surveys	
<b>C</b>	Boundary Road and Proposed Development Access Road (Access Alternative 2)	Free flow on Boundary Road	No Pedestrian activity observed during surveys	



**TABLE 5.2: SUMMARY OF ROAD CHARACTERISTICS**

RELEVANT ROAD SECTION	PICTURE OF ROAD SECTION	ASSUMED EXISTING CLASS OF ROAD	POSSIBLE FUTURE CLASS OF ROAD	Road Authority	Road Reserve (M)	Number of Lanes	Lane Width	Type of Surface	Median	Anticipated Traffic Growth per Annum over 5 Years	Speed Limit												
<b>Road Section 1</b>  <b>Boundary Road</b>  Road link between Roads R42 and R59		<b>Primary Function:</b> Mobility (Vehicle priority. Through route)	<b>Proposed Function:</b> Mobility (Vehicle priority. Through route)	Department of Police, Roads and Transport, Free State Province	±30m	One lane per direction	3.7m wide	Asphalt	None	3%	100 km/h												
		<table border="1"> <thead> <tr> <th>Class</th> <th>Class No.</th> <th>Route No.</th> </tr> </thead> <tbody> <tr> <td>Minor Arterial</td> <td>R3</td> <td>P</td> </tr> </tbody> </table>	Class									Class No.	Route No.	Minor Arterial	R3	P	<table border="1"> <thead> <tr> <th>Class</th> <th>Class No.</th> <th>Route No.</th> </tr> </thead> <tbody> <tr> <td>Minor Arterial</td> <td>R3</td> <td>P</td> </tr> </tbody> </table>	Class	Class No.	Route No.	Minor Arterial	R3	P
		Class	Class No.									Route No.											
		Minor Arterial	R3									P											
		Class	Class No.									Route No.											
Minor Arterial	R3	P																					
<b>Description:</b> Main Road	<b>Description:</b> Main Road																						
<b>Spacing between Intersections:</b> 1.6km	<b>Spacing between Intersections:</b> 1.6km																						
<b>Road Section 2</b>  <b>Road S171</b>  Provides access to and from Boundary Road		<b>Primary Function:</b> Access/Activity	<b>Proposed Function:</b> Access/Activity	Department of Police, Roads and Transport, Free State Province	±25m	One lane per direction	3.7m wide	Asphalt	None	3%	80 km/h												
		<table border="1"> <thead> <tr> <th>Class</th> <th>Class No.</th> <th>Route No.</th> </tr> </thead> <tbody> <tr> <td>Collector Road</td> <td>R4</td> <td>S</td> </tr> </tbody> </table>	Class									Class No.	Route No.	Collector Road	R4	S	<table border="1"> <thead> <tr> <th>Class</th> <th>Class No.</th> <th>Route No.</th> </tr> </thead> <tbody> <tr> <td>Collector Road</td> <td>R4</td> <td>S</td> </tr> </tbody> </table>	Class	Class No.	Route No.	Collector Road	R4	S
		Class	Class No.									Route No.											
		Collector Road	R4									S											
		Class	Class No.									Route No.											
Collector Road	R4	S																					
<b>Description:</b> Collector	<b>Description:</b> Collector																						
<b>Spacing between Intersections:</b> 600m to 800m	<b>Spacing between Intersections:</b> 600m to 800m																						

**TABLE 5.3.1: RURAL FUNCTIONAL ROAD CLASSIFICATION**  
 (COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)

FUNCTION			DESCRIPTION		MOBILITY				
BASIC FUNCTION	ALTERNATE FUNCTIONAL DESCRIPTION	DETERMINING FUNCTION	CLASS NO. (R_)	CLASS NAME	ORIGIN / DESTINATION	THROUGH TRAFFIC COMPONENT	REACH OF CONNECTIVITY	% OF BUILT KM	AADT (AVERAGE ANNUAL DAILY TRAFFIC)
Mobility	Vehicle priority, vehicle only, long distance, through, high order, high speed, numbered, commercial, economic, strategic; route, arterial road or highway	Movement is dominant, through traffic is dominant, the majority of traffic does not originate or terminate in the immediate vicinity; the function of the road is to carry high volumes of traffic between urban areas.	R 1	Principal arterial*	Metro areas, large cities, large border posts, join national routes.	Exclusively	> 50km	2 - 4% Classes 1 and 2	1 000 - 100 000+
			R 2	Major arterial*	Cities and large towns, transport nodes (harbour and international airports), smaller border posts, join major routes.	Exclusively	> 25km		500 - 25 000+
			R 3	Minor arterial*	Towns, villages and rural settlements, tourist destinations, transport nodes (railway sidings, seaports, and landing strips), small border posts, and other routes.	Predominant	> 10km	6 - 12% Classes 1, 2 and 3	100 - 2 000+
Access / Activity	Access, mixed pedestrian and vehicle traffic, short distance, low order, lower speed, community / farm, road or street.	Access, turning and crossing movements are allowed, the majority of traffic has an origin or destination in the district, the function of the road is to provide a safe environment for vehicles and pedestrians using access points.	R 4	Collector road	Connect farming districts, rural settlements, tourist areas, national and private parks and mines to mobility routes.	Minimal	< 10km	20 - 25%	< 1 000
			R 5	Local road	Farm or property access, connection to other routes.	Nil Discontinued	< 5km	65 - 75%	< 500
			R 6	Walkway (path or track)	Settlements, farms, transport nodes, water points.	n/a	n/a	n/a	n/a

\* In rural areas, the term distributor may be preferred to arterial.

**TABLE 5.3.2: RURAL ACCESS MANAGEMENT REQUIREMENTS AND FEATURES**  
*(COTO TRH26 - SOUTH AFRICAN ROAD CLASSIFICATION AND ACCESS MANAGEMENT MANUAL VERSION 1.0 AUGUST 2012)*

BASIC FUNCTION	DESCRIPTION		REQUIREMENTS				TYPICAL FEATURES (Use appropriate context sensitive standards for design)									
	CLASS NO (R_)	CLASS NAME	DESIGN TOPOLOGY	ROUTE NO.	ACCESS TO PROPERTY	PARKING	SPEED km/h	INTERSECTION CONTROL	INTERSECTION SPACING	TYPICAL CROSS SECTION	ROADWAY / LANE WIDTH	ROAD RESERVE WIDTH	PUBLIC TRANSPORT AND PEDESTRIAN CROSSINGS	PEDESTRIAN FOOTWAYS (CONSTRUCTED)	CYCLE LANES	ANIMAL DRAWN VEHICLES
Mobility	R 1	Principal arterial	Expressway	Yes (N)	Not allowed*	No (off road rest stops allowed)	120	Grade separated or priority to through	8.0km	2/3/4 lanes, surfaced shoulders, climbing lanes	3.5 - 3.7m	60 - 80m (62m)	No	No	No	No
	R 2	Major arterial	Highway	Yes (R: 2 or 3-digit; or N)	Not allowed */**	No (off road rest stops allowed)	120	Priority or grade separated	5.0km	2/3 lanes, surfaced shoulders, climbing lanes	3.5 - 3.7m	40-70m (48m)	As required	Isolated	Recreational on shoulder	No
	R 3	Minor arterial	Main road	Yes (R: 3 or 2-digit)	Not allowed */**	No (off road rest stops allowed)	100 - 120	Priority, roundabout	1.6km	2 lanes surfaced, gravel shoulders	4.0m	30-50m (30m)	As required	Isolated	Recreational widen roadway both sides	Widen shoulder
Access / Activity	R 4	Collector road	Collector	Allowed, T (tourist) or D (district)	Yes	No (off road edge or in lay byes / viewpoints)	80 - 100	Priority	600 - 800m	2 lanes surfaced or gravel, gravel shoulders	3.5m	25m	As required	Rare, isolated	Widen roadway	Widen shoulder
	R 5	Local road	Farm road	Allowed, T (tourist) or L (local)	Yes	No (on verge or shoulder)	60 - 80	Priority	450 - 600m	1/2 lane/s gravel, 600mm concrete strips in environmental areas		20m	As required	Rare	Use roadway	Use roadway
	R 6	Walkway	Track or pathway	No	Yes	N/A			N/A					Not constructed, formed by use		

\* Access to properties sufficiently large to warrant a private intersection / interchange which can be considered if access spacing requirements are met and there is no future need for public road.

\*\* Low volume farm gate and tourist access (less than 10 vehicles per day) can be considered if no alternative exists.

### 5.1.1.3 TRAFFIC COUNTS AS BASIS FOR MAKING TRAFFIC-ENGINEERING CALCULATIONS

In order to gain a better understanding of the existing traffic patterns and movements adjacent to the Proposed Development, 12-hour manual traffic counts were conducted at the existing intersections that would potentially be affected by the Proposed Development.

It is standard traffic engineering practice to conduct at least 12-hour manual traffic counts, as close as possible to a month-end Friday when traffic movement is expected to be at its highest. The relevant 12-hour manual traffic counts were therefore conducted on Friday 05 February 2021 at the intersection of Boundary Road and Road S171, **Point A**.

The combined hourly totals of all the vehicle types for the traffic survey conducted on Friday 05 February 2021 between 06:00 and 18:00 is indicated in **Table A-1** of **Appendix A** of this report. The description of the relevant vehicle movements at the relevant intersection appears in **Figure A-1 Appendix A**. **Figures B-1** provides a graphical presentation of the peak-hour traffic volumes as derived from the relevant manual traffic counts.

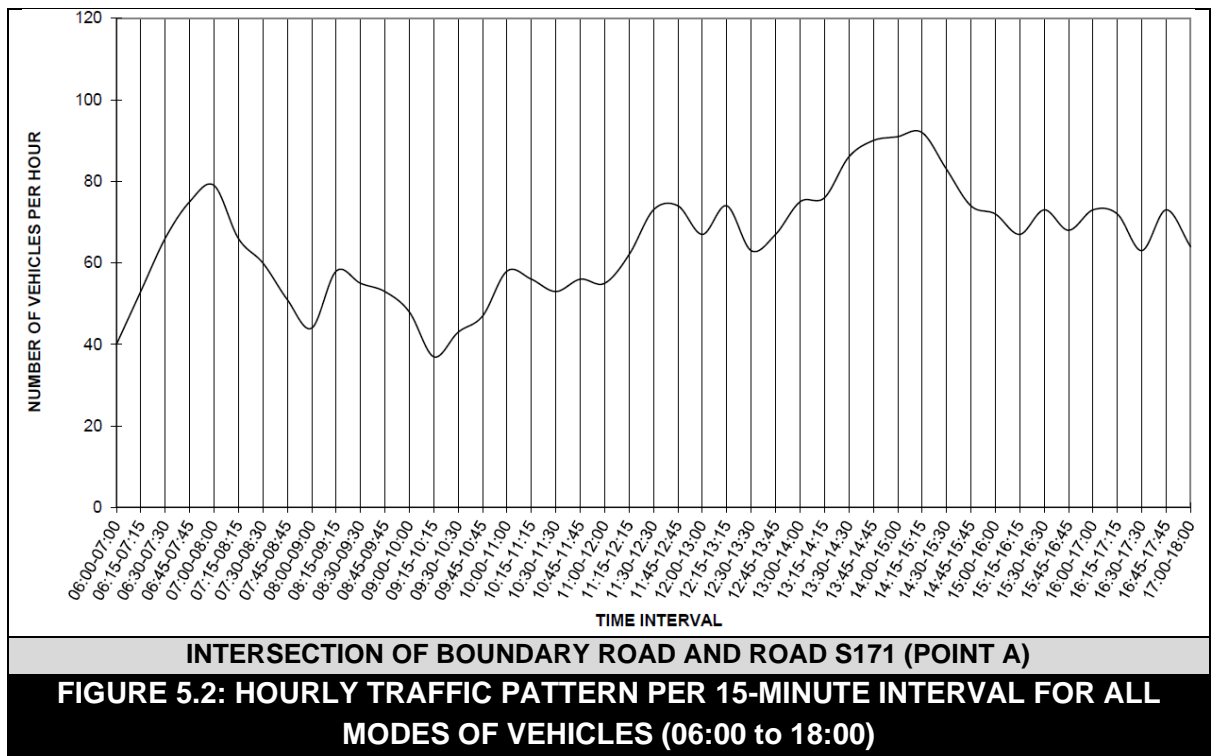
The respective peak-hour flows for the traffic counts at the relevant intersections were identified as indicated in **Table 5.4** below.

It is assumed, as a worst-case scenario, that shift starting and ending times of the Proposed Development for the construction and operational phases would fall within the existing vehicle traffic peak times for the purpose of the traffic impact assessment.

<b>TABLE 5.4 PEAK HOUR PERIODS AT THE RELEVANT INTERSECTION</b>					
<b>POINT</b>	<b>INTERSECTION</b>	<b>AM PEAK</b>		<b>PM PEAK</b>	
		<b>TIME INTERVAL</b>	<b>NUMBER OF VEHICLES</b>	<b>TIME INTERVAL</b>	<b>NUMBER OF VEHICLES</b>
A	Boundary Road and Road S171	07:00 to 08:00	79	16:45 to 17:45	73

**Figure 5.2** indicates the hourly traffic pattern, per 15-minute interval, for all modes of vehicles at the relevant intersection between 06:00 and 18:00 on Friday 05 February 2021. A graphical presentation of the peak-hour vehicle flows is indicated with **Figure B-1** of **Appendix B**.





## 5.1.2 FUTURE LAND USE AND ROAD CHARACTERISTICS

### 5.1.2.1 Future land use

The relevant properties to be utilised as part of the proposed Scafell Cluster will be utilised for renewable energy generation by means of erecting PV solar facilities which would feed electricity into the existing electricity distribution network.

### 5.1.2.2 Information about the expected future modal distribution

**Figures B-5 and B-6 of Appendix B** indicate, in percentages, the expected vehicle trips distribution, respectively, of light vehicles and heavy vehicles for the AM and PM peak periods for the relevant scenarios.

### 5.1.2.3 Existing and proposed approved future latent developments in the area.

Apart from a mining development to be known as the Pure Source mine, for which environmental authorization has been granted, no further approved latent developments were known of at the time of preparing this study. Refer to **Section 6.1.1** for further information with regards to the proposed Pure Source Mine.

### 5.1.3 Access to and from the Proposed Development

Access to and from the Proposed Development is planned in the following manner:

- a) Access for the Damlaagte and Scafell solar PV Facilities via a proposed new access intersection along Road S171 (Point B).
- b) Access to the Vlakfontein and Ilikwa solar PV Facilities via an existing intersection along Boundary Road (Point C).

OR

- c) Access for all relevant sites of the Proposed Development from a proposed new access intersection along Road S171 (Point B).

OR

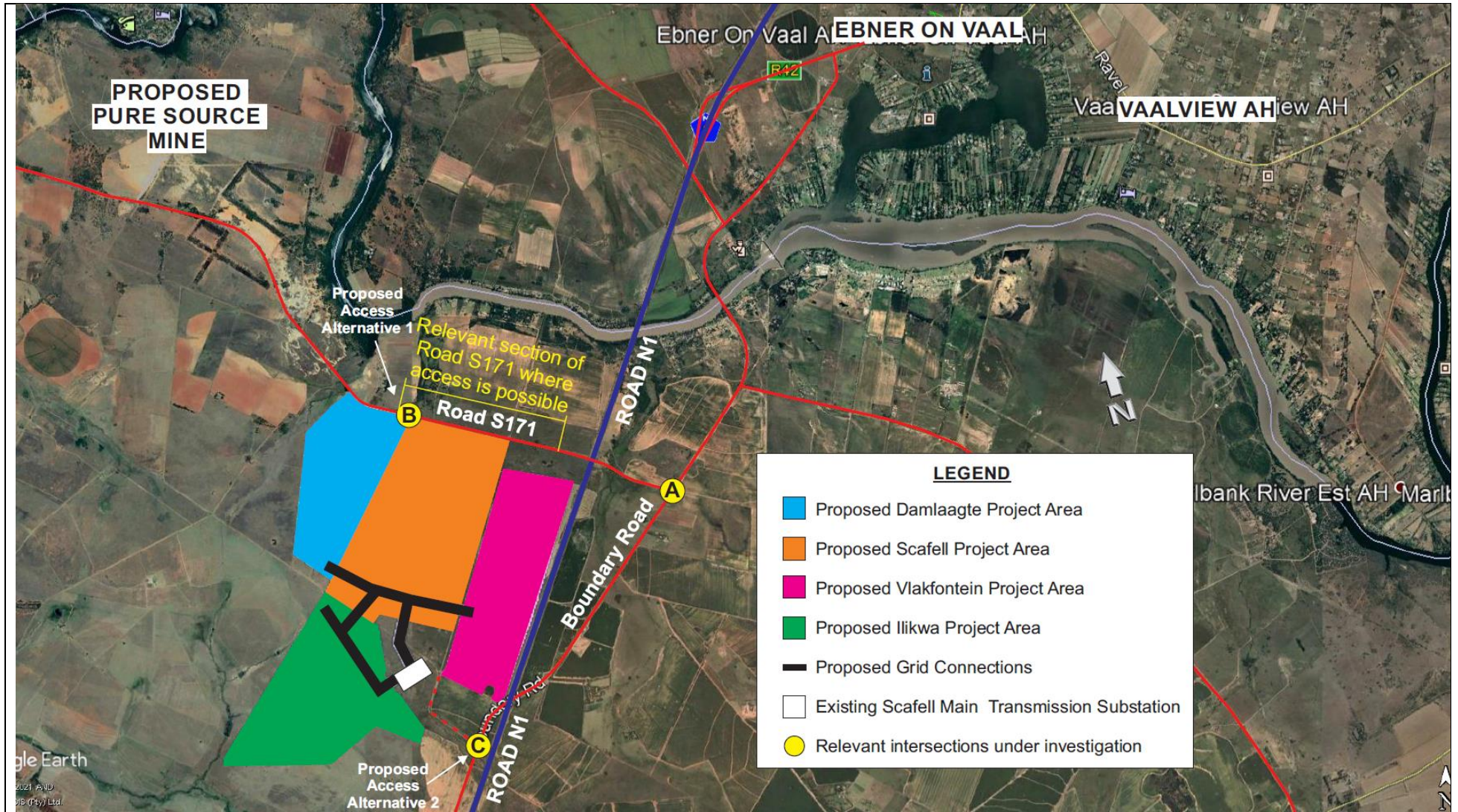
- d) Access for all relevant sites of the Proposed Development from an existing intersection along Boundary Road (Point C).

As a worst-case scenario, calculations and evaluations as part of this report was conducted for all relevant sites of the Proposed Development to all gain access via Point B or Point C.

The final location of the proposed access intersection along Road S171, evaluated as Point B as part of this report, need to be determined as part of the detail design phase of the Proposed Development. The traffic impact assessment therefore only determined a section of Road S171 from where access is possible. Factors that were taken into consideration are as follows:

- a) Intersection and approach site distances.
- b) Road reserve availability for the provision of dedicated right-turn and left-turn deceleration lanes.
- c) Existing road furniture which includes bridges and culverts.
- d) Other elements which include transmission towers (electricity pylons).
- e) Other existing access intersections.
- f) Proposed Development site layout.

**Figure 5.3** provides a graphical presentation of the locality of the existing access intersection from Boundary Road (Point C), and the relevant section of Road S171 from where access to and from the Proposed Development was deemed acceptable from a visual inspection, as well as an identified potential access intersection position, illustrated as Point B, that would conform to the necessary road safety measures and standards required.



**FIGURE 5.3: GRAPHICAL PRESENTATION OF THE RELEVANT SECTION OF ROAD S171 FROM WHERE ACCESS TO AND FROM THE PROPOSED DEVELOPMENT WAS DEEMED ACCEPTABLE**

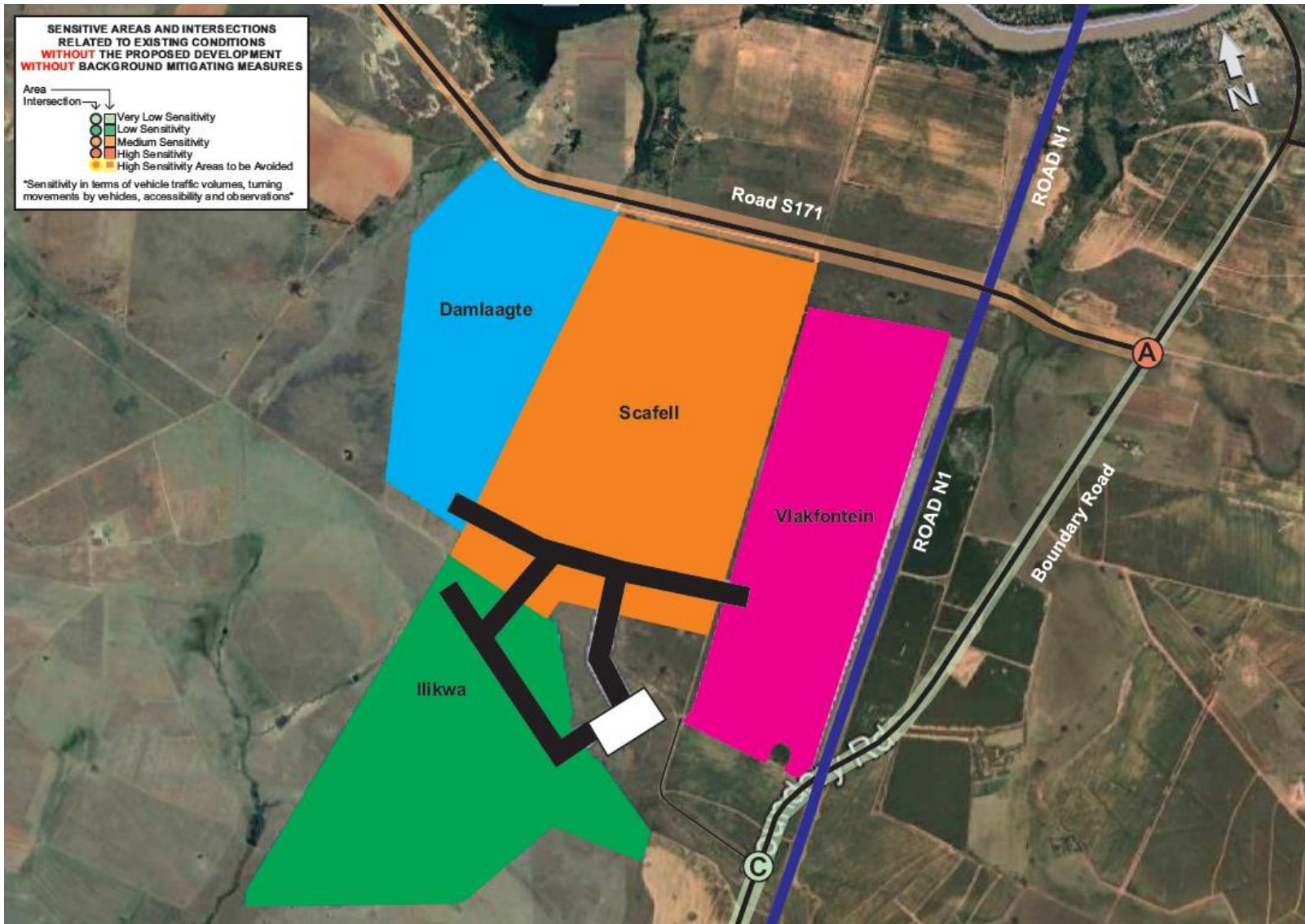
#### 5.1.4 Sensitive road sections and intersections related to existing and future conditions

Sensitive road sections and intersections related to existing and future conditions **without** and **with** the Proposed Development in terms of vehicular traffic include the following:

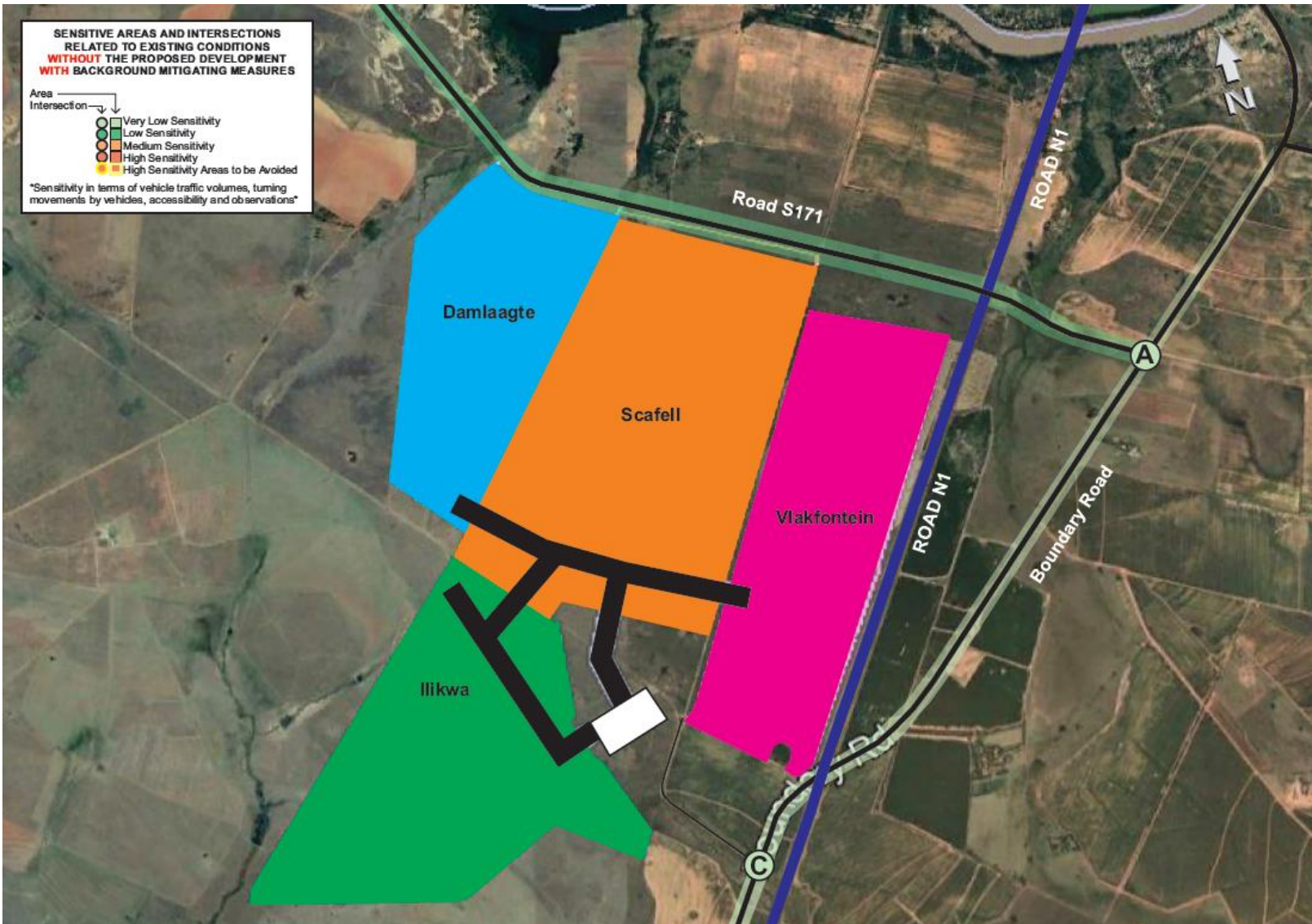
- a) Where residents and schools are located (vehicle / pedestrian conflict).
- b) Free-flow legs of intersections where right turning movements take place and where no dedicated right-turn lanes are provided.
- c) Intersections with high volumes of vehicular traffic conflicts.
- d) Vehicle speeding.

**Figures 5.4 to 5.6** presented as part of the sensitive road sections **without** and **with** the Proposed Development where **Table 5.5** provides more detailed information of the latter figures.

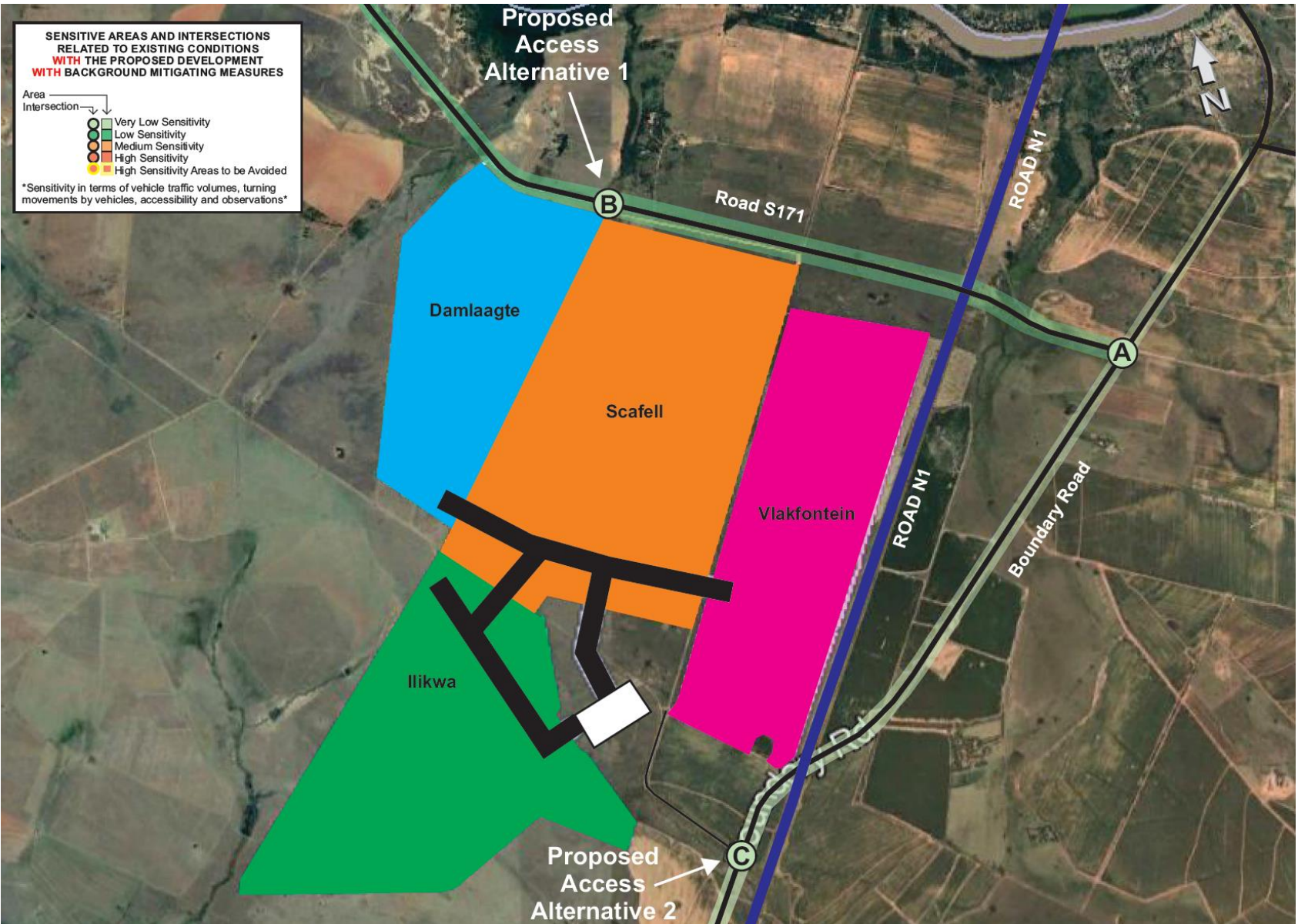
It can be concluded from **Figures 5.4 to 5.6** and **Table 5.5** that the anticipated vehicle traffic to be generated by the Proposed Development would have an insignificant impact on the sensitivity of the road network and intersections in terms of the previously mentioned vehicular traffic factors.



**FIGURE 5.4: SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED DEVELOPMENT AND WITHOUT BACKGROUND MITIGATION MEASURES**



**FIGURE 5.5: SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITHOUT THE PROPOSED DEVELOPMENT WITH BACKGROUND MITIGATION MEASURES**



**FIGURE 5.6: SENSITIVE ROAD SECTIONS AND INTERSECTIONS INDICATING EXISTING SENSITIVE AREAS AND INTERSECTIONS WITH THE PROPOSED DEVELOPMENT WITH BACKGROUND MITIGATION MEASURES**

**TABLE 5.5: DETAILED INFORMATION RELATED TO SENSITIVITY OF RELEVANT ROAD SECTIONS AND INTERSECTIONS**

FIGURE	DESCRIPTION	DETAILED INFORMATION
<p><b>Figures 5.4 and 5.5</b></p>	<p>Sensitive road sections and intersections indicating existing sensitive areas and intersections <b>WITHOUT</b> the Proposed Development <b>WITHOUT / WITH</b> background mitigation measures.</p>	<p>Intersection A is considered to have a high sensitivity due to the lack of a dedicated right-turn lane on the northern approach of Boundary Road which creates a higher road safety risk for vehicles making turning movements. Intersection C is considered to have a low sensitivity due to this access intersection currently only utilised by a low number of vehicles. With the Proposed Development potentially gaining access at Point C, the sensitivity would change to high due to the lack of a dedicated right-turn lane on the northern approach of Boundary Road. The condition of Road S171 is also in a poor state, as per attached report in Appendix F. The mitigation measures that should be implemented at this site regardless of the proposed Pure Source Mine and Proposed Development is:</p> <ul style="list-style-type: none"> <li>a) Construct a dedicated right-turn lane on the northern approach of Boundary Road.</li> <li>b) Rehabilitate Road S171 as required, regardless of the proposed Pure Source Mine and the Proposed Development.</li> </ul>
<p><b>Figure 5.6</b></p>	<p>Sensitive road sections and intersections indicating existing sensitive areas and intersections <b>WITH</b> the Proposed Development <b>WITH</b> background mitigation measures.</p>	<p>With the implementation of the recommended access intersection geometry at Points B or C, with specific reference to the dedicated right-turn lane at Point C along Boundary Road (Dependant on whether both or only one of the access intersections will be used), the access intersections to the Proposed Development, and with recommendations as part of background improvements, no further improvements would be required.</p>



#### 5.1.5 Information requested by relevant road authority

Input will be provided as part of the Detail Design Phase of the Proposed Development. All comments / approval from the relevant road authorities will be included as part of the applications for approval and detail design process as a separate document.

#### 5.1.6 Other traffic-related matters

**Table 5.6** provides a summary of the following:

- a) Access related matters.
- b) Road condition of Road S171.
- c) Road safety.
- d) Non-motorised transport.
- e) Public transport.

**TABLE 5.6: SUMMARY OF OTHER TRAFFIC-RELATED MATTERS**

Item	Description of Element	General Comments	Specific Issues	Actions Required
<b>1.</b>	<b>ACCESS - RELATED MATTERS</b>			
1.1	<b>Recommended intersection geometric layout for the existing and proposed intersections in terms of road safety</b>	a) The intersection geometric layout should be based on geometric design requirements to ensure a safe and effective intersection layout.	a) Northern approach right turning vehicles from Boundary Road at Point A. b) Vehicles turning right from the Proposed Development into Road S171 with the need to join the main traffic flow.	a) Provide dedicated right-turn lanes on Boundary Road (Northern approach) at Point A to ensure safe waiting space for vehicles waiting to turn right. b) Provide an acceleration lane towards the east on Road S171 at Point B (heavy vehicles). c) Provide a dedicated right-turn lane on the northern approach and a left-turn deceleration lane on the southern approach along Boundary Road at Point C.
1.2	<b>Sight distances</b>	a) Sight distances at the existing intersections of:  i) Boundary Road and Road S171 (Point A). ii) Road S171 and Proposed Development access 1 (Point B). iii) Boundary Road and Proposed Development Access 2 (Point C).  were assessed visually and were deemed acceptable.	a) It is a general occurrence for vehicles to maintain normal road speeds at free-flow intersections in rural areas (lack of speed reduction).	a) Speed limit signs should be erected along the relevant section of Boundary Road. The speed limit should be limited to 80 km/h at Points A, B, and C and enforced by the relevant road authority for the relevant section. b) Rumble strips can be provided on Boundary Road prior to approaching Points A and C.
<b>2.</b>	<b>CONDITION OF ROAD S171 FROM WHERE THE PROPOSED MINING DEVELOPMENT WOULD GAIN ACCESS FROM AND TO</b>			
2.1	<b>Current condition of relevant section of Road S171</b>	a) A visual inspection of the relevant section of Road S171 under investigation was conducted during a site visit.	a) From the visual inspection of the relevant section of Road S171 under investigation, it is possible to note that the road surface is currently in a poor condition with multiple potholes and the road surface is possibly deteriorating. b) A site investigation on the condition of Road S171 was conducted by the Department of Police, Roads and Transport Free State Province which confirms the findings from the visual inspection. Refer to Appendix F for a copy of the report.	a) In order to ensure that construction materials and workers can be transported at all times, it is recommended that a Roads Maintenance Plan (upgrades included) be prepared in collaboration with other landowners, developments and the relevant roads authority. b) A pavement design specialist should be commissioned to investigate the condition of the roadway layers in order to identify any collapsing and deterioration of the roadway layers.

**TABLE 5.6: SUMMARY OF OTHER TRAFFIC-RELATED MATTERS**

Item	Description of Element	General Comments	Specific Issues	Actions Required
<b>2.</b>	<b>ROAD SAFETY MATTERS</b>			
2.1	<b>General road safety</b>	<p>The following are typical elements related to the road network, which cause road safety problems in rural and urban areas, and which need to be addressed on a continuous basis:</p> <ul style="list-style-type: none"> <li>a) Intersection layout, with specific reference to dedicated right-turn lanes, where there is heavy vehicle movement.</li> <li>b) Pedestrian movements (road crossings).</li> <li>c) Intersection alignment, such as staggered intersections.</li> <li>d) Insufficient public transport facilities.</li> <li>e) Access control for vehicle movement.</li> <li>f) Fencing to control animal movement.</li> <li>g) Lack of or deterioration of reflective road studs for visibility during the night at strategic points.</li> <li>h) Lack of pedestrian walkways to separate pedestrian and vehicle movements at strategic points.</li> <li>i) Lack of provision and quality of road markings.</li> <li>j) Lack of provision and quality of road signs.</li> <li>k) Improper road safety training for workers as well as adjacent communities.</li> </ul>	<ul style="list-style-type: none"> <li>a) Need for reflective road studs at strategic points.</li> <li>b) Need for overhead lighting at intersections.</li> <li>c) Road markings are fading.</li> <li>d) Need for relevant road traffic signs.</li> </ul>	<p>In general, the report was compiled so as to address the road safety issues as far as practically possible:</p> <ul style="list-style-type: none"> <li>a) Refer to Sections 5 and 6 for the required and recommended intersection improvements.</li> <li>b) Collaborate with the relevant road authority to ensure that the road maintenance plan to maintain the relevant road network on which heavy vehicle movement is anticipated incorporates the necessary measures to support road safety conditions.</li> <li>c) Provide reflective road studs at strategic points (LED if possible) to ensure the safe operation of the relevant intersections under investigation at night-time at strategic points.</li> <li>d) Provide required road traffic signs for the relevant intersections.</li> <li>e) Provide relevant road markings at relevant intersections under investigation (highway paint recommended).</li> <li>f) Provide workers and contractor workers with training on road safety.</li> <li>g) Road safety and awareness campaigns should be run at the mine.</li> <li>h) Sweeping of intersections on a regular basis in order to prevent slippery conditions and visibility of road markings. Recommended to be implemented by Proposed Development as a road safety initiative and to ensure road safety at access intersection.</li> </ul>
<b>3.</b>	<b>NON-MOTORISED AND PUBLIC TRANSPORT</b>			
3.1	<b>Non-motorised and public transport</b>	<ul style="list-style-type: none"> <li>a) Two types of public transport commuters are relevant: <ul style="list-style-type: none"> <li>i) Firstly, workers who travel to and from the proposed mining development during all phases.</li> <li>ii) Secondly, visitors to the development during all phases.</li> </ul> </li> <li>a) No non-Proposed Development related pedestrian activity around the relevant intersections under investigation was observed during the site visit.</li> <li>b) Due to the location of the Proposed Development, it is anticipated that during the construction phase contractors will provide workers with transport via contracted taxis or private transport, and during the operational phase staff would make use of private transport and lift opportunities.</li> </ul>	<ul style="list-style-type: none"> <li>a) None.</li> </ul>	<ul style="list-style-type: none"> <li>a) None.</li> </ul>

## 6. TRAFFIC IMPACT ASSESSMENT

**Table 6.1** provides a summary of the relevant traffic related information for each proposed site. It is possible to conclude that all the sites would comprise of more or less the same activity for the construction and operational phases and would therefore generate similar volumes of vehicle trips in the event that each site is constructed and operated individually one at a time. It was therefore as part of the impact assessment to evaluate a single scenario which would be relevant to each proposed site individually, and another scenario which would assess all the proposed sites, the Proposed Development, cumulatively.

The following scenarios were therefore developed and evaluated from a vehicle traffic and intersection performance perspective as part of this study:

- a) **Scenario 1:** 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **without** the Proposed Development.
- b) **Scenario 2:** Projected 2026 peak hour traffic (background traffic with growth factor applied) **with** the proposed Pure Source Mine **without** the Proposed Development.
- c) **Scenario 3-1:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually).
- d) **Scenario 3-2:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually).
- e) **Scenario 4-1:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually).
- f) **Scenario 4-2:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually).
- g) **Scenario 5-1:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with Access Alternative 1 (Construction Phase) (All sites Cumulatively).
- h) **Scenario 5-2:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with Access Alternative 2 (Construction Phase) (All sites Cumulatively).
- i) **Scenario 6-1:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with Access Alternative 1 (Construction Phase) (All sites Cumulatively).
- j) **Scenario 6-2:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development with Access Alternative 2 (Construction Phase) (All sites Cumulatively).

It is important to take note that although the construction phase of each site is estimated to be between 12 and 18 months, the exact timeframe for when construction would commence is not a fixed timeframe. The construction phase was therefore assessed for both the base-year scenario and future (5-year) scenario. The operational phase would generate a low volume of vehicles and the impact on the relevant road network would be insignificant.

The following sections elaborate on the above-mentioned scenarios.

**TABLE 6.1: SUMMARY OF THE RELEVANT TRAFFIC RELATED INFORMATION FOR EACH PROPOSED SITE**

DESCRIPTION	SCAFELL SOLAR PV FACILITY AND GRID CONNECTION	DAMLAAGTE SOLAR PV FACILITY AND GRID CONNECTION	VLAKFONTEIN SOLAR PV FACILITY AND GRID CONNECTION	ILIKWA SOLAR PV FACILITY AND GRID CONNECTION
Duration of construction	12 to 18 months	12 to 18 months	12 to 18 months	12 to 18 months
Expected number of heavy vehicles delivering consumables and construction materials per day for each site individually	20 per day	20 per day	20 per day	20 per day
Expected percentage of heavy vehicles delivering consumables or construction materials during traffic peak times	20%	20%	20%	20%
Number of construction staff per day for each site individually	230	230	230	230
Number of shifts for construction staff per day	1 shift per day	1 shift per day	1 shift per day	1 shift per day
Where staff are anticipated to reside	Surrounding areas	Surrounding areas	Surrounding areas	Surrounding areas
Vehicle trip distribution	See <b>Figure B-5</b> of <b>Appendix B</b>			
Access road to Proposed Development	Single Access from Road S171 (Point B) or Boundary Road (Point C) for all sites			
Calculated number of vehicle trips to be generated by each site individually during AM or PM peak hours for the <b>Construction phase</b>	AM Peak: 60 PM Peak: 60	AM Peak: 60 PM Peak: 60	AM Peak: 60 PM Peak: 60	AM Peak: 60 PM Peak: 60
Number of operational staff per day for each site individually	17	17	17	17
Number of heavy vehicles expected to deliver consumables per day	1 as worst case	1 as worst case	1 as worst case	1 as worst case
Calculated number of vehicle trips to be generated by each site individually during AM or PM peak hours for the <b>Construction phase</b>	AM Peak: 8 PM Peak: 8	AM Peak: 8 PM Peak: 8	AM Peak: 8 PM Peak: 8	AM Peak: 8 PM Peak: 8

## 6.1 TRAFFIC IMPACT RELATED ASSESSMENT WITHOUT THE PROPOSED DEVELOPMENT (SCENARIOS 1 AND 2)

### 6.1.1 Approved latent developments included as part of assessment

A mining development to be known as the Pure Source Mine, for which environmental authorization has been granted, is proposed to the west of the Proposed Development and the proposed mining development would also make use of Road S171 and gain access from and to Boundary Road at the intersection of Boundary Road and Road S171 (**Point A**).

The proposed mining development would entail the mining and selling of silica sand, aggregate and alluvial diamonds and as per information obtained from the traffic impact assessment conducted by Siyazi in 2018, **Table 6.2** provides information on the number of vehicle trips which are anticipated to be generated during the same peaks as determined as part of this study.

<b>TABLE 6.2: NUMBER OF VEHICLE TRIPS WHICH ARE ANTICIPATED TO BE GENERATED BY THE PROPOSED PURE SOURCE MINE</b>				
<b>Phase</b>	<b>Construction Phase</b>		<b>Operational Phase</b>	
<b>Trips</b>	<b>IN</b>	<b>OUT</b>	<b>IN</b>	<b>OUT</b>
<b>AM Peak</b>	8	2	59	50
<b>PM Peak</b>	2	8	50	59

The above-mentioned vehicle trips were included as part of this investigation as latent approved vehicle trips. More detail regarding the proposed mining development is available upon request and authorization from the proposed mining development company.

### 6.1.2 Total traffic expected at the relevant intersections as part of background traffic and proposed latent developments

The following figures as presented as part of **Appendix B** are relevant:

- b) **Figure B-1:** 2021 peak hour traffic (background traffic) without the proposed Pure Source Mine without the Proposed Development.
- c) **Figure B-2:** Projected 2026 peak hour traffic (background traffic) without the proposed Pure Source Mine without the Proposed Development.
- d) **Figure B-3:** Projected 2021 peak hour traffic (background traffic) with the proposed Pure Source Mine without the Proposed Development (**Scenario 1**).
- e) **Figure B-4:** Projected 2026 peak hour traffic (background traffic with growth factor applied) with the proposed Pure Source Mine without the Proposed Development (**Scenario 2**).

### 6.1.3 Determination of the Levels of Service at the relevant intersections as part of background traffic

and proposed latent developments

The “**SIDRA Intersection**” software was used as an aid for the design and evaluation of the relevant intersections. The evaluations determine the intersection levels of service (LOS) which qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, manoeuvrability, delay, and safety. The following intersections were evaluated for levels of service:

- a) **Point A:** Intersection of Boundary Road and Road S171.
- b) **Point B:** Intersection of Road S171 and Proposed Development Access Road 1.
- c) **Point C:** Intersection of Boundary Road and Proposed Development Access.

In **Appendix C Tables C-1.1 to C-1.2** indicates the levels of service and the degree of saturation calculated for the relevant intersections for the respective scenarios:

- a) **Table C-1.1:** Levels of service for various approaches for the year 2021 (background traffic) **with** the proposed Pure Source Mine **without** the Proposed Development (**Scenario 1**).
- b) **Table C-1.2:** Levels of service for various approaches for the year 2026 (background traffic) **with** the proposed Pure Source Mine **without** the Proposed Development (**Scenario 2**).

From **Tables C-1.1 to C-1.2** it is possible to note that:

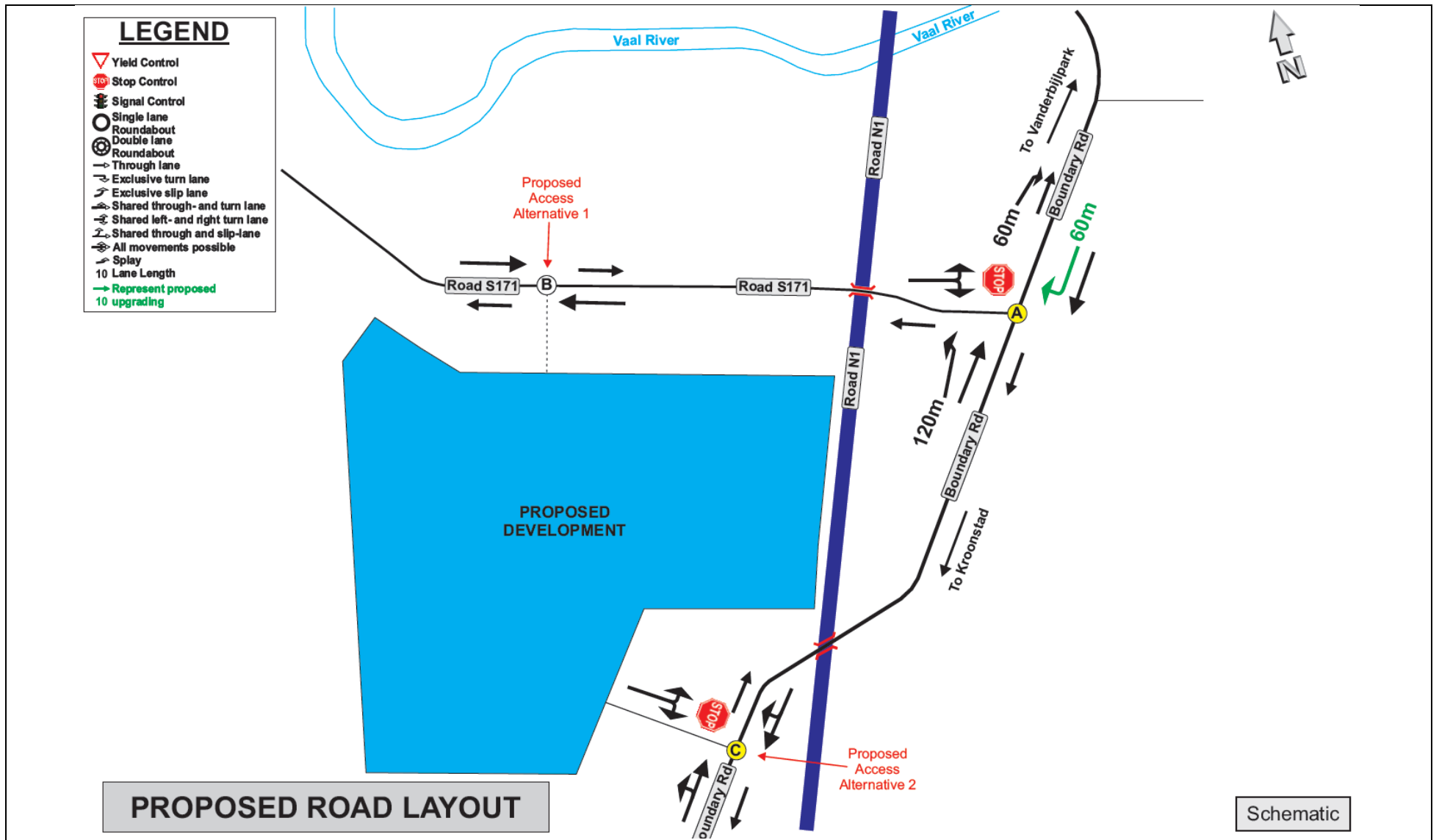
- a) Geometric upgrading at **Point A** would be required from a road safety perspective, regardless of latent approved developments or the Proposed Development, with specific reference to a dedicated right-turn lane on the northern approach of Boundary Road.
- b) No further geometric upgrading would be required at the relevant intersections under investigation from an intersection capacity point of view.
- c) All relevant intersections investigated as part of this study are currently operating at acceptable levels of service and would remain so without any development in the area and a steady growth in background vehicle traffic of 3% per annum.

Refer to **Tables D-1 and D-2 of Appendix D** for level of service criteria description respectively for unsignalised and signalised intersections.

#### 6.1.4 Summary of recommended intersection improvements (mitigating measures) as part of background traffic and proposed latent developments

**Figure 6.1** provides a graphical presentation of the recommended intersection and road network improvements as part of background traffic and approved latent developments while **Table 6.3** provides detailed information on intersection improvements recommended. The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.

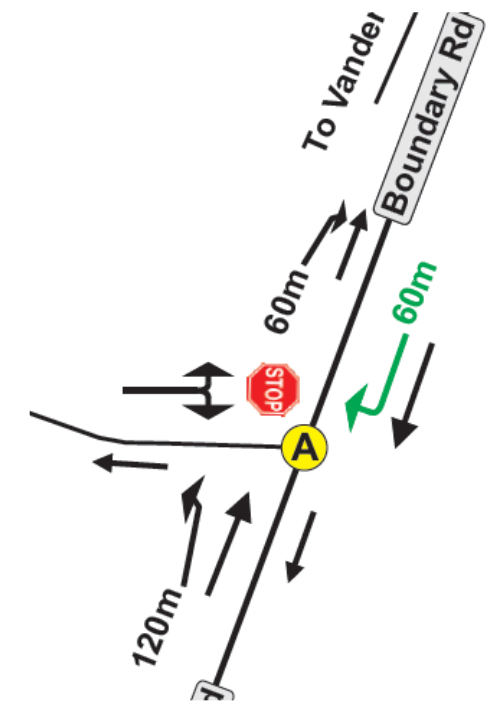




**FIGURE 6.1: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND TRAFFIC AND APPROVED LATENT DEVELOPMENTS**

**TABLE 6.3: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND VEHICLE TRAFFIC AND APPROVED LATENT DEVELOPMENTS (SCENARIOS 1 AND 2)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA			
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required		Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes								
A	Boundary Road and Road S171	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	Yes	Yes	Yes	-	-	
		South (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	-	-	-		-	Yes	Yes	-	-
		West (Road S171)	-	Yes	-	-	-	-	-	-	-	-	-	-		-	Yes	Yes	-	-
B	Road S171 and Proposed Development Access Road	East (Road S171)	Intersection B is not relevant as part of scenarios without the Proposed Development.																	
		South (Access)																		
		West (Road S171)																		



## 6.2 TRAFFIC IMPACT RELATED ASSESSMENT FOR THE PROPOSED SOLAR PV FACILITIES AND GRID CONNECTIONS INDIVIDUALLY (SCENARIOS 3 AND 4)

### 6.2.1 DETERMINATION OF VEHICLE TRIPS EXPECTED TO BE GENERATED DUE TO THE PROPOSED SOLAR PV FACILITIES AND GRID CONNECTIONS INDIVIDUALLY

**Tables 6.4** indicate the anticipated trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed construction activities associated with each proposed Solar PV Facility and Grid Connection individually while **Table 6.5** indicate the anticipated trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed operational activities of each site individually.

As part of the construction activities associated with each sites proposed Grid Connection, it is anticipated that these activities would be incorporated as part of the construction activities of each Solar PV Facility and not generate additional vehicle trips on top of what is proposed. It is although important to take note that the final Grid Connection and solar PV facilities activities are anticipated to have a low staff requirement and therefore the potential number of vehicle trips to be generated by these activities would have a negligible impact on vehicle related impacts and intersection performance.

It is possible to conclude from the relevant anticipated trips to be generated that the operational phase would generate an insignificant number of vehicle trips and therefore evaluations as part of the TIA was conducted for the construction phase only.

The trip generation rates are based on the “*COTO TMH17, South African Trip Data Manual Version 1.01, September 2013*”, information provided by the project team and assumptions made based on professional experience where information was not available.

**TABLE 6.4: ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED CONSTRUCTION ACTIVITIES ASSOCIATED WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY**

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Ave. Number Persons per Vehicle	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
<b>AM Peak Hour</b>																			
1.	Construction workers (using own transport = 50%)	115	100%	115	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle)	1	29	0	0	29	0,25	100%	0%	29	0
2.	Construction workers (Transported via 10-seater taxis = 50%)	115	100%	115	0	0%	0	10,0	10 persons per taxi (Taxi deliver workers and leave site empty)	1	12	1	12	23	0,20	50%	50%	12	12
3.	Heavy vehicles delivering consumables and plant materials per day		0%	0	20	20%	4	1,0	Delivery vehicles expected during peak periods	1	4	1	4	8	2,00	50%	50%	4	4
<b>TOTAL</b>														<b>60</b>				<b>44</b>	<b>16</b>
<b>PM Peak Hour</b>																			
1.	Construction workers (using own transport = 50%)	115	100%	115	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle)	0	0	1	29	29	0,25	0%	100%	0	29
2.	Construction workers (Transported via 10-seater taxis = 50%)	115	100%	115	0	0%	0	10,0	40 persons per bus (Bus deliver workers and leave site empty)	1	12	1	12	23	0,20	50%	50%	12	12
3.	Heavy vehicles delivering consumables and plant materials per day		0%	0	20	20%	4	1,0	Delivery vehicles expected during peak periods	1	4	1	4	8	2,00	50%	50%	4	4
<b>TOTAL</b>														<b>60</b>				<b>16</b>	<b>44</b>

**TABLE 6.5: ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED OPERATIONAL ACTIVITIES ASSOCIATED WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY**

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Ave. Number Persons per Vehicle	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
<b>AM Peak Hour</b>																			
1.	Operational Day Staff (using own transport = 100%)	12	72%	9	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle).	1	3	0	0	3	0,25	100%	0%	2	0
2.	Operational Shift Staff (using own transport = 100%)	5	27%	1				4,0	Trips per Worker (4 Persons per Vehicle). One shift end and next start	1	1	1	1	3	0,50	50%	50%	2	2
3.	Heavy vehicles delivering consumables		0%	0	1	100%	1	1,0	Delivery vehicles expected during peak periods as worst-case scenario	1	1	1	1	2	2,00	50%	50%	1	1
<b>TOTAL</b>														<b>8</b>				<b>5</b>	<b>3</b>
<b>PM Peak Hour</b>																			
1.	Operational Day Staff (using own transport = 100%)	12	100%	9	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle).	0	0	1	3	3	0,25	0%	100%	0	2
2.	Operational Shift Staff (using own transport = 100%)	5	100%	1				4,0	Trips per Worker (4 Persons per Vehicle). One shift end and next start	1	1	1	1	3	0,50	50%	50%	2	2
3.	Heavy vehicles delivering consumables		0%	0	1	100%	1	1,0	Delivery vehicles expected during peak periods as worst-case scenario	1	1	1	1	2	2,00	50%	50%	1	1
<b>TOTAL</b>														<b>8</b>				<b>3</b>	<b>5</b>

## 6.2.2 DETERMINATION OF THE TOTAL TRAFFIC EXPECTED TO BE GENERATED AT THE RELEVANT INTERSECTIONS AS PART OF EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY

The detailed traffic-related investigation was conducted for the construction phase relevant to each proposed Solar PV Facility and Grid Connection individually. The following figures are relevant:

- a) **Figure B-5:** Anticipated vehicle trip distribution relevant to all sites of the Proposed Development (Access Alternative 1).
- b) **Figure B-6:** Anticipated vehicle trip distribution relevant to all sites of the Proposed Development (Access Alternative 2).
- c) **Figure B-7:** Anticipated vehicle trips to be generated relevant to each site individually of the Proposed Development (Access Alternative 1).
- d) **Figure B-8:** Anticipated vehicle trips to be generated relevant to each site individually of the Proposed Development (Access Alternative 2).
- e) **Figure B-9:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually) (**Scenario 3-1**).
- f) **Figure B-10:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually) (**Scenario 3-2**).
- g) **Figure B-11:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually) (**Scenario 4-1**).
- h) **Figure B-12:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually) (**Scenario 4-2**).

## 6.2.3 DETERMINATION OF THE LEVELS OF SERVICE AT THE RELEVANT INTERSECTIONS AS PART OF EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY

The “**SIDRA Intersection**” software was used as an aid for the design and evaluation of the relevant intersections. The evaluations determine the intersection levels of service (LOS) which qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, manoeuvrability, delay, and safety. The following intersections were evaluated for levels of service:

- a) **Point A:** Intersection of Boundary Road and Road S171.
- b) **Point B:** Intersection of Road S171 and Proposed Development Access Road 1.
- c) **Point C:** Intersection of Boundary Road and Proposed Development Access Road 2.

In **Appendix C Tables C-2.1 to C-2.2** indicates the levels of service and the degree of saturation calculated for the relevant intersections for the respective scenarios:

- a) **Table C-2.1:** Levels of service for various approaches for the year 2021 (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually) (**Scenario 3-1**).
- b) **Table C-2.2:** Levels of service for various approaches for the year 2021 (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually) (**Scenario 3-2**).
- c) **Table C-2.3:** Levels of service for various approaches for the year 2026 (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 1 (Construction Phase) (Relevant to all sites individually) (**Scenario 4-1**).
- d) **Table C-2.4:** Levels of service for various approaches for the year 2026 (background traffic) **with** the proposed Pure Source Mine **with** one of the proposed sites with Access Alternative 2 (Construction Phase) (Relevant to all sites individually) (**Scenario 4-2**).

From **Tables C-2.1 to C-2.4** it is possible to note that:

- a) No additional geometric upgrading at **Point A** would be required as long as the recommended dedicated right-turn lane is provided, which is recommended as part of the scenarios without the Proposed Development (Scenarios 1 and 2).
- b) The intersection of Road S171 and the Proposed Development Access Road 1 (**Point B**), should this access point be utilised, would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- c) The intersection of Boundary Road and the Proposed Development Access Road 2 (**Point C**), should this access point be utilised, would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- d) Reserve capacity is available at the relevant intersections on the existing road network.

Refer to **Tables D-1 and D-2 of Appendix D** for level of service criteria description respectively for unsignalised and signalised intersections.

**Tables 6.6 and 6.7** provides a summary of the available reserve capacity on the various sections of roads that were investigated. The assumed free-flow capacity of individual lanes is relevant provided that the intersections have reserve capacity available for the lanes of the intersections.

**TABLE 6.6: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (UTILISING ACCESS ALTERNATIVE 1)**

Point	Intersection	Direction of Road Section	Capacity per Lane	Number of Lanes	Total Capacity	Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection		Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection	
						2021		2021		2026		2026	
						AM	PM	AM	PM	AM	PM	AM	PM
A	Boundary Road and Road S171	North (Boundary Rd)	1100	1	1100	80	77	1020	1023	87	81	1013	1019
		South (Boundary Rd)	1100	1	1100	58	91	1042	1009	62	97	1038	1003
		West (Road S171)	700	1	700	94	75	606	626	112	76	588	624
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	700	1	700	75	109	626	591	76	110	624	590
		South (Proposed Acc 1)	Not relevant. Proposed access road.										
		West (Road S171)	700	1	700	59	59	641	641	68	60	632	640



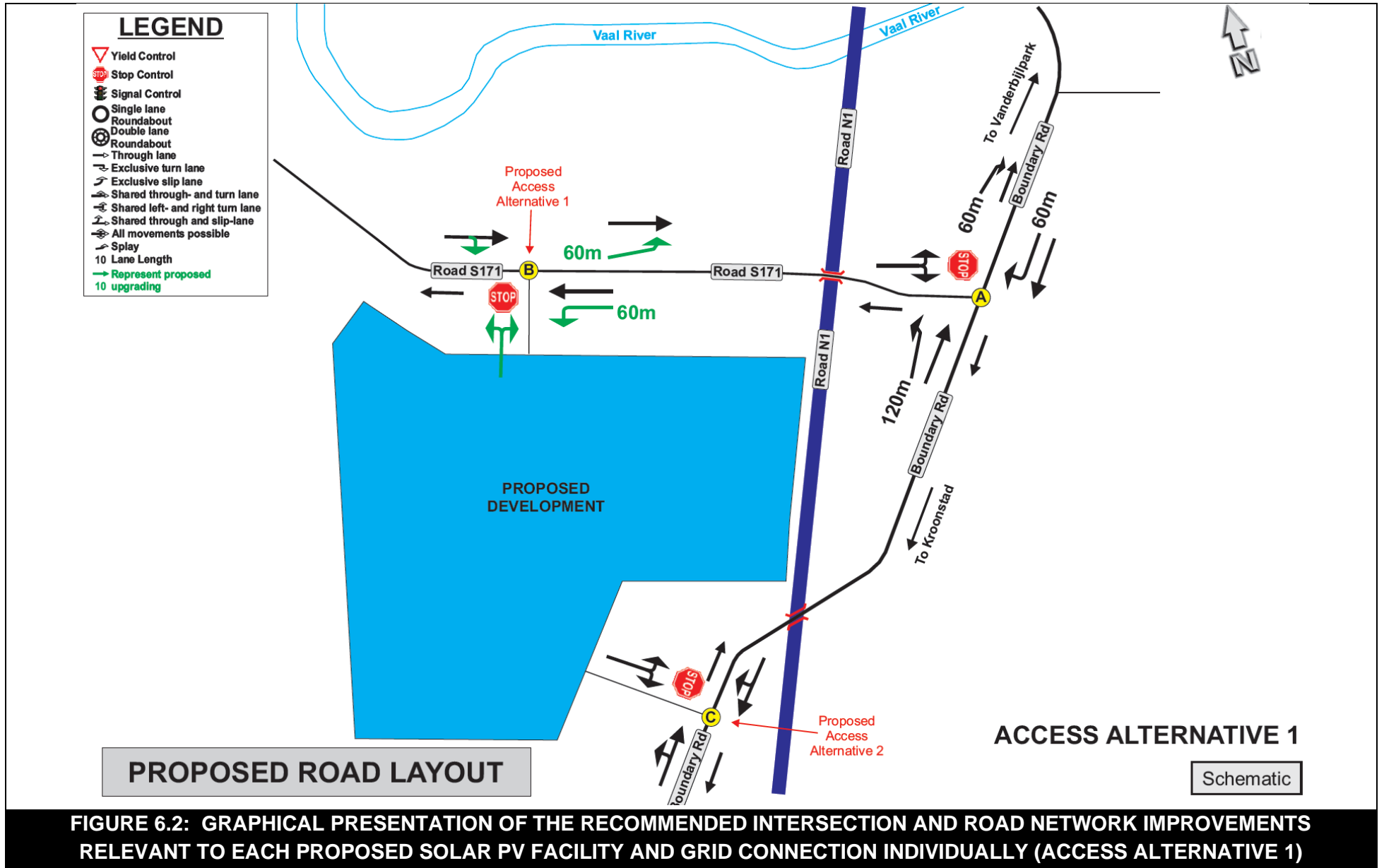
**TABLE 6.7: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (UTILISING ACCESS ALTERNATIVE 2)**

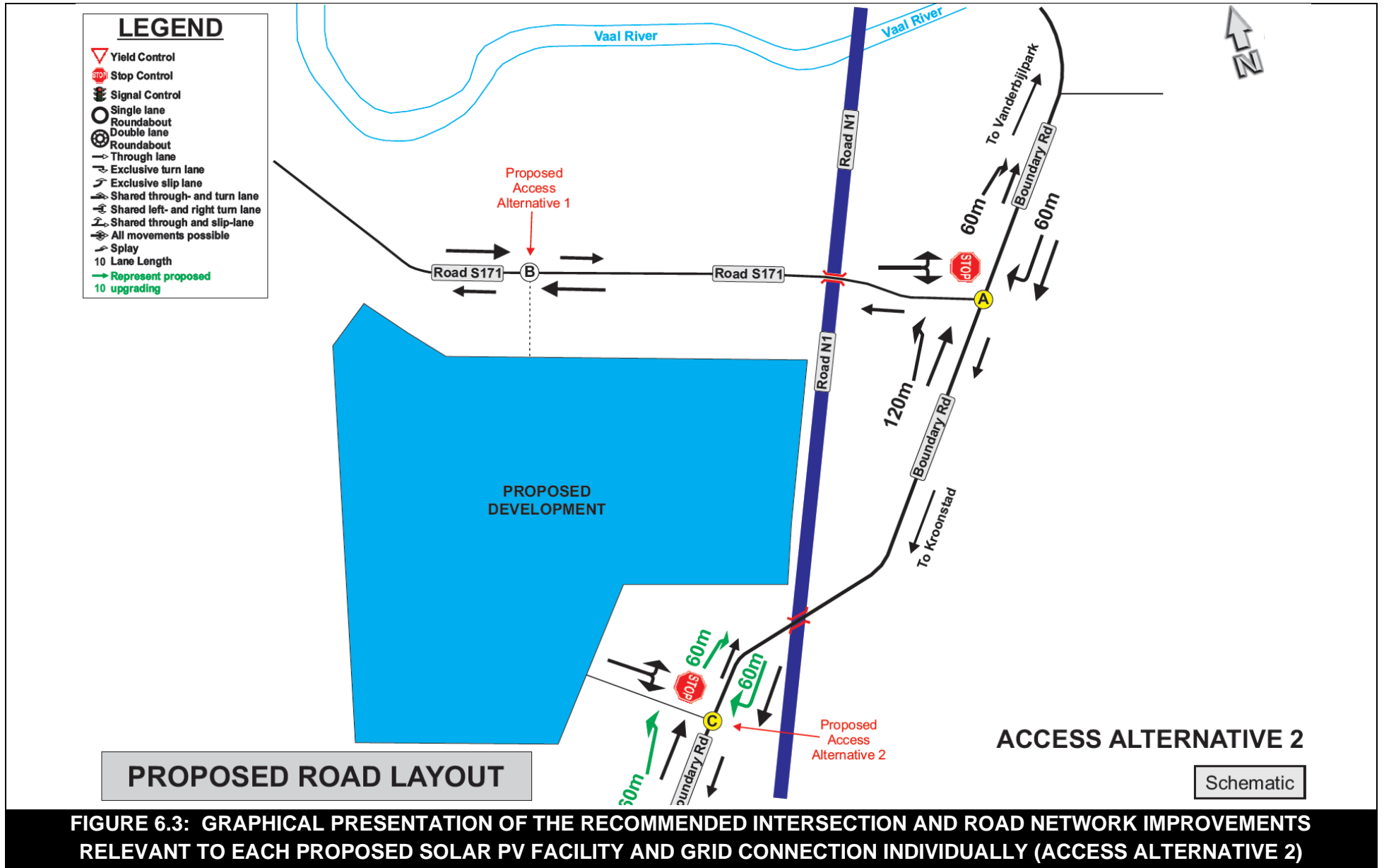
Point	Intersection	Direction of Road Section	Capacity per Lane	Number of Lanes	Total Capacity	Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection		Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection	
						2021		2021		2026		2026	
						AM	PM	AM	PM	AM	PM	AM	PM
A	Boundary Road and Road S171	North (Boundary Rd)	1100	1	1100	80	77	1020	1023	87	81	1013	1019
		South (Boundary Rd)	1100	1	1100	72	77	1028	1023	76	83	1024	1017
		West (Road S171)	700	1	700	67	59	633	641	68	60	632	640
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	1100	1	1100	76	68	1024	1032	82	71	1018	1029
		South (Boundary Rd)	1100	1	1100	58	91	1042	1009	62	97	1038	1003
		West (Proposed Acc 2)	Not relevant. Proposed access road.										

#### 6.2.4 SUMMARY OF RECOMMENDED INTERSECTION IMPROVEMENTS (MITIGATING MEASURES) RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY

**Figure 6.2** (should Access Alternative 1 be used) and **Figure 6.3** (should Access Alternative 2 be used) provides a graphical presentation of the recommended intersection and road network improvements relevant to each proposed Solar PV Facility and Grid Connection individually while **Table 6.8** (should Access Alternative 1 be used) and **Table 6.9** (should Access Alternative 2 be used) provides detailed information on intersection improvements recommended. The last mentioned is relevant to each proposed site if constructed and operated individually, one at a time.

The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.





**TABLE 6.8: RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA									
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways					
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes													
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																						
		South (Boundary Rd)																							
		West (Road S171)																							
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	Yes	-	-	-	-	Yes, 60m	-	Yes, 60m	-	-	Road Safety	Yes	Yes	Yes	-	-							
		South (Access Alternative 1)	-	Yes	-	-	-	-	-	-	-	1	Access				-	-							
		West (Road S171)	Yes	-	-	-	-	-	-	-	-	-	-				-	-							

**TABLE 6.9: RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA									
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways					
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes													
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																						
		South (Boundary Rd)																							
		West (Road S171)																							
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	Yes	Yes	Yes	-	-							
		South (Boundary Rd)	Yes	-	-	-	-	Yes, 60m	-	-	-	-	Road Safety												
		West (Access Alternative 2)	-	Yes	-	-	-	-	-	-	-	-	-												

## 6.2.5 IMPACT SIGNIFICANCE RATINGS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY

The following tables and figures provide a summary of the impact ratings respectively without the Proposed Development and with each proposed Solar PV Facility and Grid Connection individually:

- a) **Table 6.10:** Summary of impact ratings **with** the proposed Pure Source Mine **without** the Proposed Development.
- b) **Table 6.11:** Summary of impact ratings **with** the proposed Pure Source Mine **with** each proposed Solar PV Facility and Grid Connection individually.

**Tables 6.10** and **6.11** were derived from **Tables E-1** to **E-3** of **Appendix E** of the report that provides the criteria used in terms of the assessments process.

It is possible to conclude from **Tables 6.10** and **6.11** that with the recommended background mitigation measures implemented in order to mitigate the existing (background) impacts on the road network and vehicle traffic related elements without and with the Proposed Development that:

- a) That Road S171 would require repairing and rehabilitation regardless of the proposed Pure Source Mine and the each proposed Solar PV Facility and Grid Connection individually in order to mitigate the deteriorating roadway and the impact it that has on all developments within the area.
- b) The anticipated vehicle traffic to be generated by each proposed Solar PV Facility and Grid Connection individually during the construction phase would by itself have a manageable impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.
- c) The anticipated vehicle traffic to be generated by each proposed Solar PV Facility and Grid Connection individually would by itself have an insignificant impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.

**TABLE 6.10: IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITHOUT EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY**

RECEPTOR	ACTIVITY	IMPACT	BEFORE BACKGROUND MITIGATION					AFTER BACKGROUND MITIGATION					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	H	VH	H	Very High	H	Very High	VL	H	H	Med	H	Med	Road S171 requires rehabilitation regardless of any new development.
		2. Relevant intersections (Need for additional lanes)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	No additional lanes from a capacity point of view required.
	Road Safety Matters	3. Intersection (access) spacing	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Point A is an existing intersection and is acceptable.
		4. Vertical road alignment	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Vertical Road Alignment acceptable.
		5. Available sight distance at intersections (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Point A is an existing intersection and is acceptable.
		6. Speed limit along roads (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Speed limits along roads acceptable.
		7. Relevant intersections (Need for dedicated left- and right-turn lanes, Point A)	H	VH	M	High	M	Med	L	H	M	Med	M	Low	Dedicated right-turn lane required at Point A.
		8. Pedestrian movements (with reference to access roads and intersections) (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Limited pedestrian movements observed during surveys. No pedestrian movement envisaged as part of new developments.
		9. Public transport loading and off-loading	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Proper loading- and off-loading areas will be provided on site of new developments.



**TABLE 6.11: IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITH EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (WITH BACKGROUND MITIGATION MEASURES AND RECOMMENDED INTERSECTION GEOMETRY IMPROVEMENTS AT POINTS B AND C)**

RECEPTOR	ACTIVITY	IMPACT	IMPACT RATING RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY					NO ADDITIONAL MITIGATION REQUIRED					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road	1. Relevant road sections (reconstructing/repairing of roads)	VL	H	H	Med	H	Med	No additional improvements required as part of each proposed Solar PV Facility and Grid Connection individually, as long as background improvements are implemented and recommended intersection geometry at Points B and C are implemented.	Impact on road condition due to Scafell Solar PV Facility and Grid Connection regarded as insignificant for all phases.					
		2. Relevant intersections (Need for additional lanes)	VL	M	M	Low	M	Very Low			No additional lanes from a capacity point of view required.				
	Road Safety Matters	3. Intersection (access) spacing	VL	M	M	Low	M	Very Low			Point A is an existing intersection and is acceptable. Proposed Point B position to be determined as part of detail design phase and should comply with requirements.				
		4. Vertical road alignment	VL	M	M	Low	M	Very Low			Vertical Road Alignment acceptable.				
		5. Available sight distance at intersections (Points A and B)	VL	M	M	Low	M	Very Low			Point A is an existing intersection and is acceptable. Proposed Point B position to be determined as part of detail design phase and should comply with requirements.				
		6. Speed limit along roads (Points A and B)	VL	M	M	Low	M	Very Low			Speed limits along roads acceptable.				
		7. Relevant intersections (Need for dedicated left- and right-turn lanes, Points A, B and C)	L	H	M	Med	M	Low			Dedicated right-turn lane required at Point A. Left-turn deceleration lane required at Point B. Left-turn deceleration lane and dedicated right-turn lane required at Point C.				
		8. Pedestrian movements (with reference to access roads and intersections) (Points A and C)	VL	M	M	Low	M	Very Low			Limited pedestrian movements observed during surveys. No pedestrian movement envisaged as part of new developments.				
		9. Public transport loading and off-loading	VL	M	M	Low	M	Very Low			Proper loading- and off-loading areas will be provided on site of new development.				

### 6.3 TRAFFIC IMPACT RELATED ASSESSMENT FOR THE PROPOSED DEVELOPMENT (ALL SITES CUMALITIVELY (SCENARIOS 5 AND 6))

#### 6.3.1 Determination of vehicle trips expected to be generated due to the Proposed Development and Grid Connections cumulatively

It is anticipated that in the event of the construction of all four proposed Solar PV Facilities and Grid Connections that delivery of construction materials would increase in order to adequately supply the needs of the construction activities and complete construction of all four facilities within required timelines. It is therefore assumed that delivery of construction materials for the construction of all four sites at the same time would result in double the number of delivery vehicles than that of the construction of a single site.

It is also envisaged that construction staff would not be the same as if each site is constructed individually but would rather supplement staff to each site. It is therefore anticipated that the construction of all four sites at the same time would result in double the number of employees than that of the construction of a single site.

**Tables 6.12** indicate the anticipated trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed construction activities associated with the Proposed Development and Grid Connection cumulatively for all four sites while **Table 6.13** indicate the anticipated trip generation rates, the number of vehicle trips which are expected to be generated due to the proposed operational activities of the Proposed Development cumulatively.

As part of the construction activities associated with the proposed Grid Connection, it is anticipated that these activities would be incorporated as part of the construction activities of the Solar PV Facilities and not generate additional vehicle trips on top of what is proposed. It is although important to take note that the final Grid Connection activities are anticipated to have a low staff requirement and therefore the potential number of vehicle trips to be generated by these activities would have a negligible impact on vehicle related impacts and intersection performance.

It is possible to conclude from the relevant anticipated trips to be generated that the operational phase would generate an insignificant number of vehicle trips and therefore evaluations as part of the TIA was conducted for the construction phase.

The trip generation rates are based on the “*COTO TMH17, South African Trip Data Manual Version 1.01, September 2013*”, information provided by the project team and assumptions made based on professional experience where information was not available.

**TABLE 6.12: ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED CONSTRUCTION ACTIVITIES ASSOCIATED WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY**

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Ave. Number Persons per Vehicle	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
<b>AM Peak Hour</b>																			
1.	Construction workers (using own transport = 50%)	230	100%	230	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle)	1	58	0	0	58	0,25	100%	0%	58	0
2.	Construction workers (Transported via 10-seater taxis = 50%)	230	100%	230	0	0%	0	10,0	10 persons per taxi (Taxi deliver workers and leave site empty)	1	23	1	23	46	0,20	50%	50%	23	23
3.	Heavy vehicles delivering consumables and plant materials per day		0%	0	40	20%	8	1,0	Delivery vehicles expected during peak periods	1	8	1	8	16	2,00	50%	50%	8	8
<b>TOTAL</b>														<b>120</b>				<b>89</b>	<b>31</b>
<b>PM Peak Hour</b>																			
1.	Construction workers (using own transport = 50%)	230	100%	230	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle)	0	0	1	58	58	0,25	0%	100%	0	58
2.	Construction workers (Transported via 10-seater taxis = 50%)	230	100%	230	0	0%	0	10,0	40 persons per bus (Bus deliver workers and leave site empty)	1	23	1	23	46	0,20	50%	50%	23	23
3.	Heavy vehicles delivering consumables and plant materials per day		0%	0	40	20%	8	1,0	Delivery vehicles expected during peak periods	1	8	1	8	16	2,00	50%	50%	8	8
<b>TOTAL</b>														<b>120</b>				<b>31</b>	<b>89</b>

**TABLE 6.13: ANTICIPATED TRIP GENERATION RATES, THE NUMBER OF VEHICLE TRIPS WHICH ARE EXPECTED TO BE GENERATED DUE TO THE PROPOSED OPERATIONAL ACTIVITIES ASSOCIATED WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY**

Item	Component	Number Workers per Day	% Workers active during Peak Hour	Number Workers Active per Peak Hour	Number Trucks Per Day	% Trucks active during Peak Hour	Number Trucks active during Peak Hour	Assumed Ave. Number Persons per Vehicle	Comments	Trip Generation Calculations for Peak Hour						Final Trip Information for Traffic Engineering Calculations			
										If Inward Movement is relevant Value = 1	Number Vehicle Trips for Inwards Direction	If Outward Movement is relevant Value = 1	Number Vehicle Trips for Outwards Direction	Total Number Vehicle Trips Generated during Peak Hour (In & Out)	Calculated Trip Generation Rate per Vehicle during Peak Hour	Trip Dist. %		Trip Generation	
																In	Out	In	Out
<b>AM Peak Hour</b>																			
1.	Operational Day Staff (using own transport = 100%)	48	100%	48	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle).	1	12	0	0	12	0,25	100%	0%	12	0
2.	Operational Shift Staff (using own transport = 100%)	20	100%	20				4,0	Trips per Worker (4 Persons per Vehicle). One shift end and next start	1	5	1	5	10	0,50	50%	50%	5	5
3.	Heavy vehicles delivering consumables		0%	0	4	20%	1	1,0	Delivery vehicles expected during peak periods as worst-case scenario	1	1	1	1	2	2,00	50%	50%	1	1
<b>TOTAL</b>														<b>24</b>				<b>18</b>	<b>6</b>
<b>PM Peak Hour</b>																			
1.	Operational Day Staff (using own transport = 100%)	48	100%	48	0	0%	0	4,0	Trips per Worker (4 Persons per Vehicle).	0	0	1	12	12	0,25	0%	100%	0	12
2.	Operational Shift Staff (using own transport = 100%)	20	100%	20				4,0	Trips per Worker (4 Persons per Vehicle). One shift end and next start	1	5	1	5	10	0,50	50%	50%	5	5
3.	Heavy vehicles delivering consumables		0%	0	4	20%	1	1,0	Delivery vehicles expected during peak periods as worst-case scenario	1	1	1	1	2	2,00	50%	50%	1	1
<b>TOTAL</b>														<b>24</b>				<b>6</b>	<b>18</b>

6.3.2 Determination of the total traffic expected to be generated at the relevant intersections as part of the Proposed Development and Grid Connections cumulatively

The detailed traffic-related investigation was conducted for the construction phase of the Proposed Development and Grid Connection cumulatively. The following figures are relevant:

- a) **Figure B-5:** Anticipated vehicle trip distribution relevant to all sites of the Proposed Development (Access Alternative 1).
- b) **Figure B-6:** Anticipated vehicle trip distribution relevant to all sites of the Proposed Development (Access Alternative 2).
- c) **Figure B-13:** Anticipated vehicle trips to be generated relevant to the Proposed Development and Grid Connections Cumulatively (Access Alternative 1).
- d) **Figure B-14:** Anticipated vehicle trips to be generated relevant to the Proposed Development and Grid Connections Cumulatively (Access Alternative 2).
- e) **Figure B-15:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 1 (Construction Phase) (**Scenario 5-1**).
- f) **Figure B-16:** Projected 2021 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 2 (Construction Phase) (**Scenario 5-2**).
- g) **Figure B-17:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 1 (Construction Phase) (**Scenario 6-1**).
- h) **Figure B-18:** Projected 2026 peak hour traffic (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 2 (Construction Phase) (**Scenario 6-2**).

6.3.3 Determination of the levels of service at the relevant intersections as part of the Proposed Development and Grid Connections cumulatively

The “**SIDRA Intersection**” software was used as an aid for the design and evaluation of the relevant intersections. The evaluations determine the intersection levels of service (LOS) which qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, manoeuvrability, delay, and safety. The following intersections were evaluated for levels of service:

- a) **Point A:** Intersection of Boundary Road and Road S171.
- b) **Point B:** Intersection of Road S171 and Proposed Development Access 1.
- c) **Point C:** Intersection of Boundary Road and Proposed Development Access 2.

In **Appendix C Tables C-3.1 to C-3.4** indicates the levels of service and the degree of saturation calculated for the relevant intersections for the respective scenarios:

- a) **Table C-3.1:** Levels of service for various approaches for the year 2021 (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 1 (**Scenario 5-1**).
- b) **Table C-3.2:** Levels of service for various approaches for the year 2021 (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 2 (**Scenario 5-2**).
- c) **Table C-3.3:** Levels of service for various approaches for the year 2026 (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 1 (**Scenario 6-1**).
- d) **Table C-3.4:** Levels of service for various approaches for the year 2026 (background traffic) **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections Cumulatively with Access Alternative 2 (**Scenario 6-2**).

From **Tables C-3.1 to C-3.4** it is possible to note that:

- a) No additional geometric upgrading at **Point A** would be required as long as the recommended dedicated right-turn lane is provided, which is recommended as part of the scenarios (Scenarios 1 and 2) without the Proposed Development.
- b) The intersection of Road S171 and the Proposed Development Access Road 1 (**Point B**) would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- c) The intersection of Boundary Road and the Proposed Development Access Road 2 (**Point C**), should this access point be utilised, would operate at acceptable levels of service for the relevant timeframe for which evaluations were conducted as part of the construction phase. This is anticipated to remain relevant for the operational phase since the operational phase is expected to generate less vehicle traffic than the construction phase.
- d) Reserve capacity is available at the relevant intersections on the existing road network.

Refer to **Tables D-1 and D-2 of Appendix D** for level of service criteria description respectively for unsignalised and signalised intersections.

**Tables 6.14 and 6.15** provides a summary of the available reserve capacity on the various sections of roads that were investigated. The assumed free-flow capacity of individual lanes is relevant provided that the intersections have reserve capacity available for the lanes of the intersections.

**TABLE 6.14: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS AS PART OF THE PROPOSED DEVELOPMENT CUMILITIVELY (ACCESS ALTERNATIVE 1)**

Point	Intersection	Direction of Road Section	Capacity per Lane	Number of Lanes	Total Capacity	Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection		Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection	
						2021		2021		2026		2026	
						AM	PM	AM	PM	AM	PM	AM	PM
A	Boundary Road and Road S171	North (Boundary Rd)	1100	1	1100	88	99	1013	1001	95	103	1005	997
		South (Boundary Rd)	1100	1	1100	66	113	1035	987	69	119	1031	981
		West (Road S171)	700	1	700	156	90	545	610	157	91	543	609
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	700	1	700	90	154	610	547	91	154	609	546
		South (Proposed Acc 1)	Not relevant. Proposed access road.										
		West (Road S171)	700	1	700	67	59	633	641	68	60	632	640

**TABLE 6.15: AVAILABLE RESERVE CAPACITY FOR RELEVANT ROAD SECTIONS AS PART OF THE PROPOSED DEVELOPMENT CUMILITIVELY (ACCESS ALTERNATIVE 2)**

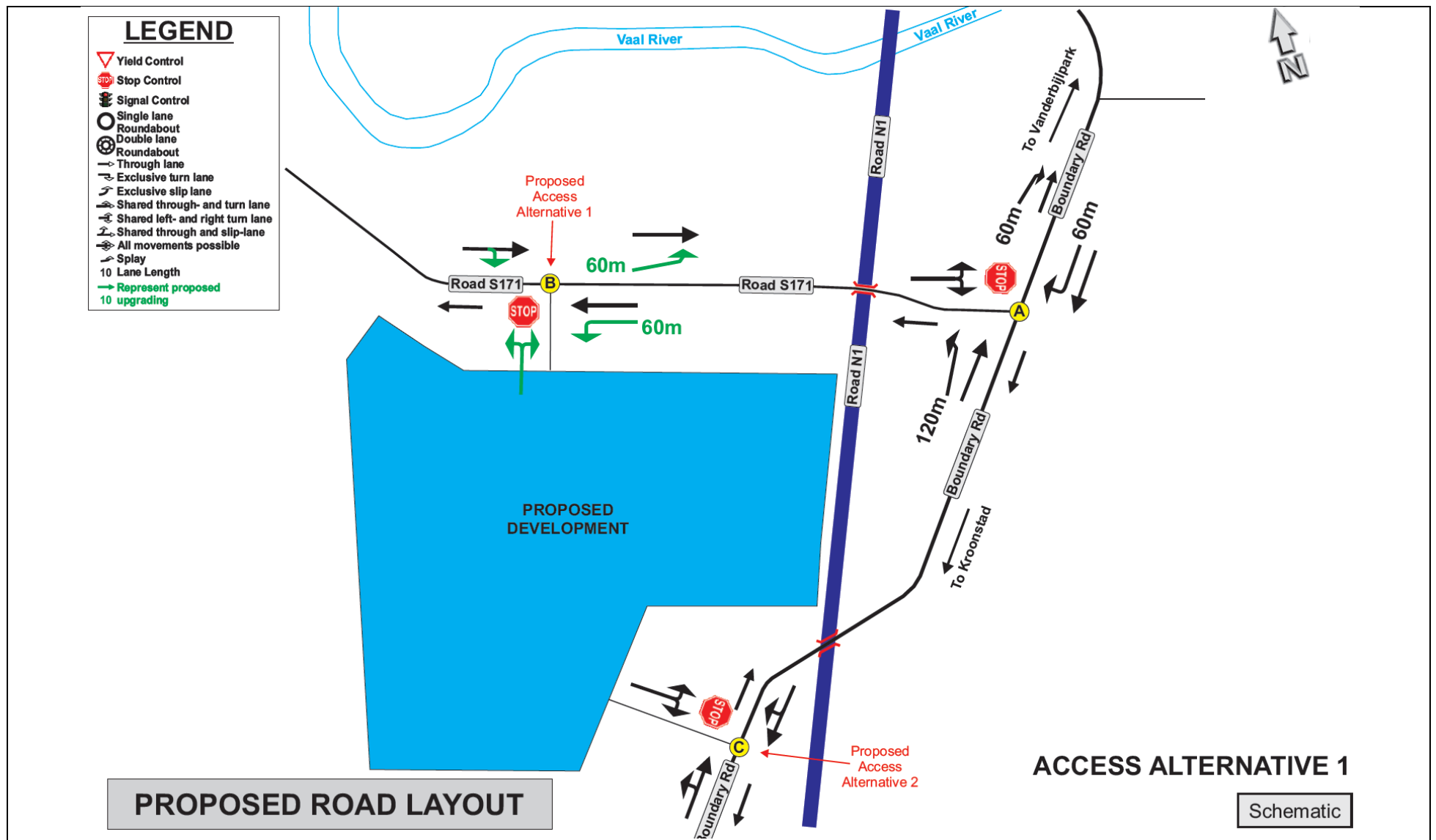
Point	Intersection	Direction of Road Section	Capacity per Lane	Number of Lanes	Total Capacity	Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection		Actual Number of Vehicles With Solar PV Facility and Grid Connection		Reserve Capacity Available With Solar PV Facility and Grid Connection	
						2021		2021		2026		2026	
						AM	PM	AM	PM	AM	PM	AM	PM
A	Boundary Road and Road S171	North (Boundary Rd)	1100	1	1100	88	99	1012	1001	95	104	1005	996
		South (Boundary Rd)	1100	1	1100	94	85	1006	1015	98	91	1002	1009
		West (Road S171)	700	1	700	67	59	633	641	68	60	632	640
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	1100	1	1100	84	90	1016	1010	90	93	1010	1007
		South (Boundary Rd)	1100	1	1100	66	113	1034	987	70	119	1030	981
		West (Proposed Acc 2)	Not relevant. Proposed access road.										



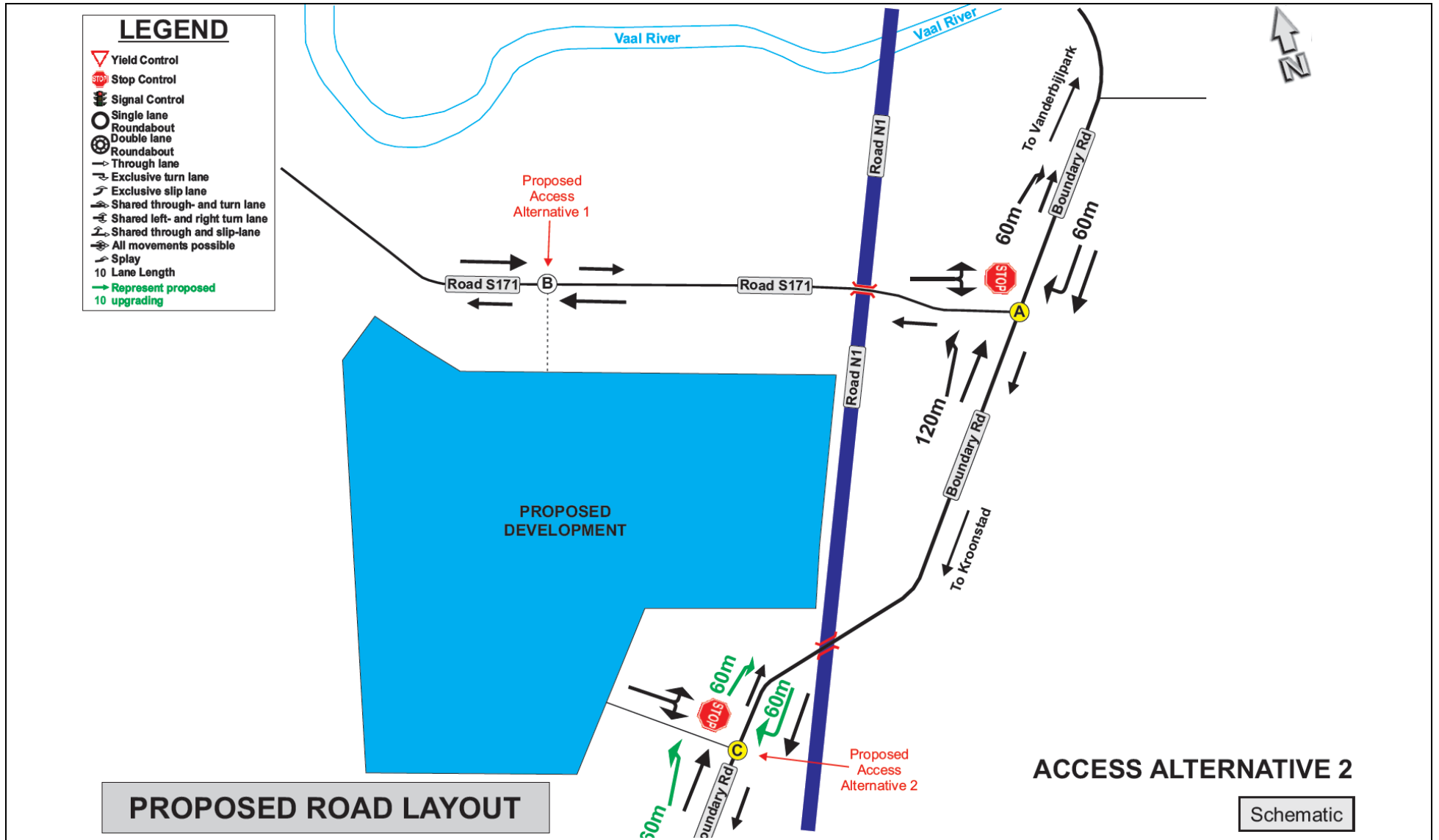
6.3.4 Summary of recommended intersection improvements (mitigating measures) as part of the Proposed Development and Grid Connections cumulatively

**Figure 6.4** (should Access Alternative 1 be used) and **Figure 6.5** (should Access Alternative 2 be used) provides a graphical presentation of the recommended intersection and road network improvements relevant to each proposed Solar PV Facilities and Grid Connections cumulatively while **Table 6.16** (should Access Alternative 1 be used) and **Table 6.17** (should Access Alternative 2 be used) provides detailed information on intersection improvements recommended.

The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.



**FIGURE 6.4: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY ACCESS ALTERNATIVE 1)**



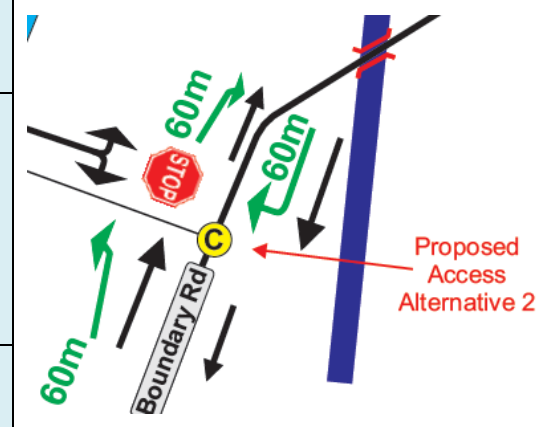
**FIGURE 6.5: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY ACCESS ALTERNATIVE 2)**

**TABLE 6.16: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA										
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways						
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes														
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																							
		South (Boundary Rd)																								
		West (Road S171)																								
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	Yes	-	-	-	-	Yes, 60m	-	Yes, 60m	-	-	Road Safety	Yes	Yes	Yes	-	-								
		South (Proposed Acc 1)	-	Yes	-	-	-	-	-	-	-	1	Access				-	-								
		West (Road S171)	Yes	-	-	-	-	-	-	-	-	-	-				-	-		-						

**TABLE 6.17: RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED DEVELOPMENT AND GRID CONNECTIONS (ACCESS ALTERNATIVE 2)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA									
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways					
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes													
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																						
		South (Boundary Rd)																							
		West (Road S171)																							
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	Yes	Yes	Yes	-	-							
		South (Boundary Rd)	Yes	-	-	-	-	Yes, 60m	-	-	-	-	Road Safety				-	-							
		West (Access Alternative 2)	-	Yes	-	-	-	-	-	-	-	-	-				-	-							



#### 6.3.4 IMPACT SIGNIFICANCE RATINGS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY

The following tables and figures provide a summary of the impact ratings respectively with and without the Proposed Development and Grid Connections cumulatively:

- a) **Table 6.18:** Summary of impact ratings **with** the proposed Pure Source Mine **without** the Development and Grid Connections.
- b) **Table 6.19:** Summary of impact ratings **with** the proposed Pure Source Mine **with** the Proposed Development and Grid Connections cumulatively.

**Tables 6.18** and **6.19** were derived from **Tables E-1** to **E-3** of **Appendix E** of the report that provides the criteria used in terms of the assessments process.

It is possible to conclude from **Tables 6.18** and **6.19** that with the recommended background mitigation measures implemented in order to mitigate the existing (background) impacts on the road network and vehicle traffic related elements without and with the Proposed Development and Grid Connections that:

- a) That Road S171 would require repairing and rehabilitation regardless of the proposed Pure Source Mine and the Proposed Development and Grid Connections in order to mitigate the deteriorating roadway and the impact that has on all developments within the area.
- b) The anticipated vehicle traffic to be generated by The Proposed Development and Grid Connections during the construction phase would have a manageable impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.
- c) The anticipated vehicle traffic to be generated by the Proposed Development and Grid Connections cumulatively would have an insignificant impact on the existing road network with reference to road capacity, road safety and intersection performance for the operational phase.

**TABLE 6.18: IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITHOUT THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS**

RECEPTOR	ACTIVITY	IMPACT	BEFORE BACKGROUND MITIGATION					AFTER BACKGROUND MITIGATION					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road Capacity	1. Relevant road sections (reconstructing/repairing of roads)	H	VH	H	Very High	H	Very High	VL	H	H	Med	H	Med	Road S171 requires rehabilitation regardless of any new development.
		2. Relevant intersections (Need for additional lanes)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	No additional lanes from a capacity point of view required.
	Road Safety Matters	3. Intersection (access) spacing	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Point A is an existing intersection and is acceptable.
		4. Vertical road alignment	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Vertical Road Alignment acceptable.
		5. Available sight distance at intersections (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Point A is an existing intersection and is acceptable.
		6. Speed limit along roads (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Speed limits along roads acceptable.
		7. Relevant intersections (Need for dedicated left- and right-turn lanes, Point A)	H	VH	M	High	M	Med	L	H	M	Med	M	Low	Dedicated right-turn lane required at Point A.
		8. Pedestrian movements (with reference to access roads and intersections) (Point A)	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Limited pedestrian movements observed during surveys. No pedestrian movement envisaged as part of new developments.
		9. Public transport loading and off-loading	VL	M	M	Low	M	Very Low	VL	M	M	Low	M	Very Low	Proper loading- and off-loading areas will be provided on site of new developments.

**TABLE 6.19: IMPACT RATING WITH THE PROPOSED PURE SOURCE MINE WITH THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (WITH BACKGROUND MITIGATION MEASURES AND RECOMMENDED INTERSECTION GEOMETRY IMPROVEMENTS AT POINTS B AND C)**

RECEPTOR	ACTIVITY	IMPACT	IMPACT RATING RELEVANT TO EACH SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY					NO ADDITIONAL MITIGATION REQUIRED					Comments and Mitigation Measures		
			Intensity	Duration	Spatial Scale	Consequence	Probability	Significance	Intensity	Duration	Spatial Scale	Consequence		Probability	Significance
Road and Traffic	Road	1. Relevant road sections (reconstructing/repairing of roads)	V/L	H	H	Med	H	Med	No additional improvements required as part of the Proposed Development and Grid Connections cumulatively, as long as background improvements are implemented and recommended intersection geometry at Points B and C are implemented.						Impact on road condition due to the Proposed Development and Grid Connection regarded as insignificant for all phases.
		2. Relevant intersections (Need for additional lanes)	V/L	M	M	Low	M	Very							No additional lanes from a capacity point of view required.
	Road Safety Matters	3. Intersection (access) spacing	V/L	M	M	Low	M	Very Low							Point A is an existing intersection and is acceptable. Proposed Point B position to be determined as part of detail design phase and should comply with requirements.
		4. Vertical road alignment	V/L	M	M	Low	M	Very Low							Vertical Road Alignment acceptable.
		5. Available sight distance at intersections (Points A and B)	V/L	M	M	Low	M	Very Low							Point A is an existing intersection and is acceptable. Proposed Point B position to be determined as part of detail design phase and should comply with requirements.
		6. Speed limit along roads (Points A, B and C)	V/L	M	M	Low	M	Very Low							Speed limits along roads acceptable.
		7. Relevant intersections (Need for dedicated left- and right-turn lanes, Points A, B and C)	L	H	M	Med	M	Low							Dedicated right-turn lane required at Point A. Left-turn deceleration lane required at Point B. Left-turn deceleration lane and dedicated right-turn lane required at Point C.
		8. Pedestrian movements (with reference to access roads and intersections) (Points A and C)	V/L	M	M	Low	M	Very Low							Limited pedestrian movements observed during surveys. No pedestrian movement envisaged as part of new developments.
		9. Public transport loading and off-loading	V/L	M	M	Low	M	Very Low							Proper loading- and off-loading areas will be provided on site of new developments.



## 7. SUMMARY OF FINDINGS AND RECOMMENDATIONS

*Based on a site inspection of the existing road network adjacent to the site under investigation, traffic surveys, calculations and reference to the relevant traffic engineering guideline documents, the following findings and recommendations were made:*

### 7.1 FINDINGS

The following are discussed in terms of the findings:

- a) Traffic impact during the respective phases.
- b) Site accessibility.
- c) Sensitive road sections as part of the Proposed Development.

#### 7.1.1 Traffic impact during the respective phases

The capacity calculations for the traffic impact assessment were conducted for the years 2021 and 2026 respectively. This time frame is in line with traffic engineering guidelines and practice and is determined by the expected number of vehicle trips that could potentially be generated during any specific peak hour by a specific development.

Furthermore, owing to the type and nature of the Proposed Development, it is expected that the Proposed Development and Grid Connections will have a manageable impact on vehicle traffic during all phases, regardless of whether only one of the proposed sites are constructed and operated at one time or all the proposed sites are constructed and operated at the same time, provided that road infrastructure improvements are implemented as indicated in **Section 7.2** below, in order to mitigate the impact of the Proposed Development and Grid Connections.

## 7.1.2 Site accessibility

Access to and from the Proposed Development is planned in the following manner:

- a) Access for the Damlaagte and Scafell solar PV Facilities via a proposed new access intersection along Road S171 (Point B).
- b) Access to the Vlakfontein and Ilikwa solar PV Facilities via an existing intersection along Boundary Road (Point C).

OR

- c) Access for all relevant sites of the Proposed Development from a proposed new access intersection along Road S171 (Point B).

OR

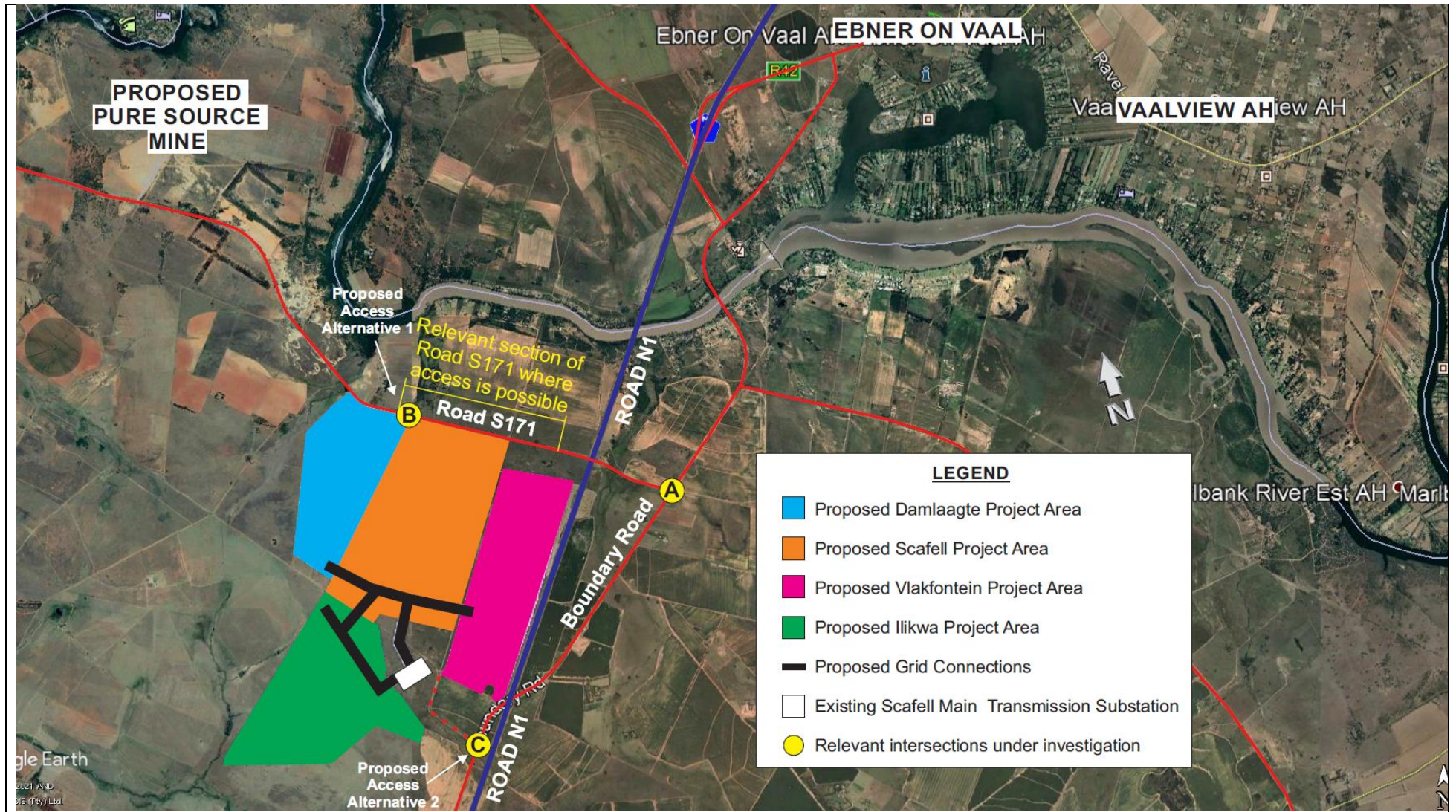
- d) Access for all relevant sites of the Proposed Development from an existing intersection along Boundary Road (Point C).

As a worst-case scenario, calculations, and evaluations as part of this report was conducted for all relevant sites of the Proposed Development to all gain access via Point B or Point C.

The final location of the proposed access intersection along Road S171, evaluated as Point B as part of this report, need to be determined as part of the detail design phase of the Proposed Development. The traffic impact assessment therefore only determined a section of Road S171 from where access is possible. Factors that were taken into consideration are as follows:

- a) Intersection and approach site distances.
- b) Road reserve availability for the provision of dedicated right-turn and left-turn deceleration lanes.
- c) Exiting road furniture which includes bridges and culverts.
- d) Other elements which include transmission towers (electricity pylons).
- e) Other existing access intersections.
- f) Proposed Development site layout.

**Figure 7.1** provides a graphical presentation of the locality of the existing access intersection from Boundary Road (Point C), and the relevant section of Road S171 from where access to and from the Proposed Development was deemed acceptable from a visual inspection, as well as an identified potential access intersection position, illustrated as Point B, that would conform to the necessary road safety measures and standards required.



**FIGURE 7.1: GRAPHICAL PRESENTATION OF THE RELEVANT SECTION OF ROAD S171 FROM WHERE ACCESS TO AND FROM THE PROPOSED DEVELOPMENT WAS DEEMED ACCEPTABLE**

### 7.1.3 Sensitive road sections as without and with the Proposed Development and Grid Connections

It was possible to conclude from the determined sensitive road sections status as described in more detail as part of **Section 5** of this report, that with the recommended background mitigation measures implemented in order to mitigate the existing (background) impacts on the road network and vehicle traffic related elements without and with the Proposed Development and Grid Connections that:

- a) That Road S171 would require repairing and rehabilitation regardless of the proposed Pure Source Mine and the Proposed Development and Grid Connections in order to mitigate the deteriorating roadway and the impact that the deteriorating roadway has on all developments within the area.
- b) The anticipated vehicle traffic to be generated by the Proposed Development and Grid Connections during the construction phase would have a manageable impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.
- c) The anticipated vehicle traffic to be generated by the Proposed Development and Grid Connections during the operational phase would have an insignificant impact on the existing road network with reference to road capacity, road safety and intersection performance for all phases.

## 7.2 RECOMMENDATIONS

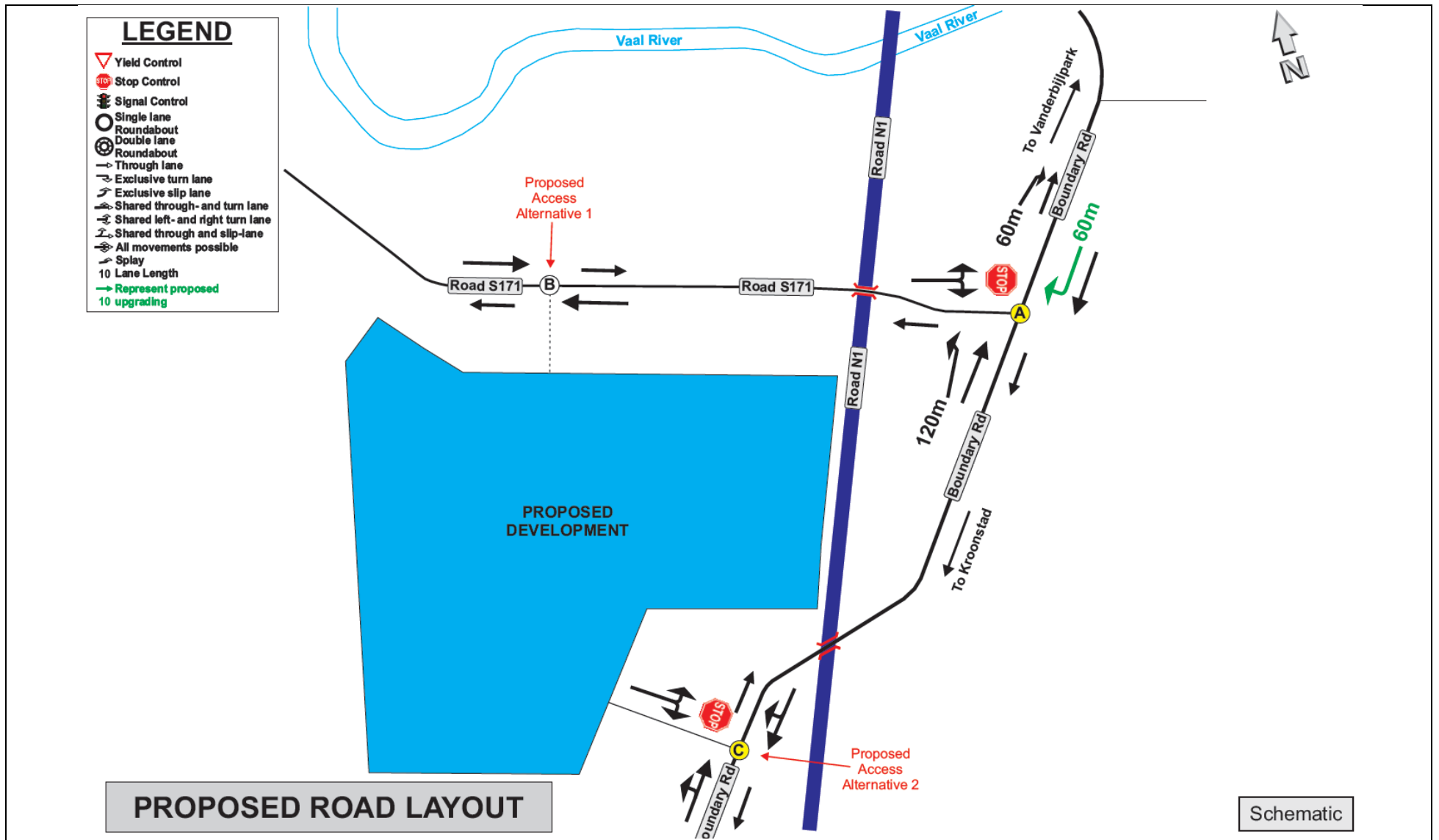
The following are discussed in terms of the recommendations:

- a) Summary of recommended intersection improvements (mitigating measures) as part of background traffic and proposed latent developments.
- b) Summary of recommended intersection improvements (mitigating measures) relevant to each Solar PV Facility and Grid Connection individually.
- c) Summary of recommended intersection improvements (mitigating measures) as part of the Proposed Development and Grid Connections cumulatively.
- d) Institutional arrangements.
- e) Reasoned opinion for authorisation.

### 7.2.1 Summary of recommended intersection improvements (mitigating measures) as part of background traffic and proposed latent developments

**Figure 7.2** provides a graphical presentation of the recommended intersection and road network improvements as part of background traffic and approved latent developments while **Table 7.1** provides detailed information on intersection improvements recommended.

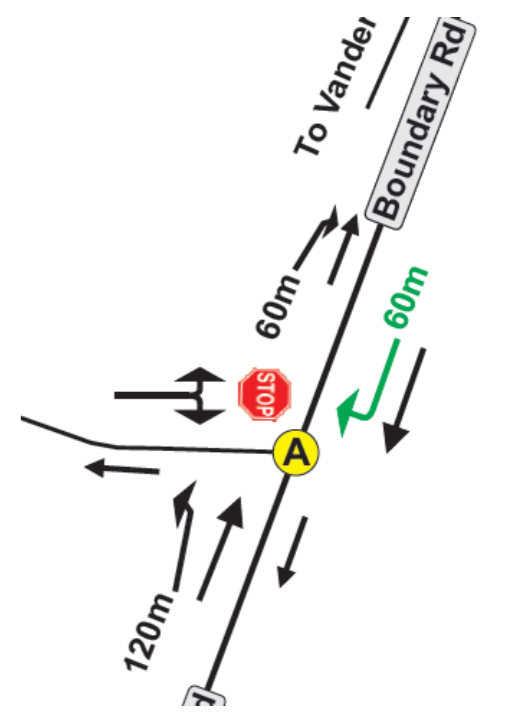
The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.



**FIGURE 7.2: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND TRAFFIC AND APPROVED LATENT DEVELOPMENTS**

**TABLE 7.1: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF BACKGROUND VEHICLE TRAFFIC AND APPROVED LATENT DEVELOPMENTS (SCENARIOS 1 AND 2)**

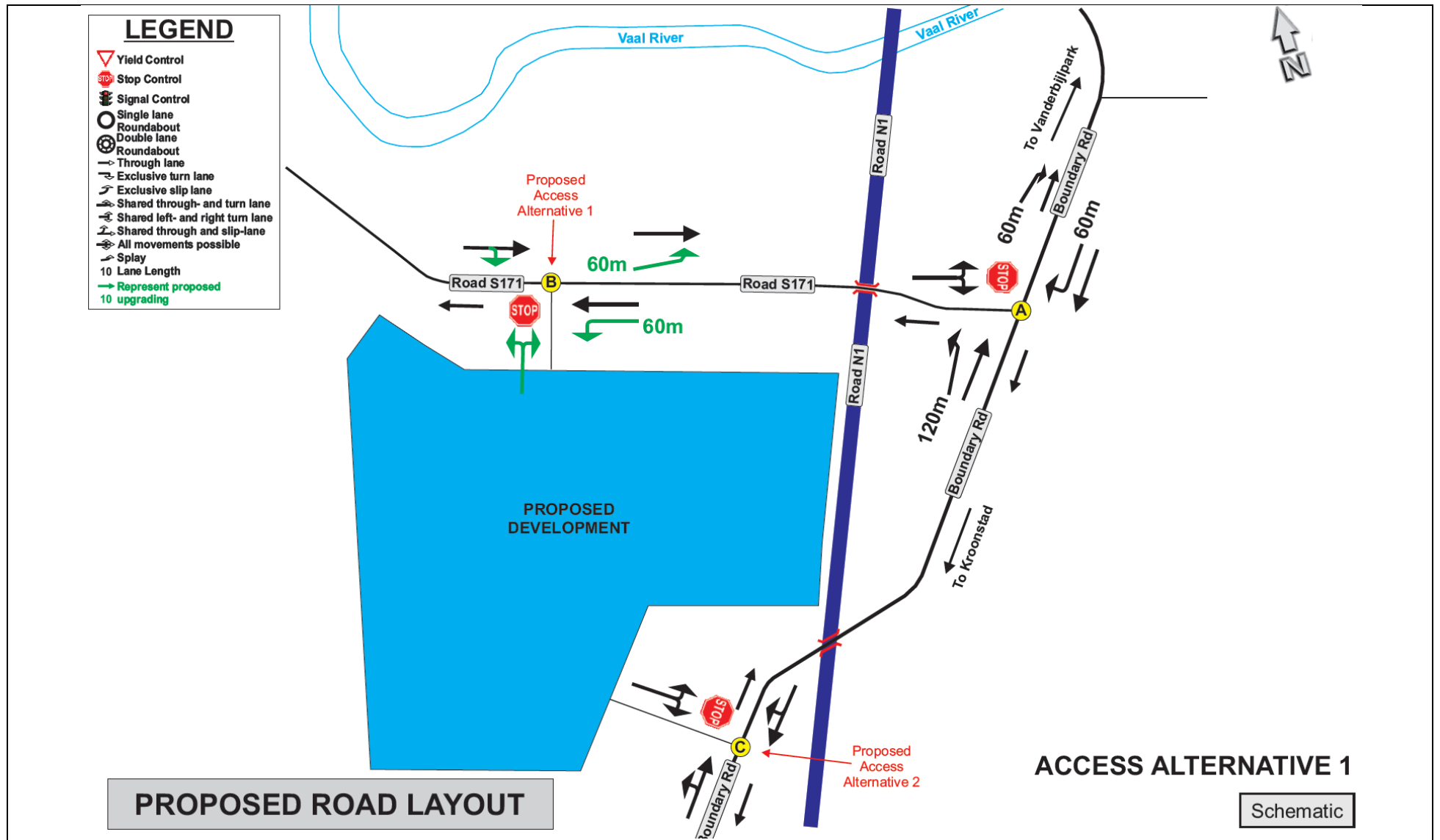
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA		
			Approach Traffic Control				Extra Lanes Required (m)						Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required		Public Transport Loading and Off-Loading	Pedestrian Walkways
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes							
A	Boundary Road and Road S171	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	-	Yes	Yes	-	-
		South (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	-
		West (Road S171)	-	Yes	-	-	-	-	-	-	-	-	-	-	-	Yes	Yes	-	-
B	Road S171 and Proposed Development Access Road	East (Road S171)	Intersection B is not relevant as part of scenarios without the Proposed Development.																
		South (Access)																	
		West (Road S171)																	



7.2.2 Summary of recommended intersection improvements (mitigating measures) relevant to each Solar PV Facility and Grid Connection individually

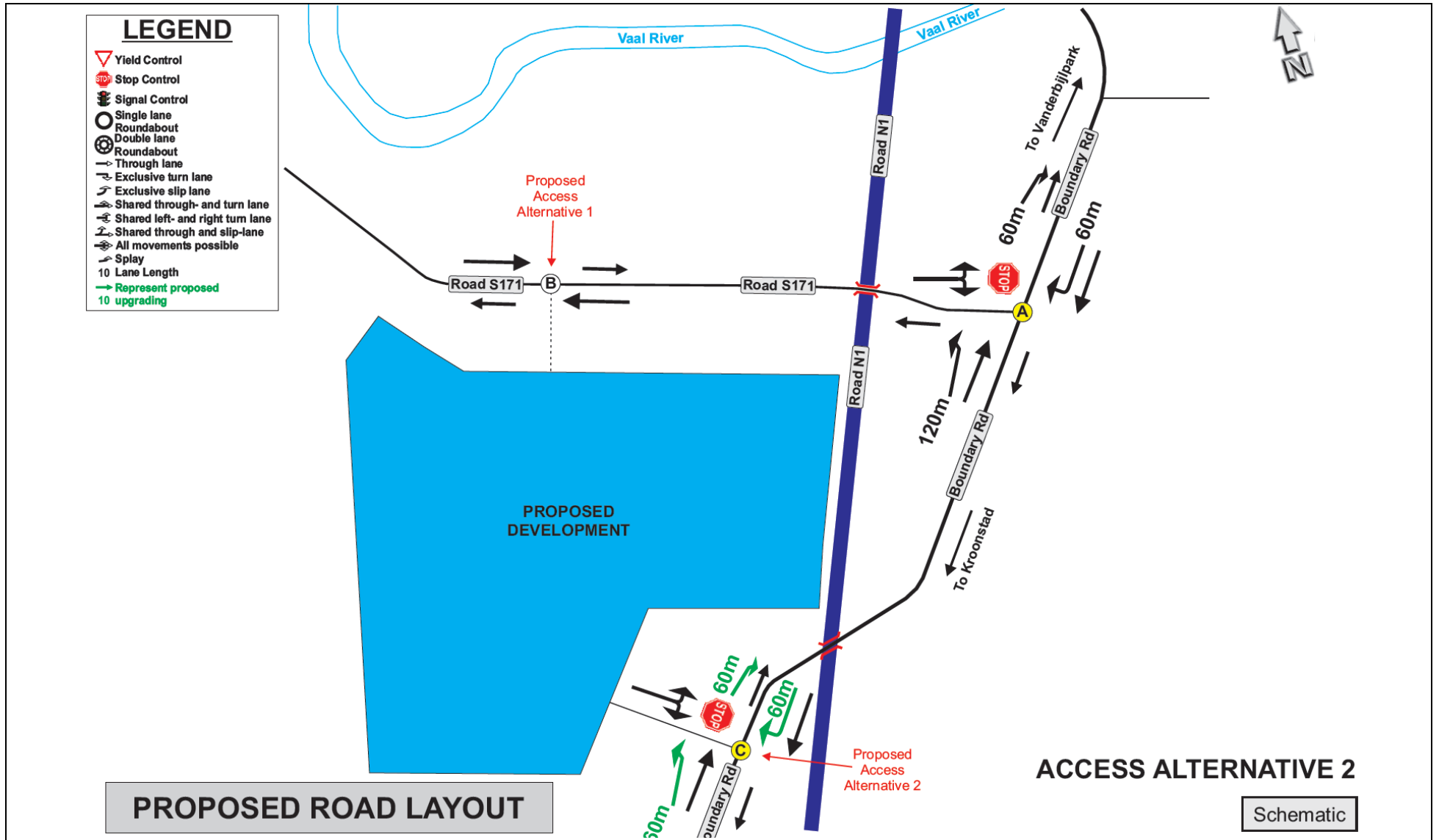
**Figure 7.3** (should Access Alternative 1 be used) and **Figure 7.4** (should Access Alternative 2 be used) provides a graphical presentation of the recommended intersection and road network improvements relevant to each proposed Solar PV Facility and Grid Connection individually while **Table 7.2** (should Access Alternative 1 be used) and **Table 7.3** (should Access Alternative 2 be used) provides detailed information on intersection improvements recommended. The last mentioned is relevant to each proposed site if constructed and operated individually, one at a time.

The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.



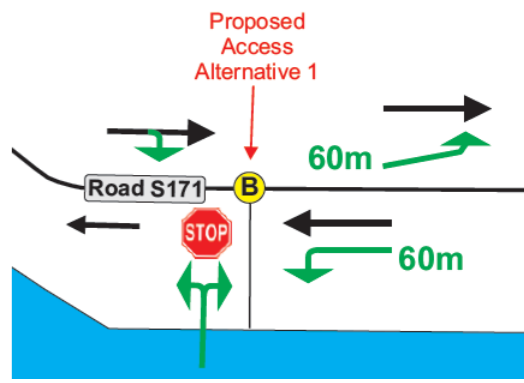
**FIGURE 7.3: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 1)**





**FIGURE 7.4: GRAPHICAL PRESENTATION OF THE RECOMMENDED INTERSECTION AND ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)**

**TABLE 7.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED											GEOMETRY DETERMINED BY MEANS OF SIDRA							
			Approach Traffic Control				Extra Lanes Required (m)					Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways			
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane								Number of Extra Through Lanes		
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																		
		South (Boundary Rd)																			
		West (Road S171)																			
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	Yes	-	-	-	-	Yes, 60m	-	Yes, 60m	-	-	Road Safety	Yes	Yes	Yes	-	-			
		South (Proposed Acc 1)	-	Yes	-	-	-	-	-	-	-	1	Access				-	-			
		West (Road S171)	Yes	-	-	-	-	-	-	-	-	-	-				-	-			

**TABLE 7.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA			
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required		Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes								

**TABLE 7.3: RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED SOLAR PV FACILITY AND GRID CONNECTION INDIVIDUALLY (ACCESS ALTERNATIVE 2)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED														GEOMETRY DETERMINED BY MEANS OF SIDRA			
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required		Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes								

A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																	
		South (Boundary Rd)																		
		West (Road S171)																		
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	Yes	Yes	Yes	-	-	

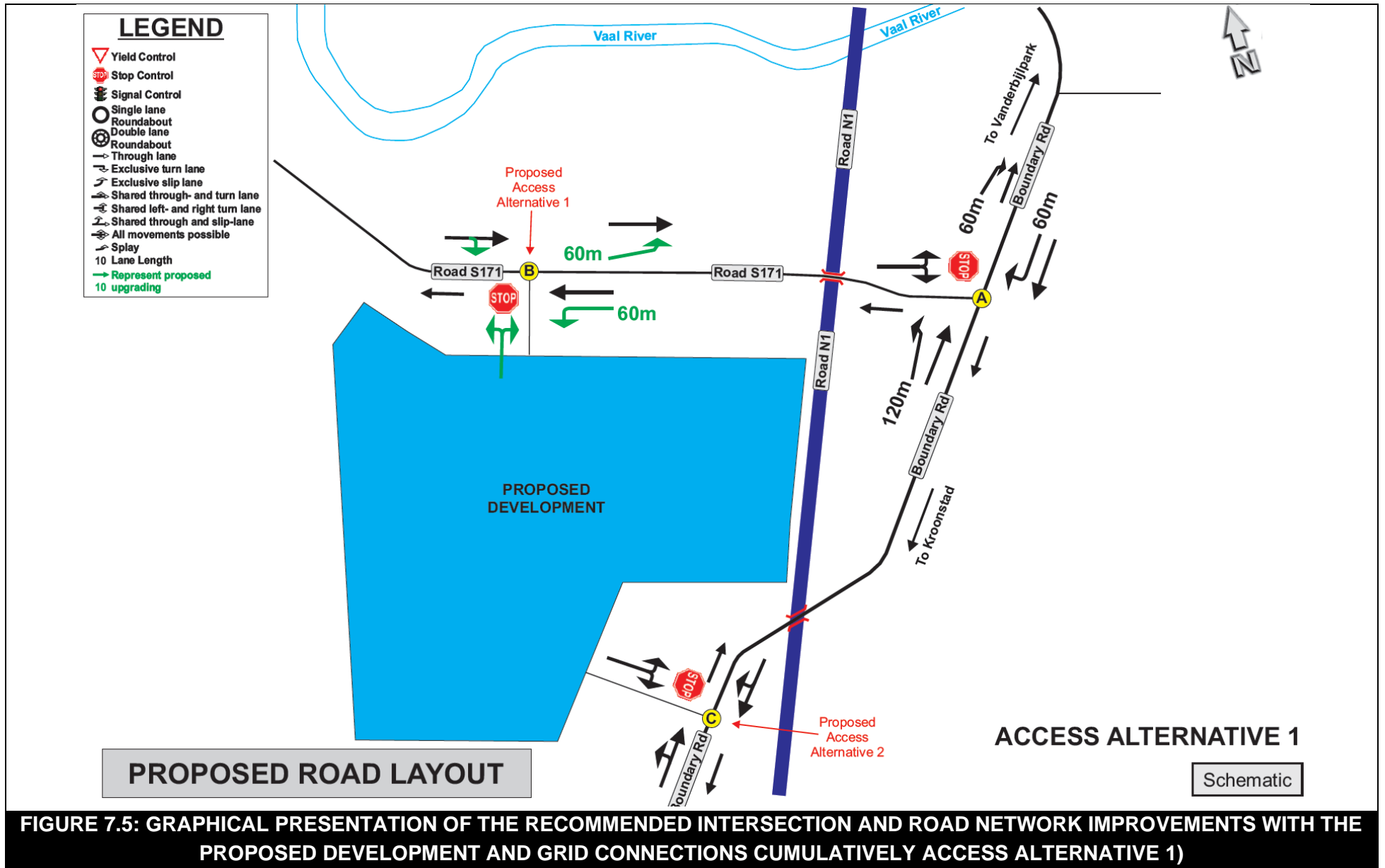
**TABLE 7.2: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)**

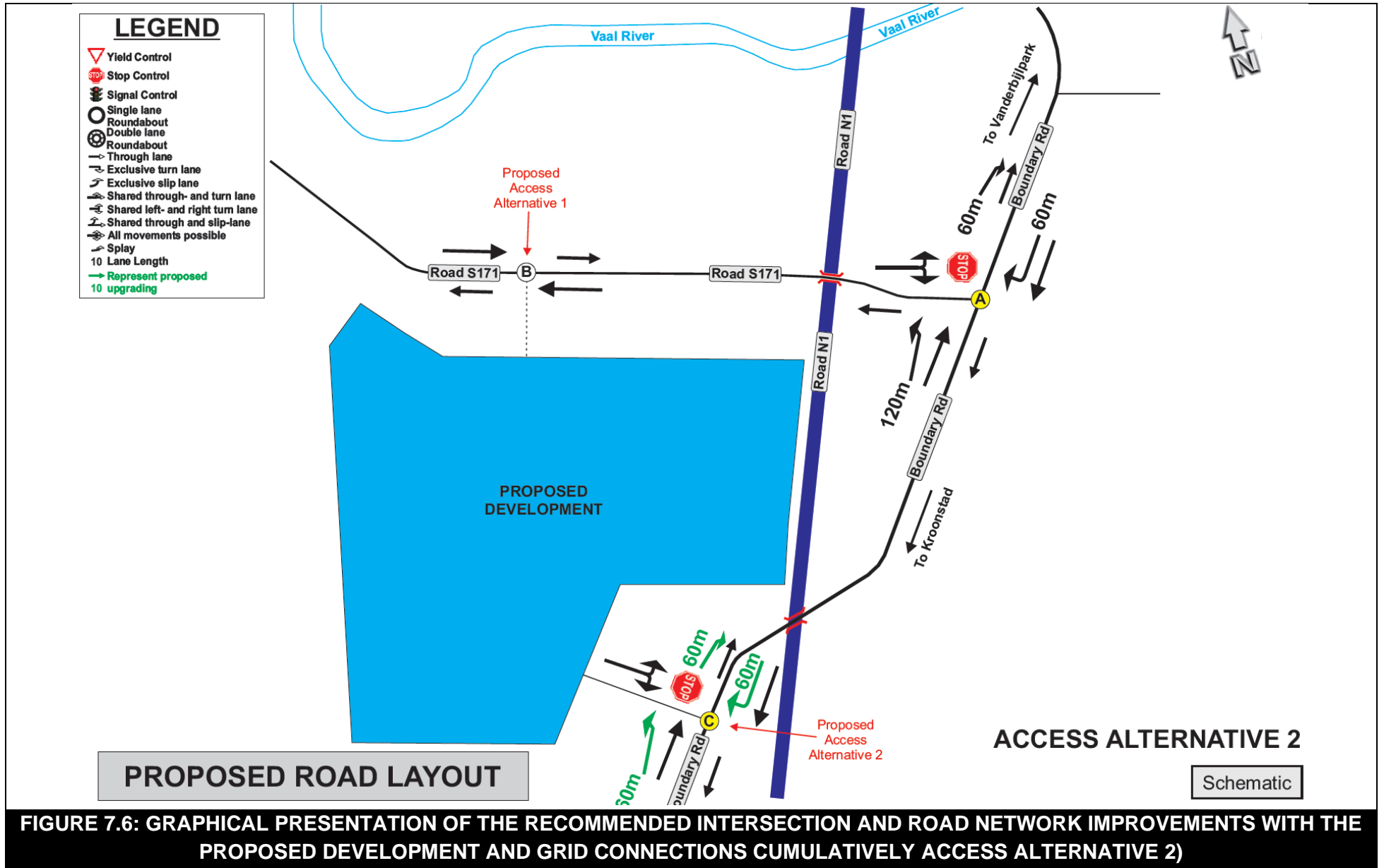
POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED											GEOMETRY DETERMINED BY MEANS OF SIDRA											
			Approach Traffic Control				Extra Lanes Required (m)								Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways					
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes													
		South (Boundary Rd)	Yes	-	-	-	-	Yes, 60m	-	-	-	-	-	Road Safety											
		West (Access Alternative 2)	-	Yes	-	-	-	-	-	-	-	-	-	-											

7.2.3 Summary of recommended intersection improvements (mitigating measures) as part of the Proposed Development and Grid Connections cumulatively

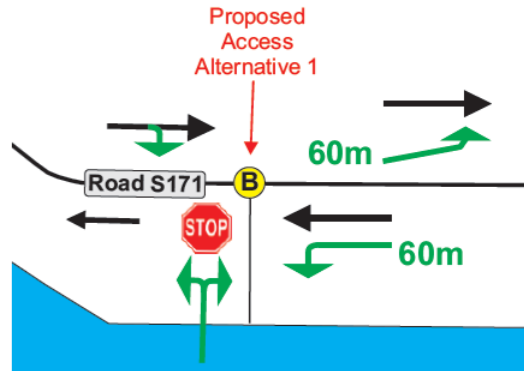
**Figure 7.5** (should Access Alternative 1 be used) and **Figure 7.6** (should Access Alternative 2 be used) provides a graphical presentation of the recommended intersection and road network improvements relevant to each proposed Solar PV Facilities and Grid Connections cumulatively while **Table 7.4** (should Access Alternative 1 be used) and **Table 7.5** (should Access Alternative 2 be used) provides detailed information on intersection improvements recommended.

The traffic impact assessment does not comment on pavement layer attributes in terms of the relevant road sections. This would need to be based on recommendations from a Pavement Design Specialist.





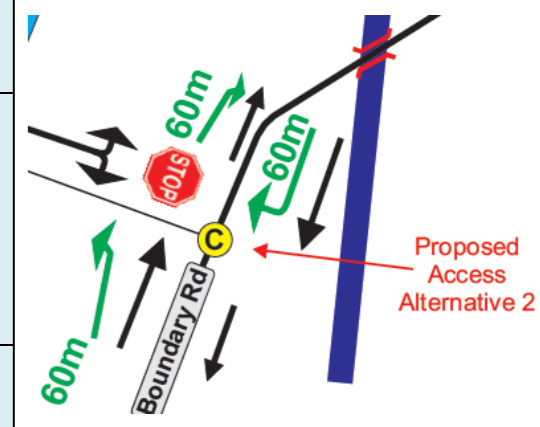
**TABLE 7.4: RECOMMENDED ROAD NETWORK IMPROVEMENTS AS PART OF THE PROPOSED DEVELOPMENT AND GRID CONNECTIONS CUMULATIVELY (ACCESS ALTERNATIVE 1)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED													GEOMETRY DETERMINED BY MEANS OF SIDRA										
			Approach Traffic Control				Extra Lanes Required (m)							Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection		Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways						
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes														
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																							
		South (Boundary Rd)																								
		West (Road S171)																								
B	Road S171 and Proposed Development Access Road 1	East (Road S171)	Yes	-	-	-	-	Yes, 60m	-	Yes, 60m	-	-	Road Safety	Yes	Yes	Yes	-	-								
		South (Proposed Acc 1)	-	Yes	-	-	-	-	-	-	-	1	Access				-	-								
		West (Road S171)	Yes	-	-	-	-	-	-	-	-	-	-				-	-		-						



**TABLE 7.5: RECOMMENDED ROAD NETWORK IMPROVEMENTS RELEVANT TO EACH PROPOSED DEVELOPMENT AND GRID CONNECTIONS (ACCESS ALTERNATIVE 2)**

POINT	INTERSECTION	APPROACH	IMPROVEMENTS RECOMMENDED											GEOMETRY DETERMINED BY MEANS OF SIDRA								
			Approach Traffic Control				Extra Lanes Required (m)								Improvements required from a Road Safety or Intersection performance Perspective	Reflective Road Studs required at Intersection	Road Markings Required	Road Signs Required	Public Transport Loading and Off-Loading	Pedestrian Walkways		
			Free-Flow	Stop	60m Radius Roundabout	Traffic Light System	Left-Turn Taper	Left-Turn Deceleration Lane	Acceleration Lane	Acceleration Lane in Middle of Road	Dedicated Right-Turn Lane	Number of Extra Through Lanes										
A	Boundary Road and Road S171	North (Boundary Rd)	No additional improvements required as long as improvements recommended as part of scenarios without the Proposed Development have been implemented with specific reference to the dedicated right-turn lane on the northern approach of boundary road.																			
		South (Boundary Rd)																				
		West (Road S171)																				
C	Boundary Road and Proposed Development Access Road 2	North (Boundary Rd)	Yes	-	-	-	-	-	-	-	-	Yes, 60m	-	Road Safety	Yes	Yes	Yes	-	-			
		South (Boundary Rd)	Yes	-	-	-	-	Yes, 60m	-	-	-	-	-	Road Safety				-	-			
		West (Access Alternative 2)	-	Yes	-	-	-	-	-	-	-	-	-	-				-	-			



### 7.3 INSTITUTIONAL ARRANGEMENTS

The following recommendations are made in terms of the detailed design phase of roads for the proposed project:

- a) Detailed investigations should be conducted in conjunction with the relevant road authority in terms of the existing quality and potential life span of the existing road surface layers of the roads where consumables, construction materials and workers will be transported (Road S171 and Boundary Road).
- b) A road maintenance plan (possible upgrade for pavement layer) needs to be prepared in conjunction with the relevant road authority on public roads where delivery trucks will operate as soon as the project has been approved, in order to ensure that the consumables, deliveries and workers can be transported at all times.

### 7.4 CONCLUSION AND REASONED OPINION FOR AUTHORISATION

In conclusion of the findings as part of the investigations, Siyazi Gauteng Consulting Services (Pty) Ltd. is of the opinion that the Proposed Development and Grid Connections, and the use of both access alternatives 1 and 2 (Points B and C), would have a manageable impact on the relevant roads network, regardless of whether one site is constructed and operated at a time or all sites are constructed and operated at the same time, as long as the mitigation measures are implemented as recommended in **Section 6.1** of this report. In this case it is therefore recommended that authorisation be granted for the Proposed Development and both access alternatives.

### 7.5 REFERENCES

1. Committee of Transport Officials (COTO) – South African Traffic Impact Assessment Standards and Requirements Manual, Version 1.01, February 2014.
2. Committee of Transport Officials (COTO) – TRH 26 South African Road Classification and Access Management Manual, Version 1.0, August 2012.
3. Committee of Transport Officials (COTO) – TMH 17 South African Trip Data Manual, Version 1.01, September 2013.