Uis Afritin Mine

Transport Impact Assessment (TIA)

Erongo Region, Namibia

*Report Status – **Final***

*Date - **August 2022***

5th Floor

Imperial Terraces

Carl Cronje Drive

Tyger Waterfront

Bellville, 7530

Tel: 021 914 6211

e-mail: westerncape@itsglobal.co.za

SUMMARY SHEET

Report Type	Transport Impact Assessment (TIA)
Title	Uis Afritin Mine
Location	Erongo Region, Namibia
Client	Environmental Compliance Consultancy (ECC)
Reference Number	ITS 4427
Project Team	Christoff Krogscheepers Hugo Engelbrecht Alain Rousseau
Contact Details	Tel: 021 914 6211
Date	August 2022
Report Status	Final
File Name	G:\4427 TIA Uis Afritin Mine, Erongo\12 Report\Issue\4427_TIA Uis Afritin Mine_table report_AR_2022-08-03.docx

It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

TABLE OF CONTENTS

1 Purpose of Study 1
2 Locality 1
3 Land Use & Extent 1
4 Existing Access 1
5 Existing Roadways 3
6 Study Intersection 4
7 Analyses Hours 4
8 Scenarios Analysed 4
9 Existing Intersection Operations 4
10 Background Traffic Conditions 5
11 Trip Generation Rates and Development Trips 5
12 Trip Distribution 6
13 Total Traffic Conditions 6
14 Heavy Vehicles 7
15 Public Transport 7
16 Pedestrians 7
17 Conclusion & Recommendations 7
REFERENCES 9

REPORT - SUMMARY TABLE

This transport impact assessment is reported only in a summary table instead of a lengthy report to assist review and interpretation of the results. This summary table includes all the relevant information that is normally contained in a report. It should be sufficient for review and interpretation of the expected transport impacts as well as the comprehension of the required measures to mitigate the transport impact. If any more detail is required, please contact the authors.

ANNEXURES

Annexure A: Figures

Transport Impact Assessment

Uis Afritin Mine, Erongo Region, Namibia

1 Purpose of Study	This report summaries an investigation of the transport impacts expected as part of the Afritin Mine development in Uis. The purpose of this assessment is to identify constraints within the surrounding road network and recommend appropriate mitigation measures.
2 Locality	The Afritin mine development is located in Uis, which is in the Erongo region of Namibia. This mine is north of Hentiesbaai and west of Omaruru. The site is south of the C36 Roadway in Uis. See **Figure 1** and **Figure 2** in Annexure A for the Regional- and Local Locality Maps respectively.
3 Land Use & Extent	**Existing land use:** Currently a Tin Mine The existing land use will remain un-changed. However, it is planned to increase the production of tin at this mine. This increase in production would be achieved by increasing throughput production from 80 tonnes per hour to 120 tonnes per hour of raw material, by the: • modular expansion of individual circuits, • improving the overall recovery of tin from 60% to 70%, and • improving the overall recovery of tantalum from 15% to 30% The additional truck load of raw material being delivered to the site is approximately 2000 tonnes per month.
4 Existing Access	The existing site access is located along the C36 roadway. The closest existing intersection to the development access is located approximately 265 meters to the east along C36. The control at the mine access is free flow along the C36 and stop/priority controlled on the development exit. There is a boom-control along this access road at the mine access, which is located approximately 500 meters south of the C36 roadway. The mine used to have a secondary access along the C36, however this access is no longer in use by the mine. This secondary access was located approximately 420 meters west from the existing mine access. The current speed limit along the C36 roadway is 100km/h. The required Shoulder Sight Distance (SSD) for this operational speed, is 200 meters for cars and 300 meters for a single unit truck (Urban Transport Guidelines UTG 1).

See **Image 1** below for the required Shoulder Sight Distance for various travel speeds.

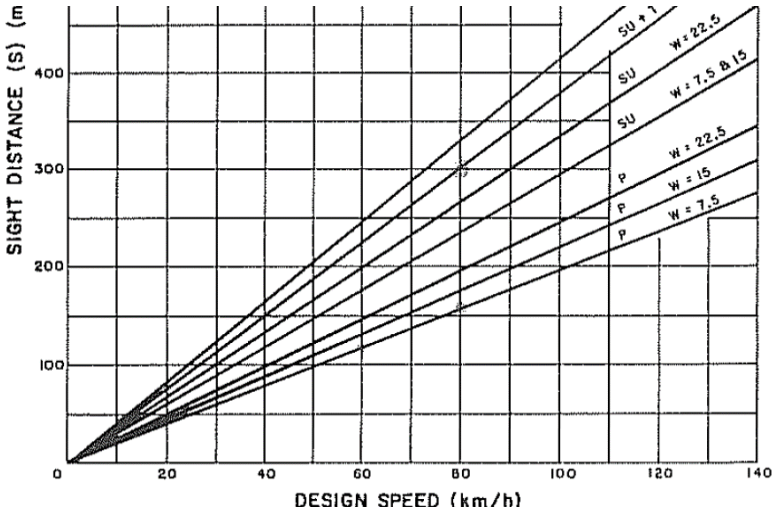


Image 1: *UTG 1, Shoulder Sight Distance*

The available SSD at this exit is approximately 240 meters, which is sufficient for cars, but it is insufficient for trucks. To improve the safety at this exit, it is recommended to reduce the speed limit along the C36 at the mine exit to 80km/h, for at least 1,0km on either side of the mine access intersection. The required SSD for an 80km/h design speed environment is 240 meters for trucks. With this reduced speed limit along the C36 to 80km/h, sufficient SSD would be available.

See **Image 2** and **Photos 1-2** below for the available Shoulder Sight Distances (SSD's).

Image 2: *Shoulder sight distance Main access*

	Main Development Access **Photo 1:** Eastbound View **Photo 2:** Westbound View Street lighting is recommended at the mine access to improve safety at this intersection during night times and / or low light conditions.
5 Existing Roadways	The major roads within the site area, are the C35 and C36 Roadways. The C35 and C36 are single carriageway roads with a posted speed limits of 100km/h. These roads are mainly gravel, however certain sections near the towns are constructed with pavement layers and road surfacing. The section of the C36 between the Uis Main Road and D3714 intersections, is constructed and surfaced. The width of this surfaced road is approximately 7,0 meters. The C35 is mostly a gravel road, however about 20km outside of Hentiesbaai it is constructed with pavement layers and road surfacing. The condition of the C36 road, near the development, is in a relatively poor condition with various spots of cracking and pavement failure. There are various reasons for this type of failure, but it is most likely due to excessive truck loads and excessive travel speeds. It is recommended that the road be upgraded and resurfaced from a safety as well as a maintenance point of view. This upgrade should be for about 1,0km total length along the C36 roadway (i.e. 500 meters either side to the mine access) and should it should be funded by the developer.

6 Study Intersection	Int. 1: C36/ Mine Access Priority Stop Control The C36 / Mine Access intersection is a "T" intersection, with free flow along the C36 and a stop control on the mine exit, and a single lane on each approach. See **Figure 3** for the existing lane configuration and traffic control.
7 Analyses Hours	Weekday AM peak hour (Surveyed peak hour 06:45 to 07:45) Weekday Midday peak hour (Surveyed peak hour 13:30 to 14:30) Weekday PM peak hour (Surveyed peak hour 17:00 to 18:00) The peak hours were determined from the peak period traffic counts
8 Scenarios Analysed	**Scenario 1**: 2021 Existing Traffic conditions. Based on existing geometry and traffic volumes. See **Section 9** of this report for details. **Scenario 2**: 2026 Background Traffic conditions (Based on **Scenario 1** traffic volumes, escalated with a 3% growth rate per year.) Refer to **Section 10** for details. **Scenario 3**: 2026 Total Traffic conditions (Based on **Scenario 2** traffic volumes, *PLUS* the additional trips for the proposed mine expansion). Refer to **Section 13** for details. Intersection analyses were done with Traffix version 8.0 Software, which is based on the Highway Capacity Manual (HCM).
9 Existing Intersection Operations	The C36 / mine access intersection was surveyed / counted in November 2021. The current production rate at this mine is 65 tons of tin (final product) per month (or 780 tons per annum). The 2021 Existing Traffic conditions is based on the current intersection geometry / control, as well as the existing traffic volumes. The following can be concluded based on the capacity analysis results: ○ Level of Service (LOS) A during all peak periods, ○ Delays less than 10 seconds average during peak periods, and ○ Volume to Capacity (v/c) ratio less than 5 percent during peak periods. Hence, more than 95% spare capacity available. Based on the existing capacity analyses results, the study intersection operates acceptably. Hence, no upgrades are required / proposed, from a capacity analyses point of view. See **Figure 3** for the Existing Traffic volumes and operations for the weekday AM, Midday and PM peak hours respectively.

10 Background Traffic Conditions

The 2026 Background Traffic conditions is based on the current intersection geometry / control. The traffic volumes are based on existing traffic counts, escalated with a 3% growth rate per year. The following can be concluded based on the capacity analysis results:

- Level of Service (LOS) A during all peak periods,
- Delays less than 10 seconds average during peak periods, and
- Volume to Capacity (v/c) ratio less than 5 percent during peak periods. Hence, more than 95% spare capacity available.

Based on the Background Traffic capacity analyses results, the study intersection would continue to operate acceptably. Hence, no upgrades are required / proposed, from a capacity analyses point of view.

See **Figure 3** for the Background Traffic volumes and operations for the weekday AM, Midday and PM peak hours respectively.

11 Trip Generation Rates and Development Trips

No trip generation data is available (in COTO- or ITE manuals) for mines, since there are various factors that affects the number of trips (including size, process, and procedures of what is being mined).

The AfriTin mine is currently operational with a monthly production rate of approximately 65 tonnes of tin (80 tonnes per hour of raw material equates to approximately 65 tonnes of tin final product per month) which is expected to increase to 100 tonnes of tin final product per month. This is an approximate increase of 50% in production. Based on the above, the current vehicular trips were also increased by 50% to determine the expected additional trips as part of the increase in production. See **Table 1** for the expected additional development trips.

Table 1: Development Trips per Peak Hour

Existing 65 tonnes per month (production)			
	AM Peak	Midday Peak	PM Peak
Total entering	47	21	18
Total exiting	13	18	34
Expected 100 tonnes per month (production)			
	AM Peak	Midday Peak	PM Peak
Total entering	74	33	28
Total exiting	21	29	53
Expected Additional Trips			
	AM Peak	Midday Peak	PM Peak
Total entering	27	12	10
Total exiting	8	11	19

See **Figure 4** in Annexure A for the development trips.

<table>
<tr><td></td><td>See Table 2 below for the additional truck trips for the raw materials being transported to the site.

Table 2: Raw Material Truck Trips
<table>
<tr><td>2000 tonnes</td><td>Per Month</td></tr>
<tr><td>20 tonnes</td><td>Truck carry capacity</td></tr>
<tr><td>100 Trips</td><td>Per Month</td></tr>
<tr><td colspan="2">Assume the Tin mine operates for 6 days a week
(About 24 days a month)</td></tr>
<tr><td>Approximately 5 Trips</td><td>Per Day</td></tr>
</table></td></tr>
<tr><td>12 Trip Distribution</td><td>The expected directional distribution of additional development trips was based on the existing peak hour trips / split. This was typically a 60%-40% split, with 60% of vehicles traveling westbound (towards Uis from the site) and 40% traveling eastbound towards Omaruru.

See Figure 4 in Annexure A for the trip distribution.</td></tr>
<tr><td>13 Total Traffic Conditions</td><td>The 2026 Total Traffic conditions is based on the current intersection geometry / control, and the traffic volumes are based on the Background Traffic volumes plus the additional development trips from the planned mine expansion. The following can be concluded based on the capacity analysis results:

○ Level of Service (LOS) A during all peak periods,
○ Delays less than 10 seconds average during peak periods, and
○ Volume to Capacity (v/c) ratio less than 5 percent during peak periods. Hence, more than 95% spare capacity available.

Based on the Total Traffic capacity analyses results, the study intersection would continue to operate acceptably. Hence, no upgrades are required / proposed, from a capacity analyses point of view.

The intersection was also evaluated to determine if turning lanes would be warranted. Based on the Access Management Guidelines (AMG) it is evident that separate turning lanes would NOT be warranted from a safety point of view. However, it is recommended to upgrade and re-surface the C36 at the mine access intersection for at least 500 meters to both sides of the intersection along the C36 as well as at along the access road for at least 50 meters, to include appropriate road markings and signage, that would ensure improved intersection safety.

See Figure 3 for the Total Traffic scenario conditions for the weekday AM, Midday and PM peak hours respectively.</td></tr>
</table>

14 Heavy Vehicles	The current heavy vehicle percentage at the C36 / mine access varies between 4 / 3 percent during the weekday AM / PM peak periods respectively, with 6 percent during the weekday midday peak periods. Currently about 6 trucks enter / exit the mine per day. As part of the proposed increase in production at the mine, the number of heavy vehicles is expected to increase to 10 truck trips per day. With an additional 5 trips per day for transporting the raw material to site.
15 Public Transport	The current public transport percentage (i.e. Buses) at the C36 / mine access varies between 13 / 11 percent during the weekday AM / PM peak periods respectively. Currently there is about 49 bus trips a day that travel through the C36 / Tin Mine access intersection, of which 35 bus trips (70%) enter / leave the mine.
16 Pedestrians	The C36 roadway is relatively straight, with sufficient Shoulder Sight Distance for pedestrians to cross the road safely, in the vicinity of the mine access. Currently more than 250 meters shoulder sight distance is available. Pedestrians can also easily cross the C36 roadway due to the low traffic volumes along the C36 (less than 100 vehicles in an hour). Pedestrians can also walk along C36 roadway in the wide gravel verge which is approximately 4 meters wide.
17 Conclusion & Recommendations	This report summaries an investigation of the transport impacts expected as part of the Afritin Mine development in Uis. The following can be concluded based on the findings in this investigation: **Existing Traffic:** The study intersection currently operates acceptably. Hence, no road upgrades are proposed / required from an intersection capacity point of view. **Background Traffic:** The study intersection would continue to operate acceptably. Hence, no road upgrades are proposed / required from an intersection capacity point of view. **Site Access:** It is recommended to reduce the posted speed limit along the C36 in the vicinity of the mine exit to 80km/h, for at least 1,0km on either side of the mine access. Street lighting is recommended at the mine access to improve safety at this intersection during night times and / or low light conditions. **Total Traffic:** The study intersection would continue to operate acceptably. Hence, no road upgrades are proposed / required from an intersection capacity point of view. The additional 5 trips for the transportation of raw materials to site per day will have no major impact to the capacity of the intersection.

	However, it is recommended to upgrade and re-surface the C36 at the mine access intersection for at least 500 meters to either side of the mine access intersection along the C36 as well as along the access road for at least 50 meters, to include appropriate road markings and signage, that would ensure improved intersection safety. Based on the findings in this transport investigation, it is evident that the proposed Uis AfriTin mine expansion could be sufficiently accommodated, provided that the upgrades discussed in this report are in place. Hence, it is recommended that this development expansion be considered for approval, from a transport point of view.

REFERENCES

1. Afritin Mining Limited. Uis Tin Mine, Phase 1 Fast Tracked Stage II Definitive Feasibility Study. Minxcon reference: P2020_030a. April 2021
2. Committee of Transport Officials. South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual. TMH 16 vol 2. 2014
3. Highway Capacity Manual (HCM), Quality and Level-of-Service Concepts, Transportation Research Board, 9 March 2015
4. South African Road Classification and Access Management Manual, TRH26, Version 1.0, August 2012
5. South African Trip Data Manual, TMH17, Version 1.1, COTO, September 2013

Annexure A

Figures

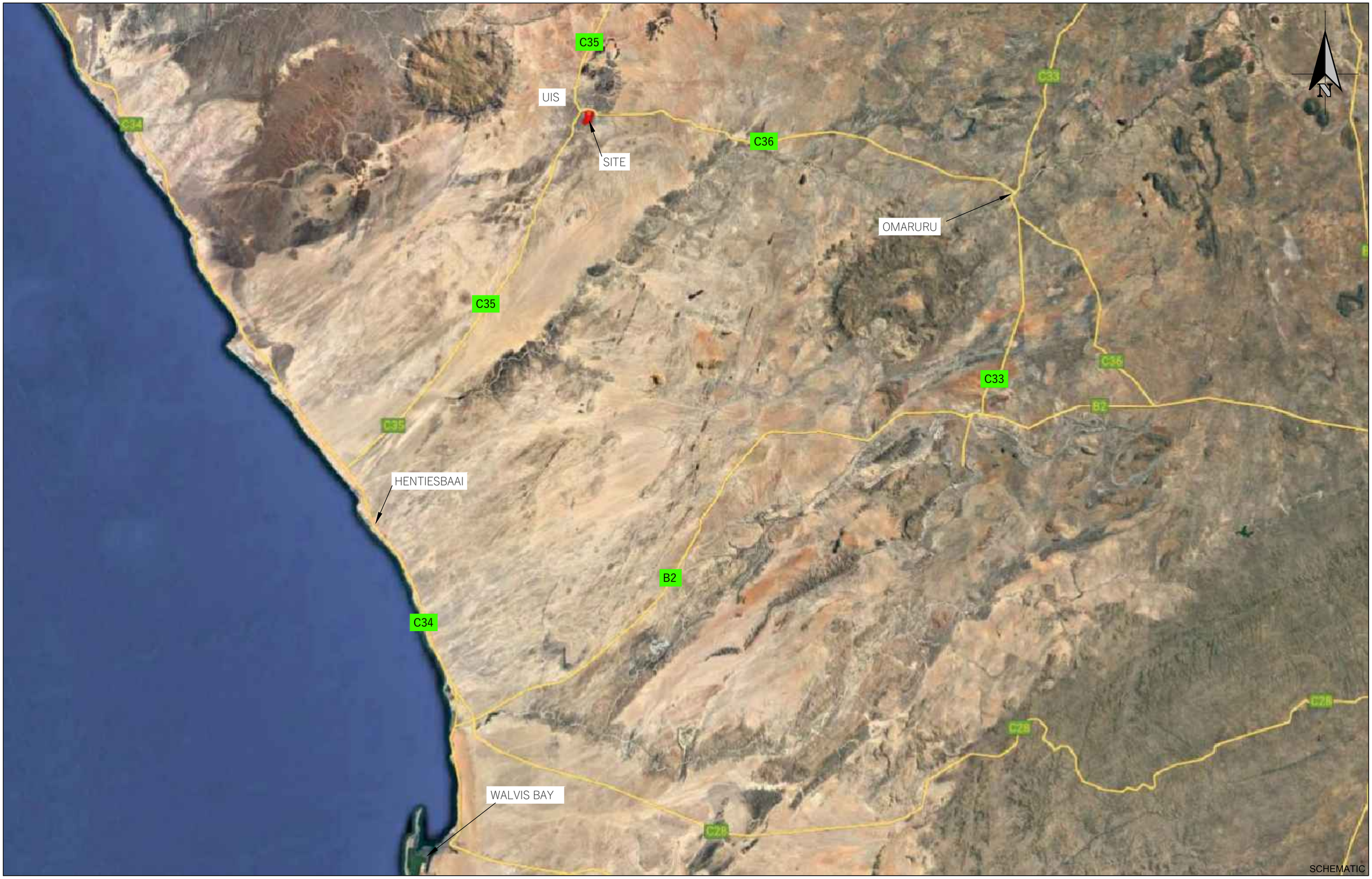
List of Figures

Figure 1: Regional Map

Figure 2: Local Locality Plan

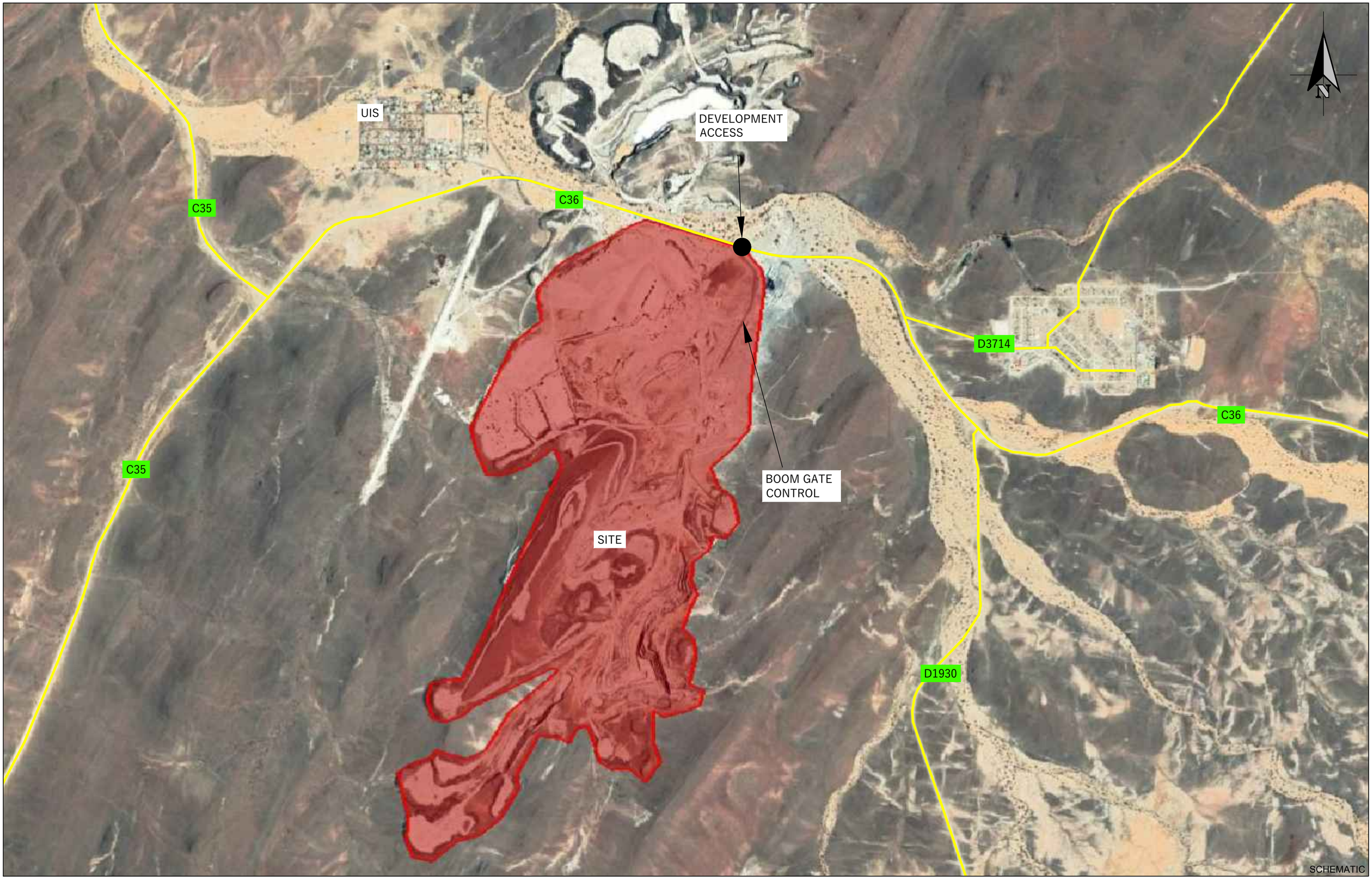
Figure 3: Access Operations and Controls

Figure 4: Trip Generation and Trip Distribution



PROJECT:	FIGURE:	NUMBER:
UIS AFRITIN MINE, TIA	REGIONAL MAP	1

G:\4427 TIA Uis Afritin Mine, Erongo\11 Drawing, Figures & GIS\CAD\4427_UIS Afritin Mine_Traffic figures_AR_2022-02-11.dwg

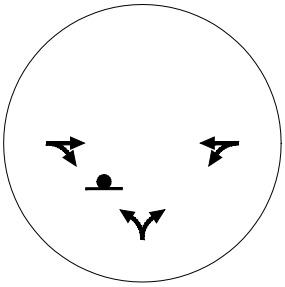


PROJECT:	FIGURE:	NUMBER:
UIS AFRITIN MINE, TIA	LOCALITY PLAN	2

G:\4427 TIA Uis Afritin Mine, Erongo\11 Drawing, Figures & GIS\CAD\4427_UIS Afritin Mine_Traffic figures_AR_2022-02-11.dwg

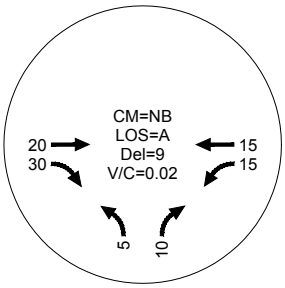
LEGEND
CM = CRITICAL MOVEMENT (UNSIGNALISED) LOS = INTERSECTION LEVEL OF SERVICE (SIGNALISED) / CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALISED) Del = INTERSECTION AVERAGE DELAY (SIGNALISED) / CRITICAL MOVEMENT DELAY UNSIGNALISED V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Existing Geometry and Control

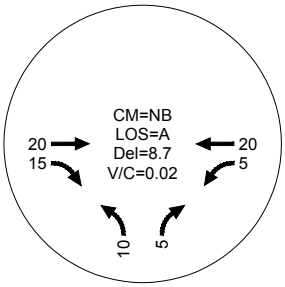


Existing Conditions

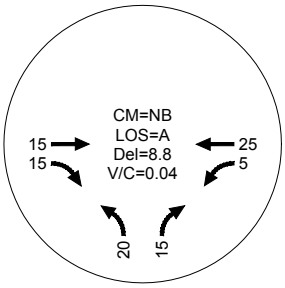
AM Peak Hour



Midday Peak Hour

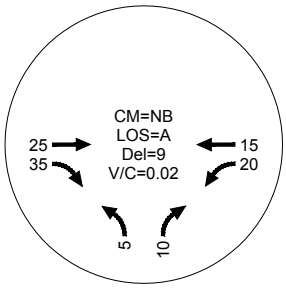


PM Peak Hour

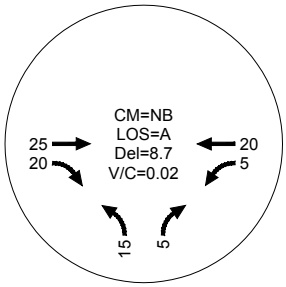


Background Conditions

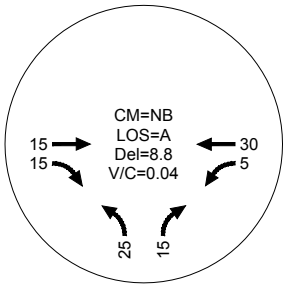
AM Peak Hour



Midday Peak Hour

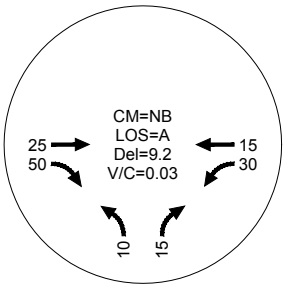


PM Peak Hour

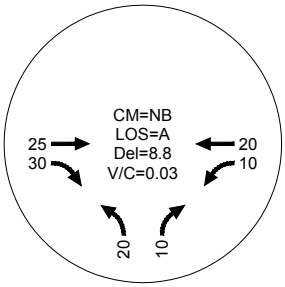


Total Conditions

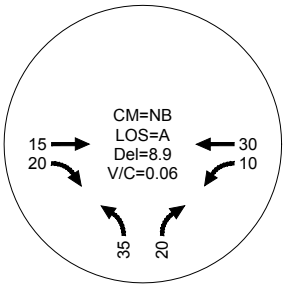
AM Peak Hour



Midday Peak Hour



PM Peak Hour

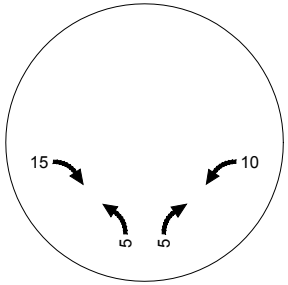


NOTE:
EXISTING TRAFFIC COUNTS: 2021 TRAFFIC COUNTS: ROUNDED TO THE NEAREST 5 veh/h

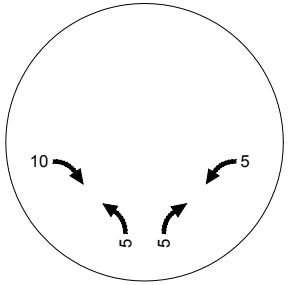
PROJECT:	NUMBER:
UIS AFRITIN MINE, TIA	3
FIGURE: ACCESS OPERATIONS AND CONTROLS	

G:\4427 TIA Uis Afritin Mine, Erongo\11 Drawing, Figures & GIS\CAD\4427_UIS Afritin Mine_Traffic figures_AR_2022-02-11.dwg

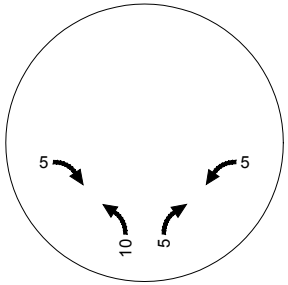
AM Trips

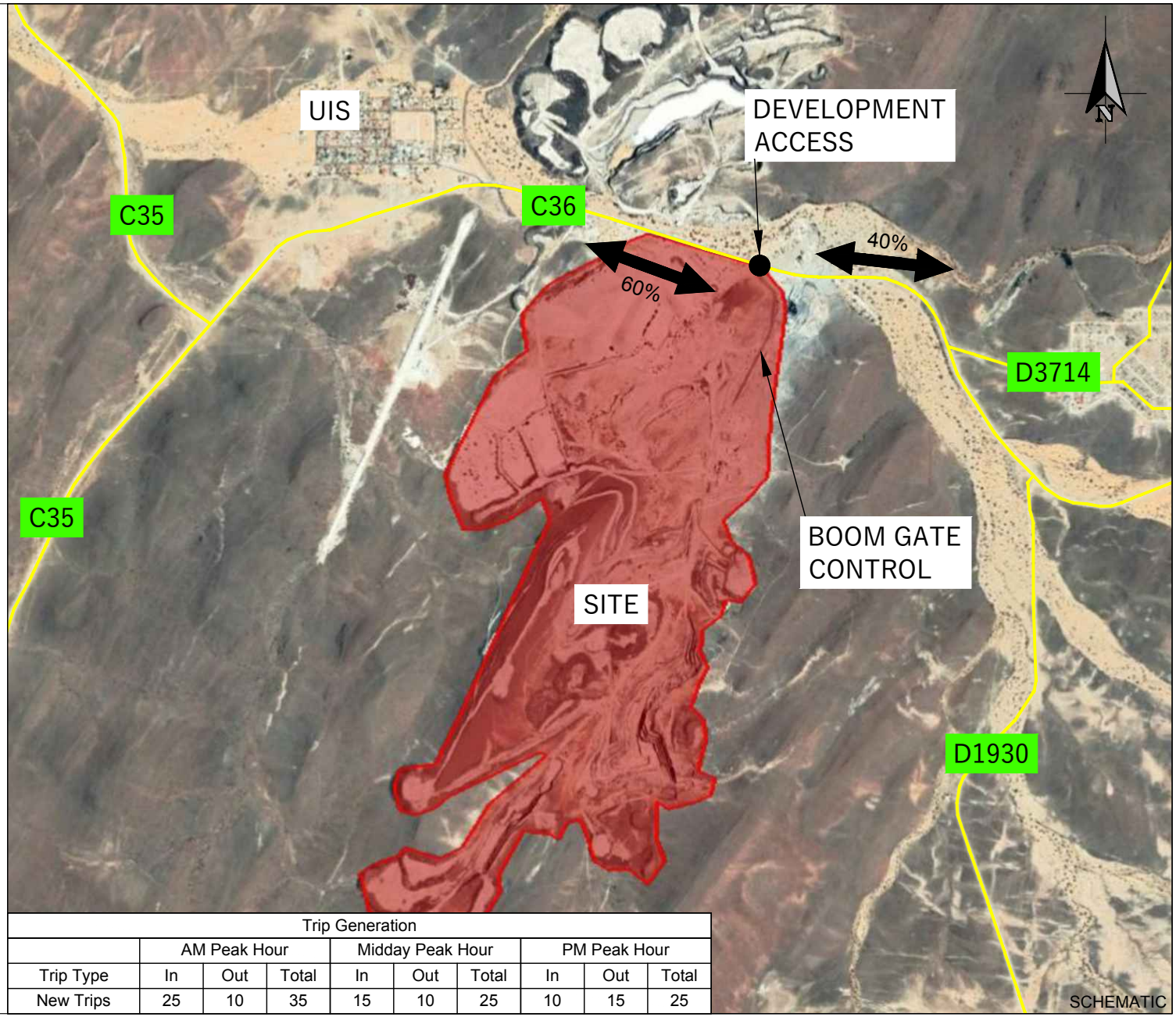


Midday Trips



PM Trips





Trip Generation									
	AM Peak Hour			Midday Peak Hour			PM Peak Hour		
Trip Type	In	Out	Total	In	Out	Total	In	Out	Total
New Trips	25	10	35	15	10	25	10	15	25

PROJECT:	FIGURE:	NUMBER:
UIS AFRITIN MINE, TIA	TRIP GENERATION AND TRIP DISTRIBUTION	4

G:\4427 TIA Uis Afritin Mine, Erongo\11 Drawing, Figures & GIS\CAD\4427_UIS Afritin Mine_Traffic figures_AR_2022-02-11.dwg