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JOINT VENTURE

# Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP)

## Traffic Impact Assessment: Phase 2F

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **AADT** | Annual Average Daily Traffic |
| **DTI** | Department of Trade and Industry |
| **DWS** | Department of Water and Sanitation |
| **GTLM** | Greater Thubatse Local Municipality |
| **IDP** | Integrated Development Plan |
| **ITP** | Integrated Transport Plan |
| **LOS** | Level of Service |
| **NMT** | Non-Motorised Transport |
| **ORWRDP** | Olifants River Water Resource Development Project |
| **RAL** | Roads Agency Limpopo |
| **SANRAL** | South African National Roads Agency Limited |
| **SDF** | Spatial Development Framework |
| **TIS** | Traffic Impact Study |
| **TOR** | Terms of Reference |
| **TRH** | Technical Recommendations for Highways |
| **V/C** | Volume/Capacity |
| **NEMA** | National Environmental Management Act |
| **LED** | Local Economic Development |
| **AAGR** | Average Annual Growth Rate |

# 1 Introduction

## 1.1 Background

Phase 2 of the Olifants River Water Resources Development Project (ORWRDP-2) is a Department of Water and Sanitation (DWS) project, which underwent an environmental impact assessment (EIA) process and obtained a positive Record of Decision (RoD) from the Department of Environmental Affairs (DEA) in 2006 in terms of the Environmental Conservation Act, No. 73 of 1989 (ECA). After many appeals by large organisations, including the Kruger National Park, the Minister decided to grant the Revised RoD (RRoD) (ref: 03/2/4), dated 16 October 2006.

The approved ORWRDP-2 consists of various phases as defined below (refer to Figure 1-1). These were previously implemented by the Trans-Caledon Tunnel Authority (TCTA). The phases are designed and implemented in a phased manner, depending on need and availability of finances. For this reason, phase specific Environmental Management Programmes (EMPrs) are developed and submitted for approval to the Competent Authority (CA).

- Phase 2A: Construction of De Hoop Dam
- Phase 2B: Pipeline from Flag Boshielo Dam to Pruissen near Mokopane (72 km)
- Phase 2B+: Consists of a raw water pipeline from Pruissen Reservior to the proposed Sekuruwe Water Treatment Works (WTW), including offtakes to the proposed Mokopane WTW and two commercial user offtakes.
- Phase 2C: Pipeline from De Hoop Dam to Mooihoek
- Phase 2D: Pipeline from Steelpoort to Mooihoek (24 km)
- Phase 2E: Pipeline from Mooihoek to Havercroft Junction (14 km)
- Phase 2F: Pipeline from Havercroft Junction to Olifantspoort (44 km)
- Phase 2G: Possible second pipeline parallel to Phase 2B
- Phase 2H: Changes and additions to the current Phase 2H (Lebalelo Network); and
- Phase 2I: Pipeline from the De Hoop Dam to the proposed Eskom Tubatse Pump-storage Hydro-electric Scheme.

The ORWRDP-2 has since been reconstituted to become the OMMP-BRWSP in recent years, with the Lebalelo Water User Association (LWUA) acting as the implementing agent for the following portions of the project:

- Phase 2B
- Phase 2B+
- Phase 2D; and
- Phase 2F

Furthermore, since inception, the project has acquired the status of strategic importance, and recently on 05 March 2023 the project was classified as a Strategic Integrated Project (SIP) under the SIP 19 (i.e., Water and Sanitation Infrastructure Portfolio). As such, it is critical that the project must be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act, No. 23 of 2014. The purpose of this piece of legislation is to provide facilitation and coordination of public infrastructure development which is of economic significance or social importance in South Africa and to ensure that infrastructure development in the country is given priority in planning, approval, and implementation

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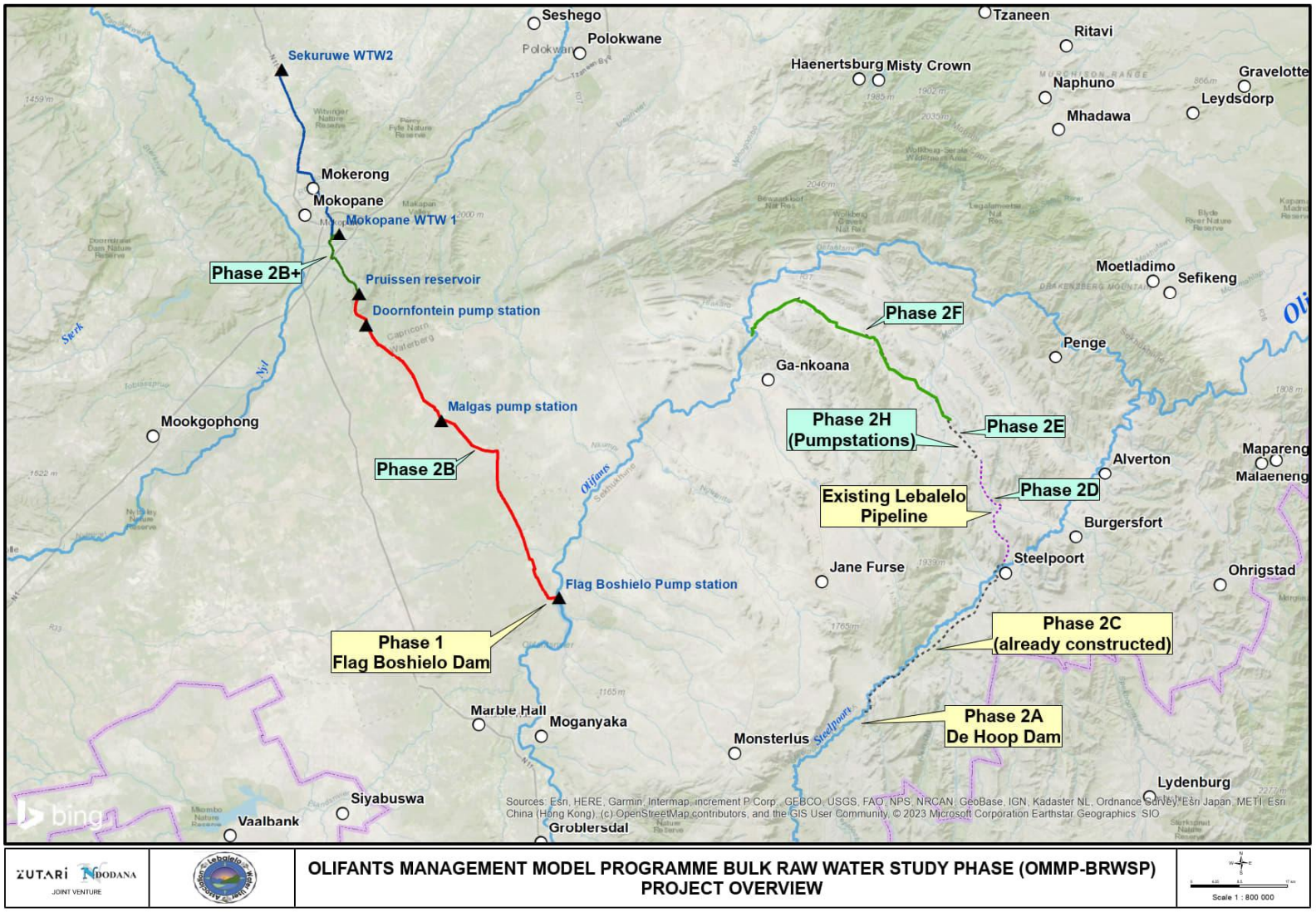


**Figure 1-1: Map of pipeline alignments: Northern Limb (Phases 2B, 2B+) and Eastern Limb (Phases 2H, 2F, 2E, 2D).**

## 1.2 Purpose of this report

The Lebalelo Water User Association (LWUA) appointed the Zutari Ndodana Joint Venture (ZNJV) to provide engineering professional services, including traffic engineering, for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP).

In 2010, Zutari (Pty) Ltd, then known as Aurecon (Pty) Ltd, was tasked with conducting a Baseline Traffic Impact Study for Phase 2 of the project. This study was part of the Environmental Impact Assessment (EIA) process. In 2012, Zutari was reappointed to update the study for Sub-Phases 2C and 2I, followed by further updates in 2016 for Sub-Phases 2B, 2D, 2E, and 2F.

Due to various developments, including the expansion of rural settlements along the pipeline route, realignments of the route and relocation of certain facilities and dams have become necessary for Phases 2D and 2F. The proposed infrastructure changes are expected to trigger several listed activities under the National Environmental Management Act (NEMA), necessitating a Basic Assessment (BA) process for authorization. The project is critical for the region's economic and social development, providing essential water resources to support growth and sustainability. The proposed pipeline alignment and associated infrastructure are detailed in the project maps and figures included in this report. As a result, an updated traffic study is required to support the environmental application process for the pipeline realignment and the newly affected areas caused by dam relocations.

The aim of this report is to assess the impact of the proposed Phase 2F transport activities on the existing surrounding road network and transport system and to assess pipeline access points, recommend road upgrades, transport infrastructure, and services to mitigate the impact if required.

## 1.3 Description and Locality of Phase 2F

Phase 2F comprises approximately 60 km of pipeline intended to convey water to the Olifantspoort Water Treatment Works (WTW), thereby augmenting the water supply to Polokwane and surrounding rural areas. The alignment of Phase 2F starts near Havercroft Junction, deviating from the R37 to take a more direct route to the Olifantspoort WTW, following existing gravel roads along part of the way. The pipeline starts as a 1,200 mm diameter over 18.5 km, reducing to a 1,000 mm diameter over 25.6 km, originating at the Klipfontein Balancing Dam (or Brake Pressure Dam) with a projected capacity of 21 ML.

The project area spans two local municipalities—Greater Tubatse and Lepelle Nkumpi—and two district municipalities—Capricorn and Greater Sekhukhune—within the Limpopo Province. Along the pipeline route, several mines are located, including RPM Twickenham, Cromex Mining Mecklenburg, Sefateng Chrome Mines, and ARM Bokoni Platinum Mine (Atok), previously owned by Anglo Platinum. This area is recognised as part of the Critical Biodiversity Area (CBA) and situated within the Sekhukhuneland Centre of Floristic Endemism, known for its diverse plant life and habitat suitable for endemic species. A general layout of all the project phases and pipeline alignments is illustrated in Figure 1-1 above and see Figure 1-2.

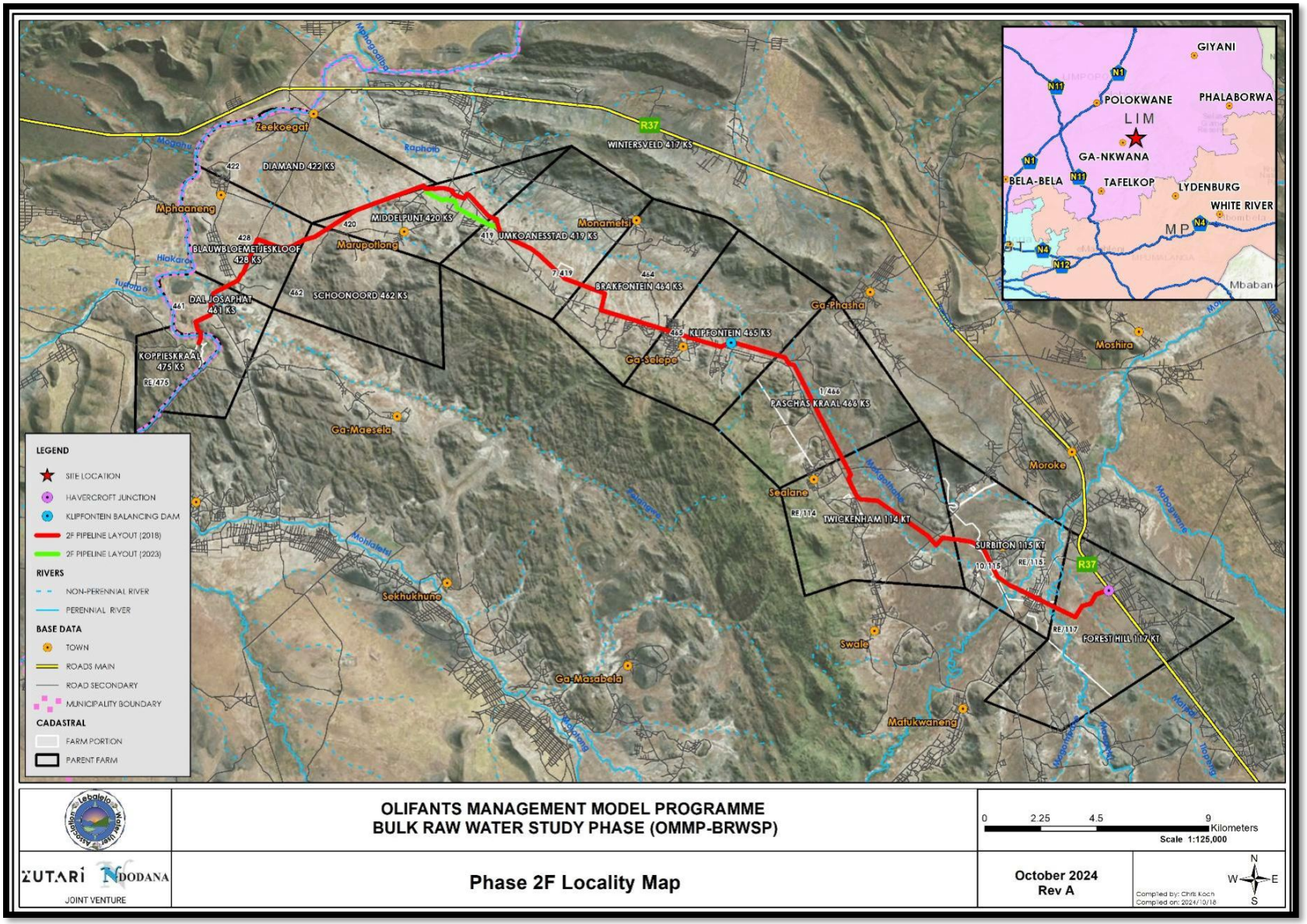


Figure 1-2: Phase 2F Locality

## 1.4 Scope of Works

This Traffic Impact Assessment (TIA) report provides a detailed traffic engineering and transport assessment associated with the Olifants Management Model Programme Bulk Raw Water Study Phase 2F. The scope of this study includes the following:

- Establish the extent of the study area (preliminary estimation);
- Collect and review essential base information, including conducting a traffic count survey at strategic locations;
- Identify other major aspects which could impact on the existing road conditions and traffic characteristics in the study area;
- Identify the potential sensitive areas and potential problem areas in the vicinity of the project;
- Review the road traffic technical details; and
- Advise on the number and best positions for the construction servitude access roads.

## 1.5 Report Structure

The remainder of the report structure for the TIA includes:

- **Section 2 – Approach and Methodology:** This section outlines the methodology used for the TIA.
- **Section 3 – Existing Conditions Assessment:** This section provides an overview of the current transport environment and its operations.
- **Section 4 – Construction and Operations Activities** This section details the expected number of additional trips resulting from the construction and operation activities of Phase 2F.
- **Section 5 – Project Traffic Impact Assessment:** This section details capacity analysis of traffic impact expected due to the number of additional trips resulting from the construction and operation transport activities of Phase 2F.
- **Section 6 – Proposed Access Road Consideration:** This section present access reviews and recommendations for proposed accesses to the pipeline servitude.
- **Section 7 –Determining the Significance of Environmental Impacts:** This section details the potential environmental impact of the project an recommends mitigation measures to minimise the impact.
- **Section 8 – Recommendations and Conclusion:** This section summarises the overall recommendations of the TIA study.

# 2 Approach and Methodology

This section outlines the approach and methodology adopted in conducting the TIA Study, focusing on key aspects such as study area and key intersections, data collection, assessment scenarios, traffic growth rates and capacity analysis approach

## 2.1 Guidelines and Standards

A key element of any TIA is the compliance with established regulations, standards, and guidelines related to transportation planning within the relevant jurisdiction. Local, regional, and national guidelines establish the framework for evaluating the impact of proposed developments on the existing road network. By adhering to these standards, the TIA guarantees that the assessment process is thorough and aligns with the necessary requirements and guidelines.

The following guidelines and standards were used in this report:

- South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual Volume 1 and 2 (TMH 16) – This guideline provides requirements for conducting TIAs in South Africa.
- South African Trip Data Manual (TMH 17) - The document provides trip generation rates that were used to estimate traffic generated by development.
- South African Road Classification and Access Management Manual (TRH 26) - This document was used to classify roads that were discussed in this study and provided guidance on access spacing standards.

## 2.2 Study Area and Key Intersections

The TMH16 guideline recommends that the boundaries of the study area be defined based on the site's location relative to the surrounding road network and the potential impact of the development on that network. It is suggested that the study area include the development's access points and key intersections within 1.5km of the site, while allowing the assessor discretion to include the first intersection on Class 1 to 3 roads. Additionally, for the transport of heavy goods, the study area must encompass all roads that will be used for the movement of these goods to or from the development.

It is expected that during the construction stage the affected road network would be used by:

- Construction workers travelling by different modes of transport (bus, minibus taxi, private car and non-motorised transport (NMT) like walking and cycling) to the construction sites; and
- Vehicles transporting construction materials and machinery to the construction sites.

During the operational stage the road network will be used by staff for maintenance and periodic assessment.

On this basis, in addition to the proposed construction and operation accesses, the key road network affected by Phase 2F transport activities include: R37, Hackney Road, D4185, D4182, D4180 and D4190. The key intersections listed below were considered for the study area. These intersections are also illustrated in

- Intersection 1: R37 / D4185
- Intersection 2: R37 / D4182
- Intersection 3: R37/D4180
- Intersection 4: R37 / D4190

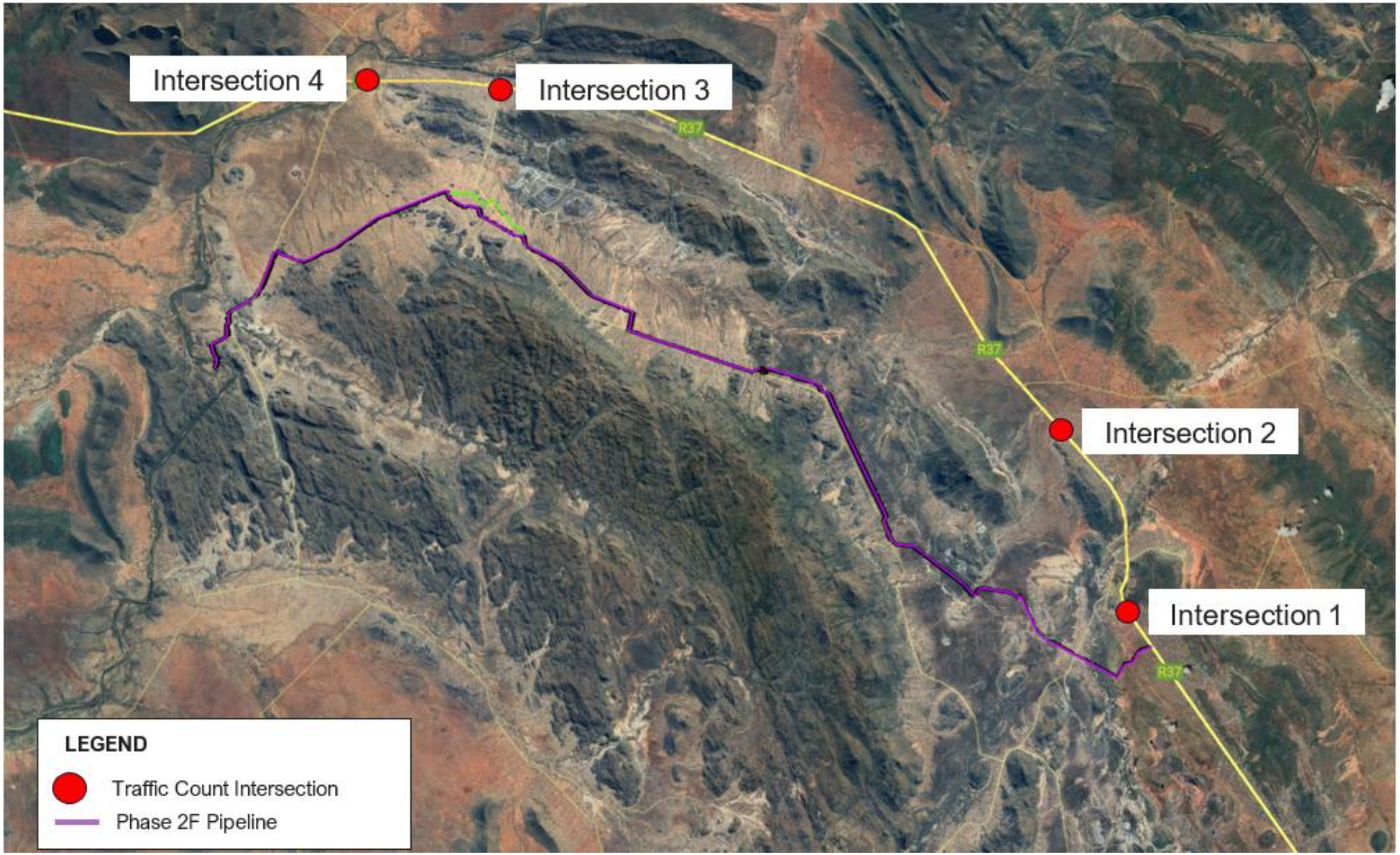


**Figure 2-1:Key Intersections**

## 2.3 Data Collection

The following sections detail the methodologies and sources employed in data collection.

### 2.3.1 Site visit

A site visit was undertaken from October 28th to 30th, 2024, to establish the current conditions of the road network layout and intersection geometry. The purpose of this visit was to assess the functionality and efficiency of the existing infrastructure, observe public transport and non-motorised transport (NMT) activities (such as pedestrians and cyclists), and gain a better understanding of the study area. This visit also aimed to identify potential safety risks, operational limitations, and opportunities for improvement.

In addition to observing traffic patterns, the visit included a thorough review of existing signage, road markings, and public transportation facilities to determine if they meet current standards and adequately serve the community. Particular attention was given to identifying hazardous areas, such as intersections prone to accidents or locations lacking proper infrastructure for vulnerable road users, such as pedestrians and cyclists. This on-the-ground assessment provides valuable insights into both the current challenges and potential areas for future traffic and infrastructure enhancements.

### 2.3.2 Future spatial and transport plans

A literature review was conducted to identify available data and information gaps that might need further investigations as well as to identify any future plans for spatial, economic and transport development in the study area. The following documents were reviewed:

- Sekhukhune District Municipality – 2023/24 Draft Integrated Development Plan (IDP) review;
- Sekhukhune District Municipality – 2018 Draft Spatial Development Framework (SDF);
- Sekhukhune District Municipality – 2024/25 – 2028/29 Draft Local Economic Development Strategy (LED);
- Limpopo Development Plan – 2020/25 Strategic Plan;
- Fetakgomo Tubatse Local Municipality– 2024/25 Final Integrated Development Plan (IDP);and
- Limpopo Spatial Development Framework– Phase 2: Spatial Analysis Report.

### 2.3.3 Existing Traffic Conditions

Classified traffic count surveys were conducted at the key intersections on an event day, Thursday the 7th of November 2024 from 06h00 to 18h00, and on a normal day. The traffic counts were undertaken at 15-minute intervals and included turning movements at intersections and vehicle classification including: light vehicles (LV), heavy vehicles (HV), buses and minibus taxis.

### 2.3.4 Peak Hours Analysed

The critical scenario for which the development and the surrounding road network will be affected is the peak hour. For the purposes of this study, it was therefore decided to analyse the AM and PM peak periods between 6h00 to 9h00 and 16h00 to 18h00. The peak hour at the key intersections was obtained and adopted for analysis.

### 2.3.5 Assessment Scenarios

The following scenarios were analysed:

- **Scenario 1**: Base year (2024) - AM and PM peak
- **Scenario 2**: Opening Year (2029) background traffic without development traffic AM and PM peak
- **Scenario 3**: Opening Year (2029) background traffic with development traffic AM and PM peak

## 2.4 Traffic Growth Rates

Traffic growth rates are commonly utilised to project future background traffic levels. These rates are typically applied exclusively to existing background traffic counts. The growth rates are influenced by expected economic development in the region.

An analysis of historic traffic growth was conducted by assessing traffic count data collected for the project in 2010, 2015, and most recently in 2024. Historic average traffic growth rates were derived, for each road link, reflecting the changes in traffic volumes over a 14-year period (2010-2024). This historical analysis allows for a clear identification of growth patterns and significant shifts in traffic demand over time, distinguishing between moderate and high-growth road links.

For future outlook, the Sekhukhune District Municipality's 2024/25 – 2028/29 Draft Local Economic Development (LED) Strategy outlines key priorities for spatial and economic growth, focusing on sectors such as agriculture, mining, and tourism. The strategy emphasizes improving infrastructure, fostering rural-urban integration, and promoting local economic hubs to stimulate job creation and attract investment. These initiatives aim to enhance connectivity between rural areas and economic centres, thereby influencing population movement and development patterns.

This planned growth is likely to have a significant impact on traffic volumes in the district. Increased economic activity, particularly in mining and agriculture, will generate higher demand for freight transport, while enhanced urban-rural connectivity may lead to more commuter traffic. Simultaneously, infrastructure improvements could shift traffic patterns, redirecting vehicles toward newly developed areas. The district's spatial and economic growth, as envisioned in the LED Strategy, underscores the importance of proactive traffic management and infrastructure development to accommodate evolving traffic demands and support sustainable development.

The TMH 17 guidelines provide a structured framework for categorising and adopting appropriate traffic growth rates based on historical traffic trends and the anticipated economic outlook of a development area. Table 2-1 classifies areas into growth categories ranging from low to exceptionally high growth, offers a practical reference for selecting a traffic growth rate that aligns with observed and projected conditions. Consequently, informed by the historic traffic growth trend and economic outlook, appropriate traffic growth rate was adopted.

**Table 2-1: Traffic Growth Rates (TMH 17 Table 1.1)**

| **Development Area** | Growth Rate |
|---|---|
| Low growth areas | 0-3% |
| Average growth areas | 3-4% |
| Above average growth areas | 4-6% |
| Fast growing areas | 6-8% |
| Exceptionally high growth areas | >8% |

## 2.5 Consideration of Operations Activities

Information about the expected workforce as well as the quantum of heavy vehicle activities during construction and operational stages was sourced from Ndodana Consulting Engineers (Pty) Ltd and is provided later in the report. This information was used to estimate traffic volumes associated with the project from first principles.

## 2.6 Review of Road Traffic Technical Details

The high level assessment of expected traffic impacts on the receiving environment (surrounding road network, public transport and non-motorised transport, road safety and communities) during the construction and operation stages of the development has been examined based on traffic engineering and transport planning standards as recommended by the Technical Methods for Highways (THM) 16, South African Traffic Impact and Site Traffic Assessment Manual (2012); as well as engineering judgement of professional traffic engineers.

SIDRA intersection software was used for the capacity analysis and the intersection performance measurements conducted were defined in accordance with the Highway Capacity Manual (HCM 2010).

## 2.7 Proposed Access Road Considerations

The pipeline alignment has been planned with a construction servitude of 40m (15m permanent and 25m temporary) to allow easy and safe manoeuvring of heavy vehicles on site. Access points to the construction servitude have been proposed along adjacent public roads by Ndodana Consulting Engineers (Pty) Ltd. For the purposes of this report, Zutari (Pty) Ltd has conducted a high-level impact assessment of the proposed access points against access management requirements necessary to ensure affected roads will continue to perform within acceptable Levels of Service, as well as the typical features of access management that presents desirable characteristics as specified in the TRH 26 South African Classification and Access Management Manual.

# 3 Existing Conditions

This section of the report discusses the existing transport road network, traffic conditions and operations, and public transport and NMT activity in the study area.

## 3.1 Affected Road Network

| R37 | |
|---|---|
|  | The R37 is a major Class 2 arterial road that falls under the jurisdiction of SANRAL. It connects Polokwane to Nelspruit, via Burgersfort and Lydenburg, ad forms the spine of the Dilokong Corridor that is centered around economic development and mining activity.<br><br>In the study area, it primarily consists of a single carriageway with bus stops near adjoining intersections. The posted speed limit is 100 km/h, with reductions to 60–80 km/h in residential areas and at intersections due to pedestrian and livestock activity.<br><br>The mining activities around the R37 as well as the villages along this route generate high volumes of freight, while certain sections are undergoing lane expansion, these upgrades are limited to specific areas.<br><br>Minibus taxis and buses were frequently observed, particularly at major intersections and near residential communities, underscoring the R37's role in both public and commercial transportation. |

## D4185

D4185 is a paved, Class 4 single carriageway road with one lane in each direction.

## Hackney Road

Hackney Road is classified as a Class 4 road with a paved surface, though it is in a severely deteriorated state.

The road consists of two lanes, which are significantly impacted by wear and damage, creating notable challenges for vehicle movement and safety.

## D4182

The D4182, a Class 4 local road under the jurisdiction of the Fetakgomo Local Municipality, is a paved single carriageway with one lane in each direction and no shoulders.

Although its designated speed limit is 50 km/h, actual operating speeds are often lower due to poor road conditions, including potholes, edge breaks, and roaming livestock.

## D4180

The D4180, a Class 4 local road under the jurisdiction of the Fetakgomo Local Municipality, is a gravel single carriageway with one lane in each direction and no shoulders.

A 50 km/h speed limit is posted. The route features several gravel speed humps, acting as traffic calming measures for residents. Despite the absence of designated NMT infrastructure, the road experiences significant pedestrian activity, with numerous street vendors observed at key intersections and along the approach to the R37 from the D4180.

## D4190

The D4190 is a Class 3 paved access road, featuring a single carriageway with one lane in each direction. This road serves as a direct connection between the Olifants River Pump Station and the R37.

As a Class 3 access road, it is designed for moderate traffic volumes and has a maximum operating speed of 80 km/h, with the speed being reduced to 60km/h in residential communities.

## 3.2 Existing Traffic Volumes

**Table 3-1: Phase 2F Traffic Count Location Description**

| Intersection | | Intersection Control Type | Description |
|---|---|---|---|
| **1.** | **R37 / D4185** | Priority Control/Stop Control | The R37 and D4185 form a T-junction with dedicated turning lanes on both R37 approaches. Sight visibility is good, but this is likely aided by the installation of guardrails that direct pedestrians around the Stop control. |
| **2.** | **R37 / D4182** | Priority Control/Stop Control | The R37 and D4182 form a T-junction with dedicated turning lanes on both R37 approaches. Sight visibility is generally good, but left visibility from the D4182 may be limited by roadside stalls. |
| **3.** | **R37/D4180** | Priority Control/Stop Control | The R37 and D4180 form a T-junction with dedicated turning lanes on both R37 approaches. Sight visibility is generally good, but left visibility from the D4180 may be obstructed by roadside stalls. |
| **4.** | **R37 / D4190** | Priority Control/Stop Control | The R37 and D4190 form a T-junction with dedicated turning lanes on both R37 approaches. Sight visibility is generally good, but left visibility from the D4190 may be obstructed by roadside stalls. While pedestrian activity is low at the junction, the advertising signage in the area should be monitored to ensure it does not further obstruct visibility. |

As previously mentioned, classified 12-hr traffic count surveys were conducted at four key intersections on Thursday, 7 November 2024, from 06:00 to 18:00. Table 3-2 shows traffic volume data and percentages of heavy vehicles during the AM and PM peak hours.

**Table 3-2: key intersections Traffic Volumes (2010 to 2024)**

| **Intersection** | | **AM** | | | **PM** | | |
|---|---|---|---|---|---|---|---|
| | | **Peak Hour** | **Total Volume** | **% Heavy** | **Peak Hour** | **Total Volume** | **% Heavy** |
| **1** | R37 / D4185 | 06:15 - 07:15 | 894 | 6.0% | 15:30 - 16:30 | 1035 | 6.0% |
| **2** | R37 / D4182 | 06:45 - 07:45 | 920 | 5.0% | 15:30 - 16:30 | 435 | 13.0% |
| **3** | R37/D4180 | 06:45 - 07:45 | 641 | 7.6% | 15:45 - 16:45 | 736 | 6.0% |
| **4** | R37 / D4190 | 07:30 - 08:30 | 506 | 7.7% | 15:30 - 16:30 | 620 | 3.0% |

As illustrated in the above table, at Intersection 1 (R37 / D4185), the AM peak saw a total volume of 894 vehicles with 6% heavy vehicles, while the PM peak saw an increase in total volume to 1,035 vehicles, maintaining the same percentage of heavy vehicles at 6%. Intersection 2 (R37 / D4182) had a higher percentage of heavy vehicles in the PM peak, with 13% of the total volume of 435 vehicles, compared to 5% during the AM peak with 920 vehicles. At Intersection 3 (R37 / D4180), the AM peak saw 641 vehicles with 7.6% heavy vehicles, while the PM peak saw 736 vehicles with 6% heavy vehicles. Lastly, Intersection 4 (R37 / D4190) showed a slight increase in volume from 506 vehicles in the AM peak to 620 vehicles in the PM peak, with a reduction in the percentage of heavy vehicles from 7.7% to 3%. These variations in traffic volumes and the percentage of heavy vehicles reflect the changing traffic patterns throughout the day, with higher volumes and fluctuating proportions of heavy traffic observed during peak periods.

A realistic growth rate was determined using data from a previous baseline report from 2010, 2015 and 2024 traffic counts. Table 3-3 shows the two-way peak hour volumes for 2010, 2015 and 2024 at the key intersections.

**Table 3-3: Two-way Traffic Volumes**

| Road link | 2010 | | 2015 | | 2024 | |
|---|---|---|---|---|---|---|
| | AM Peak Hour (Vehicles | PM Peak Hour (Vehicles | AM Peak Hour (Vehicles | PM Peak Hour (Vehicles | AM Peak Hour (Vehicles | PM Peak Hour (Vehicles |
| **R37** | 205-551 | 356-628 | 506-733 | 525-630 | 894-920 | 620-1035 |
| **D4180** | 38-205 | 32-167 | 257-320 | 247-295 | 920 | 1024 |
| **D4185** | 205 | 30 | 332 | 43 | 641 | 736 |
| **D4190** | 29-221 | 29-140 | 198 | 197 | 506 | 620 |

Overall, between 2010 and 2024, all road links experienced notable growth in traffic volumes. with the most substantial growth observed on D4180 and D4185 during the PM peak hours. R37 saw moderate growth, with annual average growth rates (AAGR) of approximately 3.7% for the AM peak and 3.6% for the PM peak. D4180 showed significant growth, with AAGRs of 11.6% for the AM peak and 12.8% for the PM peak. D4185 exhibited the highest growth, particularly in the PM peak, with AAGRs of 8.5% for the AM peak and 25.77% for the PM peak. D4190 also experienced steady growth, with AAGRs of 6.1% for the AM peak and 11.2% for the PM peak.

Based on the observed traffic growth across the road network from 2010 to 2024, a blanket annual average growth rate (AAGR) of 8% is recommended for planning purposes which TMH recommend for fast growing areas. This range reflects the overall trends in traffic volume increases, accounting for the moderate growth observed on R37 and the higher growth rates on roads like D4180, D4185, and D4190. While certain links, such as D4185 during the PM peak, experienced exceptionally high growth, these extremes may not be representative of the entire network. Therefore, adopting a more conservative and balanced growth rate within this range will ensure realistic and sustainable projections for future traffic demand across the study area.

## 3.3 Road Conditions

Apart from the R37 which was observed to be in good condition, the rest of the paved and unpaved roads were observed to be in fair to very poor condition which reflects challenges in infrastructure maintenance and accessibility. Many of these roads are uneven, riddled with potholes, and prone to erosion, especially during the rainy season. The lack of proper drainage systems exacerbates the deterioration of these roads, making them difficult to navigate and unsafe, particularly for low-clearance vehicles

In many areas, specifically along D4180, where cross culverts are installed, the gravel road exhibits significant degradation, with some sections washed away and culverts positioned in concerning conditions, lacking a solid foundation or adequate support. During heavy rainfall, these drainage problems are likely exacerbated, as blocked culverts were observed, suggesting that the required water flow would be impeded, resulting in road flooding. This ongoing issue suggests that the local infrastructure has not been maintained regularly, leading to persistent water accumulation and increasing road damage. The insufficient upkeep not only accelerates the decline of these structures but also compromises the reliability and safety of the road network for the community.

Notwithstanding, aside from the sections of the road that feature culvert crossings, some gravel road sections were found to be in relatively good condition. In many instances, driving on the gravel road provided a smoother experience compared to the paved roads, which have experienced substantial deterioration due to the heavy mining traffic that previously utilized the route. The maintained surface of the gravel road allowed for better traction and a more stable ride, whereas the paved roads are marked by significant wear and tear, including potholes and uneven surfaces.

Gravel Road Deterioration at Culvert Crossing

D4180 Gravel Road condition

## 3.4 Public transport

During site visit, it was observed that the local community rely on 7-seater vehicles for public transport. Commonly used vehicles, such as Toyota Rumions and Avanzas, were observed transporting school children and other residents within the area. These vehicles fill a critical need for local transport, helping to bridge gaps in public transport and offering accessible transport. This is due to minibus taxi services primarily operating on the tarred R37 (Burgersfort-Polokwane), D4250 (Apel Cross-Lebowakgomo), and D4190 (Apel-Sekhukhune-Steelpoort) roads.

No public transport facilities were observed in the study area except along the R37. The Municipality, in collaboration with SANRAL, is planning to develop a transport facility in municipalities. This initiative aims to address the need for public transport, particularly between key areas such as Phageng and Jane Furse, Moralele (Ga-Radingwana) to Jane Furse, Ga-Mampa, Ga-Selepe, the Health Centre, Mphanama, and the Bopedi Shopping Complex.

Public Transport by Locals (Avanza)

Public Transport by Locals (Minibus Taxi)

## 3.5 Vulnerable Road Users

A significant portion of the Phase 2F alignment passes through predominantly rural areas, where the surrounding road network consists mainly of gravel roads with limited accessibility. In these areas, NMT appeared to be the primary mode of travel for the local community. The region's infrastructure is underdeveloped, with only a few connecting roads that are in poor condition, forcing vehicles to drive along the shoulders rather than the main carriageway. This severely impacts both accessibility and safety for all road users.

Furthermore, numerous schools were observed along the route, underscoring the importance of addressing these road issues to ensure the safety and convenience of schoolchildren, as well as other pedestrians and motorists.

Given the rural setting and sparse infrastructure, there are no formal NMT facilities, such as sidewalks or designated pedestrian pathways, to ensure safe travel for residents. During the site visit, pedestrians were observed walking along the edges of the gravel roads, sharing the limited space with passing vehicles. Additionally, some residents rely on donkey-drawn carts as a cost-effective and practical means of transport also use the roadway.

The rural nature of the villages along the pipeline route also reflects a reliance on agricultural activity. Many residents were observed tending to cattle along the alignment, while livestock such as goats, sheep, pigs, and dogs roamed freely in the area. This presence of livestock near roads introduces additional safety risks, as animals wandering onto roadways increase the potential for accidents, particularly in areas without controlled fencing or designated livestock crossings. Addressing these challenges is crucial to improving safety and reducing hazards for both residents and construction activities in the area.

Donkey Drawn Carriage on Roadway

School Children walking home

Livestock on Local Roads

# 4 Construction and Operations Activities

This section of the report outlines Phase 2F construction and operation activities and the estimated traffic volumes that will be generated as a result of these activities. For the purposes of this study the expected additional trips on the transport network were determined based on the numbers of employees per project stage and the total commodities and final products to be transported during construction and operations. This data was supplied by the by Ndodana Consulting Engineers (Pty) Ltd).

## 4.1 Construction Activity

### 4.1.1 Construction Workforce

The construction of the Phase 2F pipeline will require a workforce of approximately 330 workers. Most of the workforce will be sourced from the local communities. The remainder of the workforce will arrive from other towns and will seek accommodation near the project for the sake of convenience. There will be one eight-hour shift per day during which construction activities will take place.

### 4.1.2 Construction Heavy Vehicles

The construction activities of the project will generate additional heavy vehicle traffic on the surrounding road network because of the construction vehicles travelling to and from construction sites equipment and construction materials.

Typical construction vehicles include tipper trucks, transferring spoil and bedding material, pipe delivery trucks, plant delivery trucks, service delivery trucks and water trucks. There will also be several general small plant vehicles used for supervision and site inspection.

It is anticipated that on average 150m trenches will be excavated or dug per day, resulting in an excavation volume of 1593m$^3$ per day. Trucks transporting spoil and bedding material will have a capacity of 10m$^3$. It is envisaged that depots will be set up from where deliveries will be made, throughout the 8-hour shift period. The estimated daily generated traffic for construction vehicles is presented in Table 4-1.

**Table 4-1:Phase 2F Trip Generation**

| Ty of heavy vehicle | Number |
|---|---|
| Tipper Trucks | 74 |
| Pipe delivery trucks | 1 |
| Plant delivery trucks | 1 |
| Service delivery trucks | 1 |
| Water Trucks | 1 |
| **Sub-total** | **78** |

## 4.2 Operations Activity

According to the baseline traffic study conducted in 2016, very few vehicle trips are expected to be generated by the project during operation. Phase 2F is expected to generate about 8 vehicles trip per day. Therefore, due to the negligible impact, the trips generated by the operational activity was not considered in the study.

## 4.3 Trip Generation and Distribution

The trip generation process generally estimates the number of trips expected to be generated by a development. The assumptions used to calculate the total number of trips generated by the employee and construction activities are mentioned below.

Generally, traffic generated by employee trips can be split between the following modes:

- Private vehicles
- Public transport vehicles (buses and minibus taxi)
- NMT trips

The following assumptions were made for the peak hour employee person trips:

- The National Households Travel Survey conducted in 2020 was used to determine the modal split of transport modes used by workers. The modal split in Limpopo has been summarised in Table 4-2.

**Table 4-2: Modal Split (National Household Travel Survey 2020, Statistics South Africa)**

| Province | Mode of travel | | | | | | |
|---|---|---|---|---|---|---|---|
| | Public Transport | | | Private Transport | | NMT | |
| | Train | Bus | Taxi | Car/truck driver | Car/passenger truck driver | Walking | Other |
| **Limpopo** | * | 7.4% | 22.9% | 25.6% | 6.8% | 35.9% | 1.3% |

- 80% of the trips generated by employees would be generated during the peak hour
- The vehicle capacity and occupancy per mode is shown in Table 4-3.

**Table 4-3: Vehicle Occupancy Rates**

| Mode | Vehicle Capacity | Occupancy |
|---|---|---|
| **Private car** | 4 | 1.2 |
| **Public minibus taxi** | 15 | 0.33 |
| **Bus** | 45 | 100% |

The vehicle trips generated by employees and construction vehicles have been summarised in Table 4-4.

**Table 4-5: Trip generation**

| Province | Mode of travel | | | | | | |
|---|---|---|---|---|---|---|---|
| | Heavy vehicles | Public Transport | | Private Transport | | NMT | |
| | | Bus | Taxi | Car driver | Car/passenger truck driver | Walking | Other |
| **person trips** | | 24 | 76 | 84 | 22 | 118 | 4 |
| **Vehicle trips** | 16 | 1 | 15 | 18 | 5 | | |

The trip generation estimates that the construction activities are expected to generate about 60 trips during peak hours. it was assumed that 20% of the vehicles would make return trips during peak hours, thus a total of about 70 vehicles trip can be expected during peak hours per construction site.

# 5 Road Network Capacity Analysis

Capacity analysis of the intersections included in the study area were carried out using SIDRA Intersection software. The purpose of the analysis was to determine the Levels of Service (LOS), volume/capacity ratio (v/c) and delays that may occur at intersections with the introduction of the development

The following key intersections were analysed in this section:

- Intersection 1: R37 / D4185
- Intersection 2: R37 / D4182
- Intersection 3: R37/D4180
- Intersection 4: R37 / D4190

## 5.1 Capacity Analysis Performance Criteria

The performance criteria for the intersections in the study area are indicated in Table 5-1. The level of service (LOS), delay and volume/capacity (v/c) ratio have been defined in accordance with HCM 2010 methodology.

**Table 5-1: Capacity Analysis Criteria**

| Level of Service | Control delay per Vehicle (Seconds (d)) |
|---|---|
| | Priority Intersections (Roundabouts, Stop and Give-way/Yield) |
| A | d ≤ 10 |
| B | 10 < d ≤ 15 |
| C | 15 < d ≤ 25 |
| D | 25 < d ≤ 35 |
| E | 35 < d ≤ 50 |
| F | d ≤ 50 |

### 5.1.1 Scenarios Tested

Various scenarios were tested to analyse the incremental effects of the various phases of the development as shown in Table 5-2.

**Table 5-2: Scenarios Analysed**

| Scenario | Description | Peak period | | Analysis Year | |
|---|---|---|---|---|---|
| | | AM | PM | 2024 | 2029 |
| 1 | Base year (2024) - AM and PM peak | ✓ | ✓ | ✓ | |
| 2 | Opening Year (2029) background traffic without development traffic AM and PM peak | ✓ | ✓ | | ✓ |
| 3 | Opening Year (2029) background traffic with development traffic AM and PM peak | ✓ | ✓ | | ✓ |

**Scenario 1 – 2024 baseline analysis**

The existing operating conditions (2024) of the key intersections within the study area were analysed using the surveyed traffic volumes and existing geometric layouts.

**Scenario 2 - Background traffic without development analysis**

The key intersections were analysed for the future design horizon year 2029, to assess the road network requirements resulting from annual traffic growth alone.

**Scenario 3 - Background traffic with development analysis**

The construction and operational traffic were added onto the road network and road upgrades recommended to mitigate the impact of the respective phases of the development, where required.

## 5.2 Analysis Results

### 5.2.1 Intersection 1: R37 / D4185

The existing intersection layout is shown below, and SIDRA analyses results of all scenarios are shown in the tables below.

**Intersection 1: R37 / D4185**

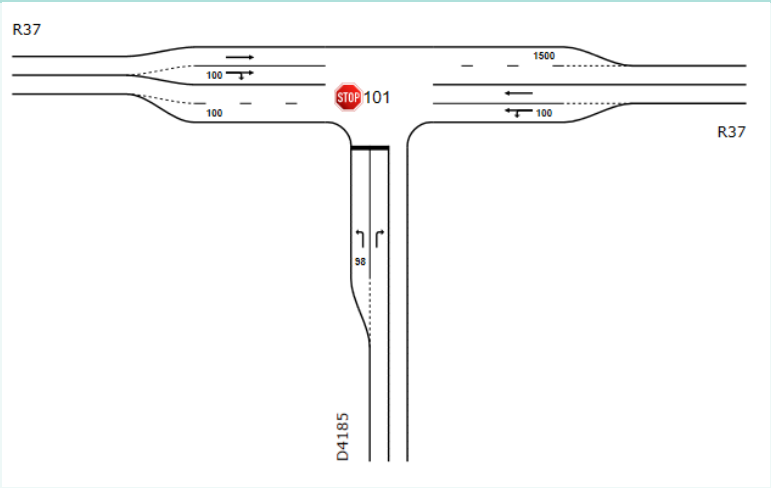


**Table 5-3: Intersection 1 - R37 / D4185**

| Scenario | Approach | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | V/C | Delay (s) | LOS | V/C | Delay (s) | LOS |
| Scenario 1 | South | 0.204 | 12.5 | B | 0.253 | 17.5 | C |
| | East | 0.096 | 1.6 | A | 0.192 | 1.2 | A |
| | North | - | - | - | - | - | - |
| | West | 0.084 | 1.4 | A | 0.134 | 1.9 | A |
| | **Overall** | **0.204** | **3.6** | **A** | **0.253** | **3.1** | **A** |
| Scenario 2 | South | 0.280 | 14.4 | B | 0.451 | 25.8 | D |
| | East | 0.113 | 1.6 | A | 0.239 | 1.4 | A |
| | North | - | - | - | - | - | - |
| | West | 0.100 | 1.6 | A | 0.166 | 2.3 | A |
| | **Overall** | **0.280** | **4** | **A** | **0.451** | **4.1** | **B** |
| Scenario 3 | South | 0.606 | 25.2 | D | 0.906 | 31.3 | D |
| | East | 0.232 | 3.6 | A | 0.255 | 1.6 | A |
| | North | - | - | - | - | - | - |
| | West | 0.110 | 2.4 | A | 0.196 | 2.9 | A |
| | **Overall** | **0.606** | **7.1** | **B** | **0.906** | **9.3** | **B** |

The analysis results indicate that this intersection is currently operating well below capacity, at LOS A. While it is expected to continue operating at an acceptable LOS in the future, a slight deterioration is anticipated, with performance decreasing from LOS A to LOS B during the PM peak. The project construction activities are expected to have a negligible impact on this change. Therefore, no mitigation measures are recommended at this intersection

### 5.2.2 Intersection 2: R37 / D4182

The existing intersection layout is shown below, and SIDRA analyses results of all scenarios are shown in the tables below.

**Intersection 2: R37 / D4182**

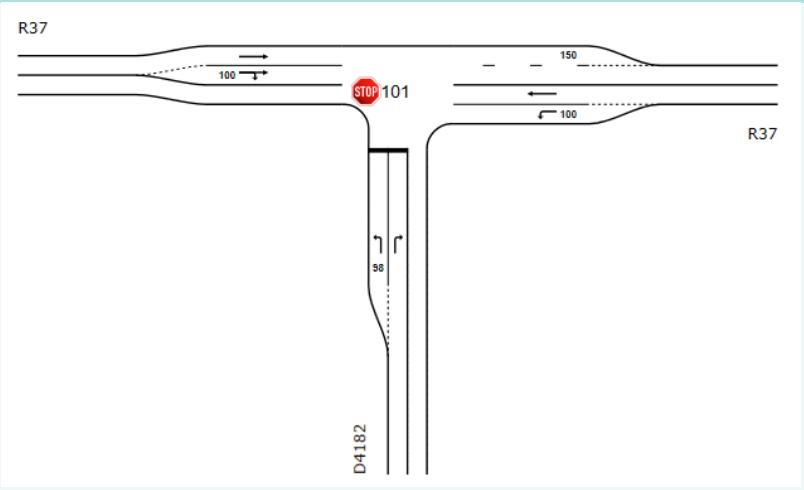


**Table 5-4: Intersection 2 - R37 / D4182**

| Scenario | Approach | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | V/C | Delay (s) | LOS | V/C | Delay (s) | LOS |
| Scenario 1 | South | 0.251 | 17.9 | C | 0.227 | 20.8 | C |
| | East | 0.198 | 0.8 | A | 0.240 | 0.6 | A |
| | North | - | - | - | - | - | - |
| | West | 0.138 | 1.2 | A | 0.159 | 1.2 | A |
| | **Overall** | **0.251** | **2.9** | **A** | **0.24** | **2.3** | **A** |
| Scenario 2 | South | 0.412 | 24.4 | C | 0.433 | 32.3 | D |
| | East | 0.233 | 0.8 | A | 0.292 | 0.6 | A |
| | North | - | - | - | - | - | - |
| | West | 0.164 | 1.4 | A | 0.198 | 1.6 | A |
| | **Overall** | **0.412** | **3.7** | **A** | **0.433** | **3.3** | **B** |
| Scenario 3 | South | 0.515 | 34.8 | D | 2.758 | 860.2 | F |
| | East | 0.233 | 2.7 | A | 0.292 | 0.9 | A |
| | North | - | - | - | - | - | - |
| | West | 0.178 | 2.2 | A | 0.201 | 1.8 | A |
| | **Overall** | **0.515** | **4.9** | **B** | **2.758** | **198.8** | **F** |

Overall, the intersection is currently operating at an acceptable LOS A and is expected to maintain this level during the AM peak in 2029. However, during the PM peak, it is anticipated to deteriorate to LOS B. The project construction activities are expected to significantly impact the southern approach, where the LOS is projected to worsen from LOS D to LOS F

Considering that construction activities will be periodic; it is not recommended that permanent geometric changes are made to accommodate the additional traffic. To mitigate the construction impact, a pointsman is recommended to direct traffic at this intersection for the duration of the construction period.

### 5.2.3 Intersection 3: R37/D4180

The existing intersection layout is shown below, and SIDRA analyses results for all scenarios are shown in the tables below.

**Intersection 3: R37/D4180**

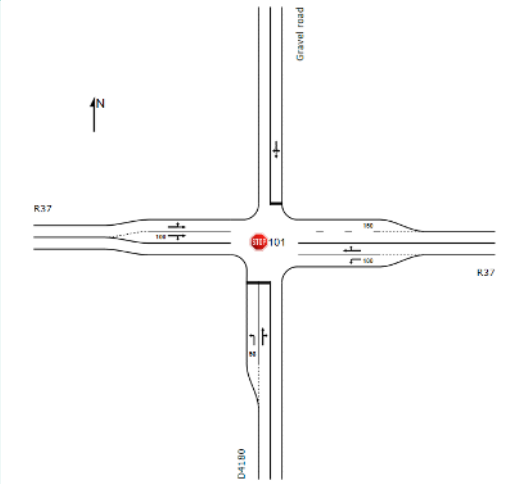


**Table 5-5: Intersection 3 - R37/D4180**

| Scenario | Approach | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | V/C | Delay (s) | LOS | V/C | Delay (s) | LOS |
| Scenario 1 | South | 0.151 | 12.2 | B | 0.249 | 12.5 | B |
| | East | 0.092 | 1.8 | A | 0.135 | 1.0 | A |
| | North | 0.027 | 15.8 | C | 0.022 | 12.7 | B |
| | West | 0.112 | 3.0 | A | 0.087 | 2.2 | A |
| | **Overall** | **0.151** | **4.5** | **A** | **0.249** | **4.9** | **A** |
| Scenario 2 | South | 0.197 | 12.9 | B | 0.331 | 13.6 | B |
| | East | 0.092 | 1.9 | A | 0.146 | 1.1 | A |
| | North | 0.033 | 16.9 | C | 0.028 | 13.4 | B |
| | West | 0.131 | 3.0 | A | 0.092 | 1.8 | A |
| | **Overall** | **0.197** | **4.8** | **A** | **0.331** | **5.4** | **A** |
| Scenario 3 | South | 0.474 | 20.4 | C | 0.795 | 21.4 | C |
| | East | 0.12 | 3.1 | A | 0.146 | 1.5 | A |
| | North | 0.051 | 23.4 | C | 0.033 | 15.0 | B |
| | West | 0.298 | 4.9 | A | 0.108 | 206 | A |
| | **Overall** | **0.474** | **7.5** | **B** | **0.795** | **11.0** | **B** |

Overall, the intersection is currently operating acceptably at LOS A and is expected to maintain the same LOS in 2029. However, the project construction activities are anticipated to cause a slight deterioration in intersection performance, resulting in an overall LOS decrease from A to B. Despite this, delays are expected to remain minimal. Thus, no mitigation measures in terms of road upgrades are recommended at this intersection.

## 5.2.4 Intersection 4: R37 / D4190

The existing intersection layout is shown below, and SIDRA analyses results of all scenarios are shown in the tables below.

**Intersection 4: R37 / D4190**

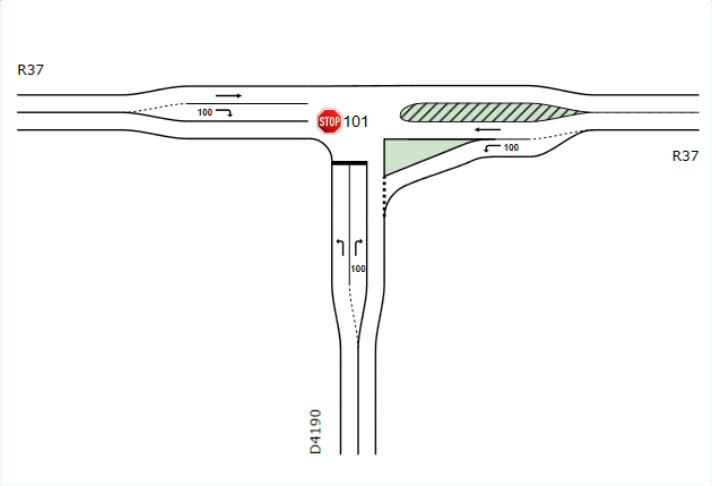


**Table 5-6: Intersection 4 - R37 / D4190**

| Scenario | Approach | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | V/C | Delay (s) | LOS | V/C | Delay (s) | LOS |
| Scenario 1 | South | 0.051 | 10.1 | B | 0.118 | 12.1 | B |
| | East | 0.1 | 1.1 | A | 0.147 | 1.1 | A |
| | North | - | - | - | - | - | - |
| | West | 0.108 | 1.0 | A | 0.090 | 1.3 | A |
| | **Overall** | **0.108** | **2.2** | **A** | **0.147** | **2.9** | **A** |
| Scenario 2 | South | 0.071 | 11.0 | B | 0.175 | 13.5 | B |
| | East | 0.137 | 1.0 | A | 0.179 | 1.1 | A |
| | North | - | - | - | - | - | - |
| | West | 0.127 | 1.0 | A | 0.109 | 1.4 | A |
| | **Overall** | **0.137** | **2.2** | **A** | **0.179** | **3.2** | **A** |
| Scenario 3 | South | 0.25 | 15.4 | C | 0.704 | 21.6 | C |
| | East | 0.2 | 3.1 | A | 0.179 | 1.4 | A |
| | North | - | - | - | - | - | - |
| | West | 0.127 | 1.0 | A | 0.109 | 1.6 | A |
| | **Overall** | **0.25** | **4.3** | **A** | **0.704** | **8.9** | **A** |

Overall, the intersection is expected to operate at an acceptable LOS A across all scenarios. However, slight increases in delays are anticipated due to growing traffic volumes and the commencement of project construction activities. No road upgrades are recommended at this intersection.

# 6 Proposed Access Roads and Road Maintenance Considerations

## 6.1 Proposed Accesses considerations

For the purposes of this report, a high-level assessment was conducted of the proposed access points (shown in Figure 6-1) against the access management requirements necessary to ensure that the affected roads continue to perform their function adequately. Additionally, the typical features of access management that present desirable characteristics, as specified in the TRH 26 South African Classification and Access Management Manual, for access spacing (see Table 6-1) and sight distances.

**Table 6-1: Minimum Access Spacing**

| Class | Rural | Urban signals(*) | Urban roundabouts and priority(*) |
|---|---|---|---|
| Class 1 | 8.0 km | n/a | n/a |
| Class 2 | 5.0 km | 800 m ± 15% | 800 m ± 15% |
| Class 3 | 1.6 km | 600 m ± 20% | 600 m ± 20% |

(*) These values can be halved for the leg of T-junctions and for one-way streets.

| Class | Rural | Urban signals | Urban roundabouts and priority |
|---|---|---|---|
| Class 4a | 600 - 800 m | 200 - 300 m | 200 – 300 m |
| Class 4b | 600 - 800 m | 150 - 250 m | 150 – 250 m |
| Class 5a | 450 - 600 m | 150 - 250 m | 150 – 250 m |
| Class 5b | 450 - 600 m | 150 m | 75 - 150 m |

The temporary access points for construction for Phase 2F are mostly proposed along Class 4 gravel roads. These road experience few to none, but have notable pedestrian activity, as well as the presence of animal-drawn carts and domesticated animals. The access spacing is not a concern due to the low traffic volumes and slow traveling speeds resulting from the poor condition of the gravel roads. However, the presence of pedestrians and animals along these roads is a critical factor to consider. To mitigate potential risks, careful attention will be given to maintaining safe access and ensuring the protection of pedestrians and animals during construction activities.

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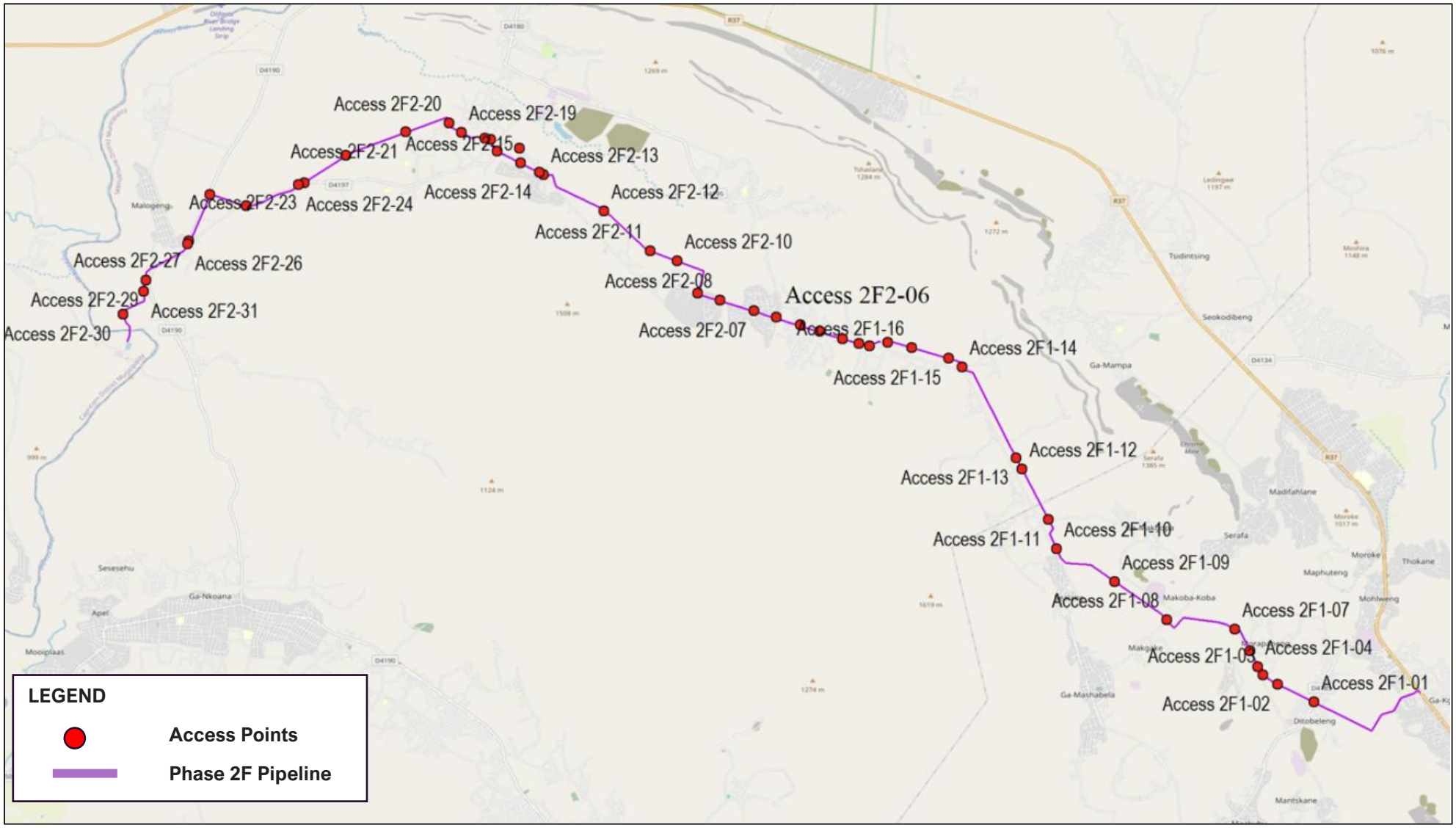


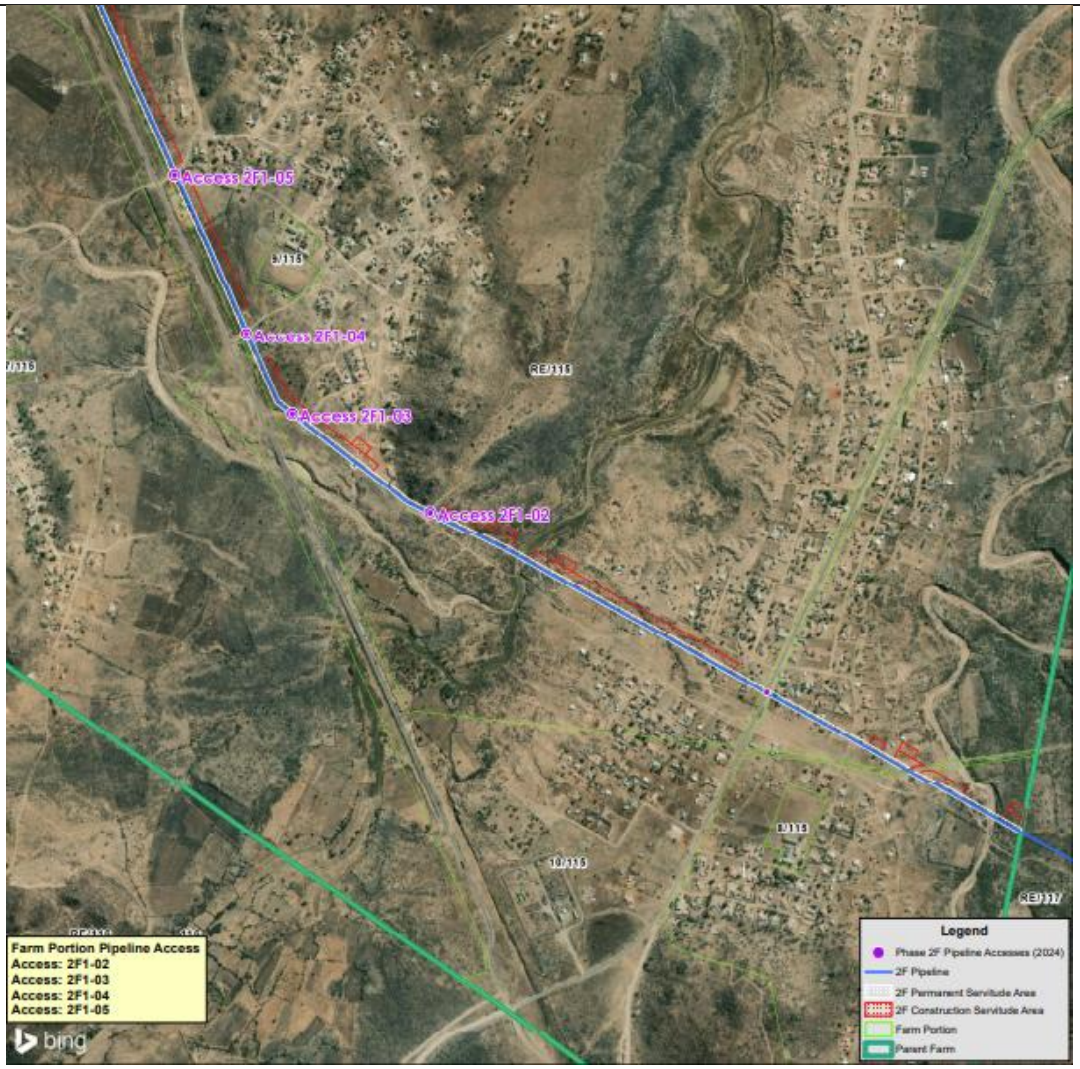

**Figure 6-1: Phase 2F Pipeline Proposed Access**

To address the accesses located within communities along the D4180 gravel road (Pipeline F1: Access 12- 17 and Pipeline F2: Access 1-22), the following mitigation strategies should be implemented.

- Temporally warning signage: Install clear, visible signs to alert drivers about pedestrians, livestock, and reduced speed limits.
- Speed Limit Enforcement: Implement and enforce reduced speed limits, particularly in areas with high pedestrian activity.
- Community Awareness Campaigns: Conduct safety awareness initiatives for residents and truck drivers, emphasizing road-sharing with animals and pedestrians.
- Dust Suppression: Apply water or other methods to control dust generated by construction vehicles.
- Maintenance of Roads: Ensure regular grading and upkeep of gravel roads to maintain safe driving conditions and minimize hazards.
- Traffic Monitors: Deploy road safety personnel or community wardens to oversee adherence to traffic regulations.
- Incident Reporting System: Establish a mechanism for the community to report road safety concerns and incidents

The remainder of the access points are discussed in the following sections.

Access 1-5




**Access 1 Location:**
24°26'37.80"S/ 30° 3'45.55"E

**Access 2 Location:**
24°26'21.76"S/ 30° 3'12.08"E

**Access 3 Location:**
24°26'12.96"S/ 30° 2'58.62"E

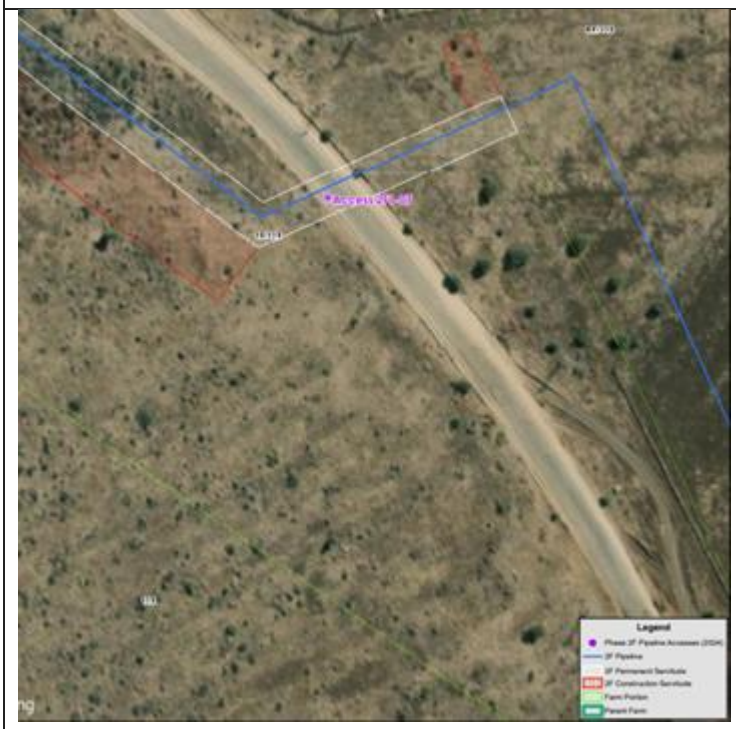
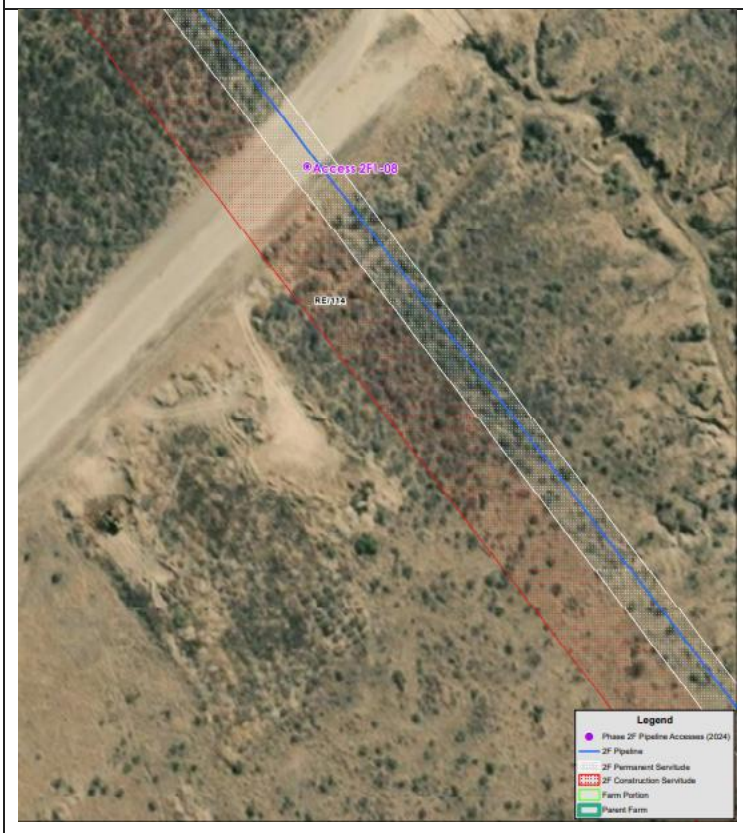
**Access 4 Location:**
24°26'5.65"S/ 30° 2'54.09"E

**Access 5 Location:**
24°25'51.12"S/ 30° 2'46.83"E

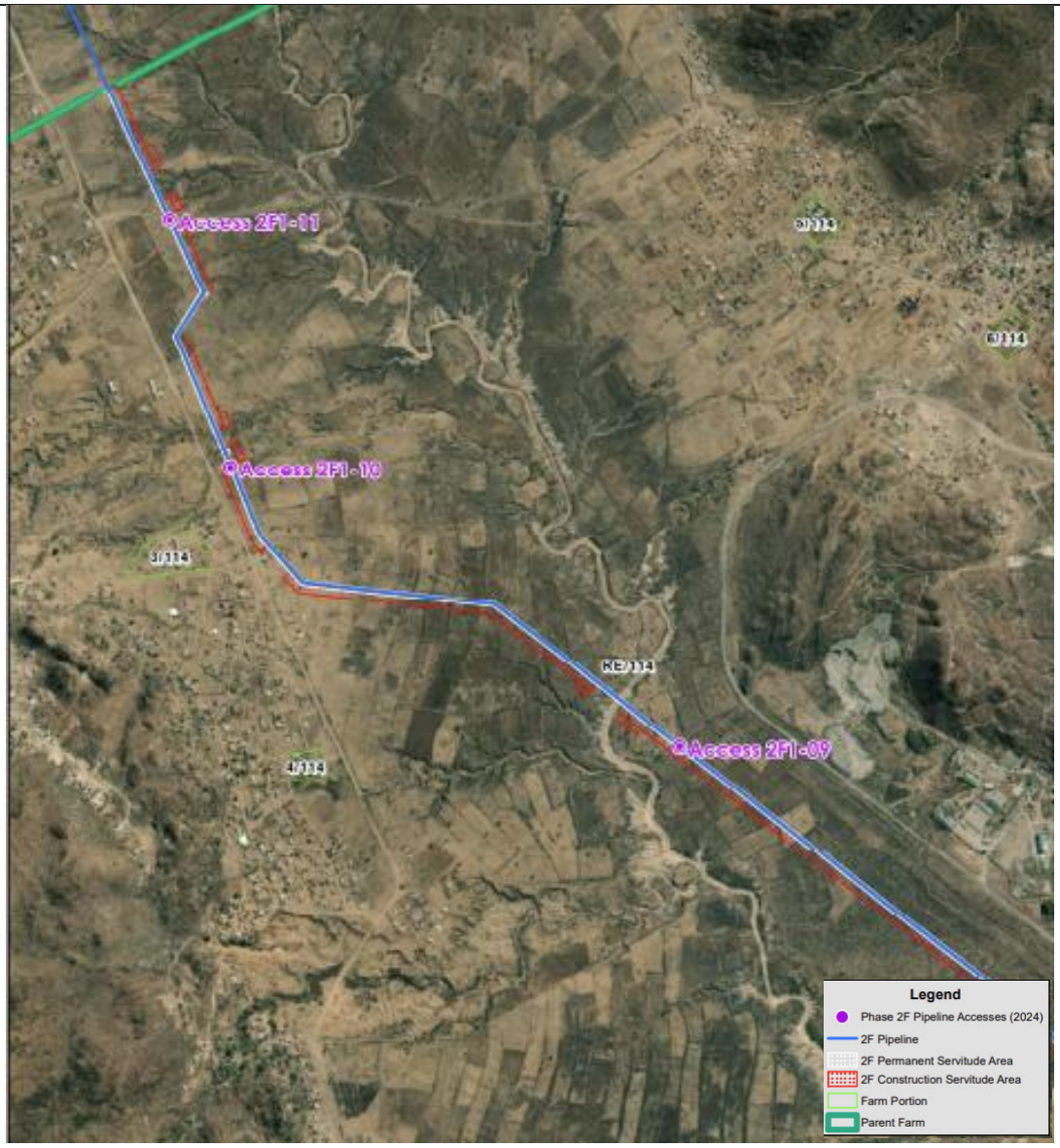
**Access spacing:**
**Access 1 –** The proposed access is approximately 70m from the nearest residential access. This is below minimum spacing for a Class 3 road in semi-rural environment. However, considering that the operating speeds are low in this area, an appropriate and cost-effective alternative that could be adopted is the construction of a speed hump from the critical approach.

The remaining accesses are adequately spaced.

**Sight distance:**
There are no permanent obstructions affecting the sight distance at any of the intersections.

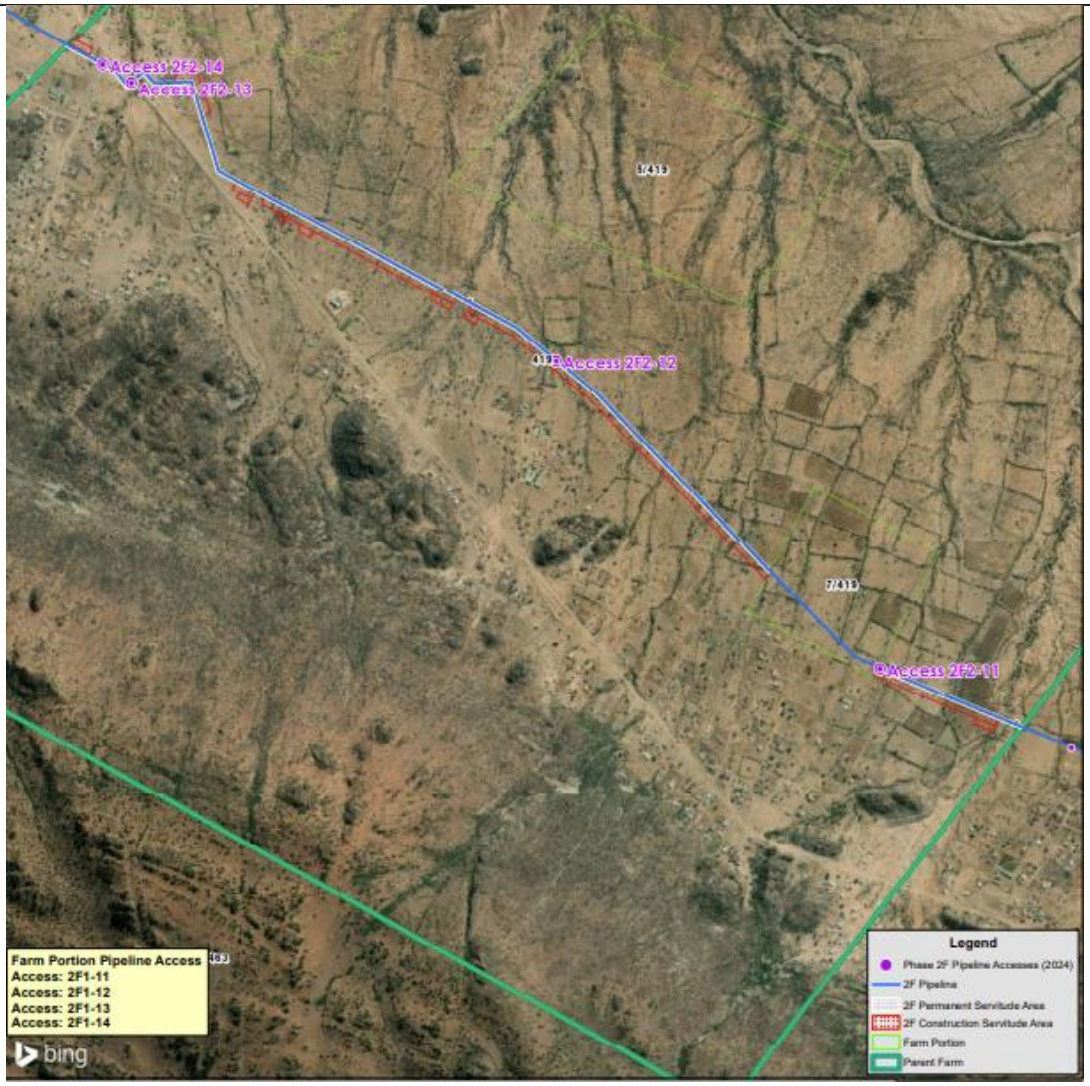
| Access 7 | |
|---|---|
|  | **Access 7 Location:**<br>24°25'30.92"S/ 30° 2'33.03"E<br><br>**Access spacing:**<br>The location of the proposed access is concerning considering that it occurs on a curve, which inevitably reduces sight distances.<br><br>**Sight distance:**<br>Poor sight distance was observed for vehicles approaching from the East.<br><br>**Mitigation:**<br>Provide an access road adjacent to the existing road 100m south of the proposed access. |
| **Access 8** | |
|  | **Access 8 Location:**<br>24°25'22.82"S/ 30° 1'30.16"E<br><br>**Access spacing:**<br>Adequate spacing is achieved.<br><br>**Sight distance:**<br>There are no permanent obstructions affecting the sight distance at the intersection. |

Access 9-11



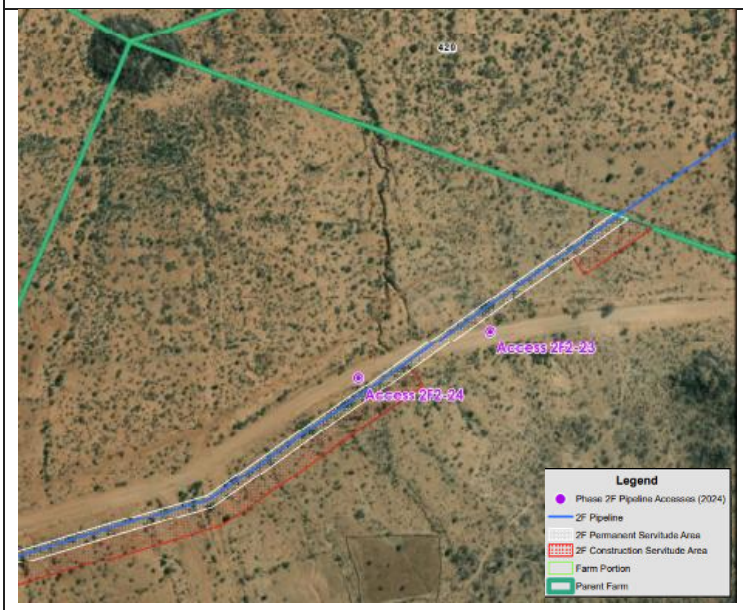

| | |
|---|---|
| **Access 9 Location:**<br>24°24'17.34"S/ 29°59'49.34"E<br><br>**Access 10 Location:**<br>24°23'50.59"S/ 29°59'41.84"E<br><br>**Access 11 Location:**<br>24°23'4.62"S/ 29°59'17.87"E | **Access spacing:**<br>All access spacings are adequate for the above.<br><br>**Sight distance:**<br>Access 9 proposes gaining from an informal access route that appears to be used by locals. However, as it currently exists, sight distance is dismal cars approaching around the corner.<br><br>Analysis indicates that clearing the vegetation at the intersection would allow for minimum sight distances to be achieved.<br><br>The remaining accesses have adequate sight distance. |

## F2 PIPELINE




| | |
|---|---|
| **Access 11 Location:**<br>24°19'44.63"S/ 29°53'37.18"E<br>**Access 12 Location:**<br>24°19'7.58"S/ 29°52'54.08"E<br>**Access 13 Location:**<br>24°18'35.00"S/ 29°51'59.25"E<br>**Access 14 Location:**<br>24°18'32.94"S/ 29°51'55.66"E | To address the accesses located within communities along the D4180 gravel road, the following mitigation strategies should be implemented.<br>► Warning Signage: Install clear, visible signs to alert drivers about pedestrians, livestock, and reduced speed limits.<br>► Speed Limit Enforcement: Implement and enforce reduced speed limits, particularly in areas with high pedestrian activity.<br>► Community Awareness Campaigns: Conduct safety awareness initiatives for residents and truck drivers, emphasizing road-sharing with animals and pedestrians.<br>► Dust Suppression: Apply water or other methods to control dust generated by construction vehicles.<br>► Maintenance of Roads: Ensure regular grading and upkeep of gravel roads to maintain safe driving conditions and minimize hazards.<br>► Traffic Monitors: Deploy road safety personnel or community wardens to oversee adherence to traffic regulations.<br>► Incident Reporting System: Establish a mechanism for the community to report road safety concerns and incidents. |

Access 23-24



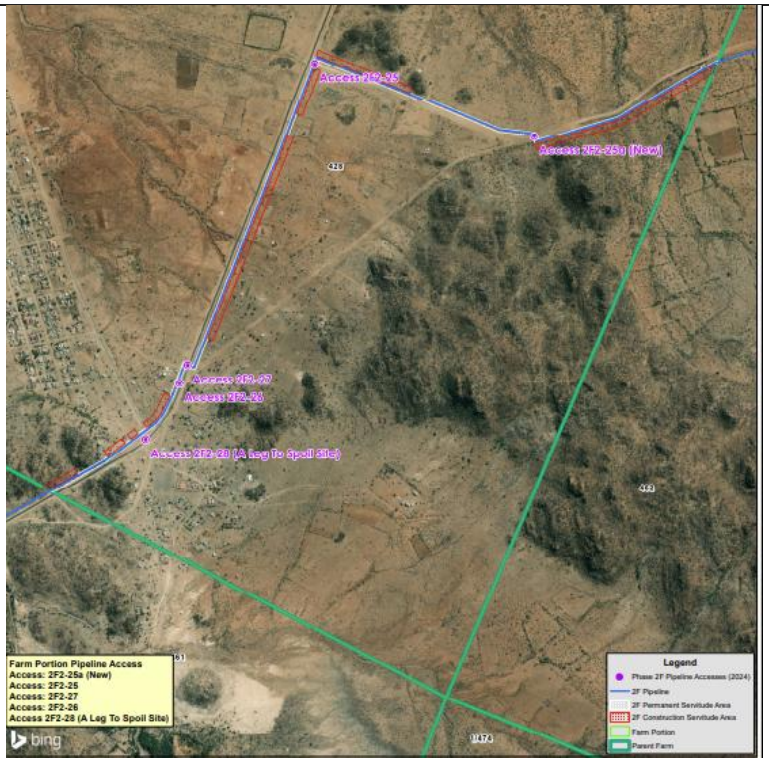

**Access 23 Location:**
24°18'42.35"S/ 29°48'20.34"E

**Access 24 Location:**
24°18'44.18"S/ 29°48'14.71"E

**Access spacing:**
Consolidating the accesses would be advised in this case as spacing between the two point is less than 100m. Beyond this, no access spacing issues are perceived.

**Sight distance:**
There are no permanent obstructions affecting the sight distance at the proposed access.

Access 25-28




**Access 25 Location:**
24°18'53.09"S / 29°46'53.48"

**Access 26 Location:**
24°19'38.07"S / 29°46'33.04"E

**Access 27 Location:**
24°19'35.58"S/ 29°46'34.23"E

**Access 28 Location:**
24°19'38.11"S/ 29°46'33.33"E

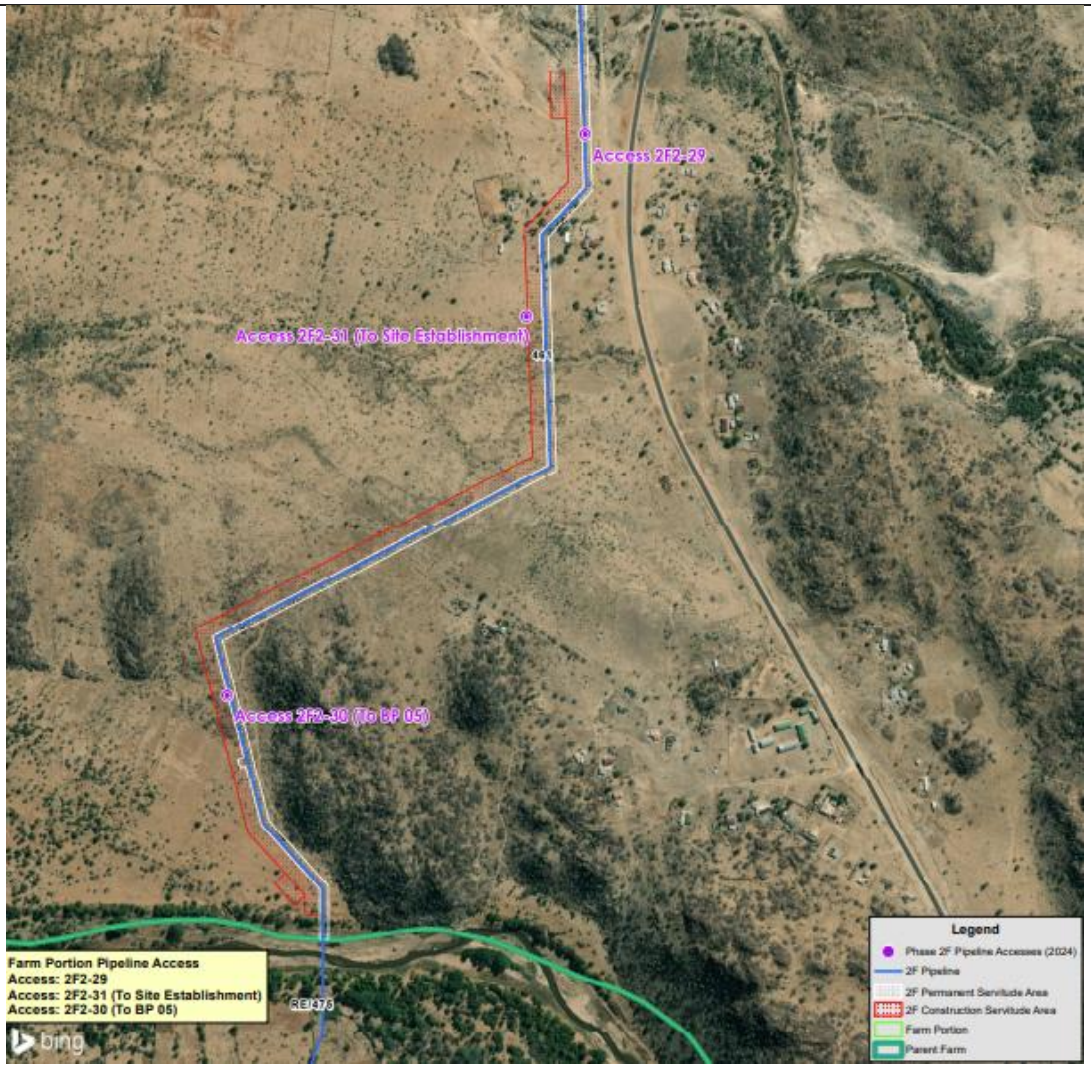
**Access spacing:**

**Access 25**: Poses a significant safety concern if intended as a permanent access, as it is located within 50m of an existing access. Constructing an adjacent access road would be preferable.

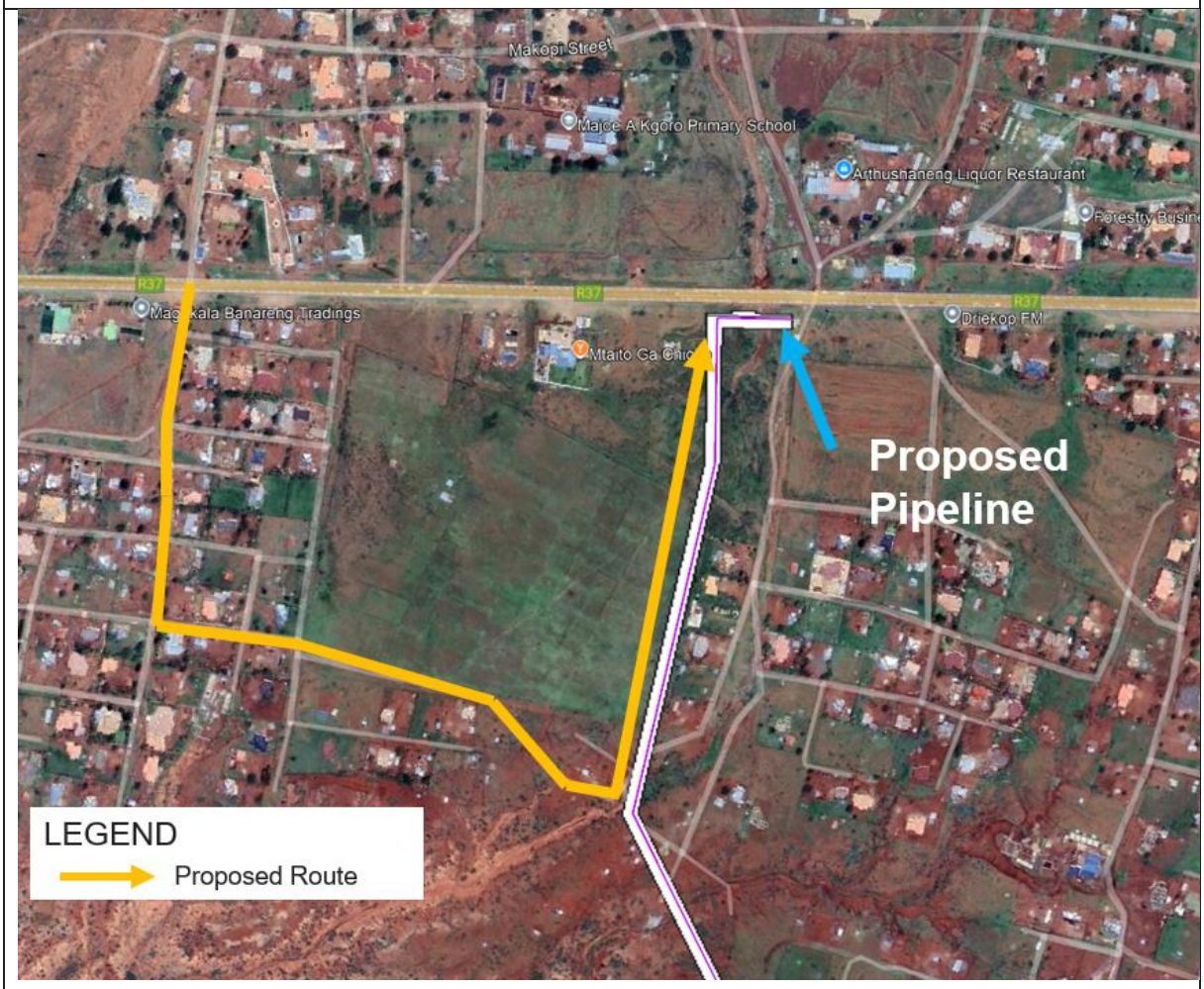
**Accesses 26 and 27**: Should be consolidated into a single access due to their close proximity and overlap with two existing local accesses.

**Access 28**: Adequately spaced relative to existing accesses.

**Sight distance:**
There are no permanent obstructions affecting the sight distance at the accesses. At Access 26 temporary obstructions may be caused by motorists parking on the side of the road.

| Access 29-31 | |
|---|---|
|  | |
| **Access 29 Location:**<br>24°19'46.42"S/ 29°46'27.83"E<br>**Access 30 Location:**<br>24°20'11.60"S/ 29°45'55.38"E<br>**Access 31 Location:**<br>24°20'21.79"S/ 29°45'51.84"E | **Access spacing:**<br>Adequate spacing is achieved.<br>**Sight distance:**<br>There are no permanent obstructions affecting the sight distance at the intersection. |

Access to Pipeline




Following correspondence with SANRAL, it was communicated that the proposed access link from the R37 to the pipeline's starting point is not feasible, as it does not meet their established standards and guidelines. SANRAL recommended aligning access with locations identified in their future planning; however, the relevant plans have not yet been made available.

Considering this, it is recommended that existing access points, although not optimal, be utilized as an alternative to the initially proposed access.

Utilizing the local road to the east of the proposed pipeline would present challenges as there is river channel that could obstruct operations.

Mitigation measures to minimize impact on the community as discussed previously would have to be implemented.

## 6.2 Road Maintenance

The D4180 road, particularly around the culverts, presents a critical issue due to its deteriorated condition. The primary causes of this deterioration are poor stormwater management and inadequate maintenance, which not only affect the road's structural integrity but also pose significant challenges to both construction and operational activities. With the increased traffic from construction vehicles, these conditions are likely to worsen, leading to further degradation of the road. The challenges include potential delays, increased costs, and heightened safety risks, particularly for both construction vehicles and local traffic. Additionally, the road's condition impacts local communities, hindering mobility, creating safety hazards, and possibly leading to economic disruptions due to limited access to essential services or markets.

To address these concerns, it is crucial to maintain ongoing communication with the Roads Agency of Limpopo (RAL) to coordinate efforts and explore potential solutions. A clear outline of the specific responsibilities of RAL, as well as other relevant stakeholders such as contractors and project teams, needs to be established to determine the necessary actions to restore the road's condition. If no remedial measures are taken in the lead-up to the intended construction date, the road is likely to be in a significantly worse state, further complicating the project timeline. A timeline for addressing these issues must be defined to prevent delays, and temporary measures, such as reinforcing road sections or improving stormwater management, may be necessary to mitigate risks until a permanent solution is implemented.

# 7 Environmental Impact Assessment and Management Plan

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

## 7.1 Impact Assessment Methodology

To clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental impacts. The majority of EIA practitioners, propose a numerical methodology for impact assessments, one has to accept that the process of environmental significance determination is inherently subjective.

The weight assigned to each factor of a potential impact, and the design of the rating process itself, is based on the values and perception of risk of members of the assessment team, as well as that of the Interested and Affected Parties (I&APs) and authorities who provide input into the process.

The perception of the probability of an impact occurring is dependent on perceptions, aversion to risk, and availability of information.

The purpose of the EIA process is to provide a structured, traceable, and defendable methodology of rating the relative significance of impacts in a specific context.

## 7.2 Methodology Used in Determining the Significance of Environmental Impacts

The impact assessment methodology utilised during the EIA Phase for the Project consists of two phases namely impact identification and impact significance rating.

Impacts and risks have been identified based on a description of the activities to be undertaken. Once impacts have been identified, a numerical environmental significance rating process will be undertaken that utilise the probability of an event occurring and the severity of the impact as factors to determine the significance of a particular environmental impact.

The severity of an impact is determined by taking the spatial extent, the duration, and the severity of the impacts into consideration. The probability of an impact is then determined by the frequency at which the activity takes place or is likely to take place and by how often the type of impact in question has taken place in similar circumstances.

Following the identification and significance ratings of potential impacts, mitigation and management measures were incorporated into the Environmental Management Plan (EMP).

Details of the impact assessment methodology used to determine the significance of physical, bio-physical, and socio-economic impacts are provided below.

The significance rating process follows the established impact/risk assessment formula:

| Significance = Consequence X Probability X Nature |
|---|

where

| Consequence = Intensity + Extent + Duration |
|---|

and

| Probability = Likelihood of an Impact Occurring |
|---|

and

| Nature = Positive (+1) or Negative (-1) Impact |
|---|

The matrix calculates the rating out of 147, whereby intensity, extent, duration, and probability are each rated out of seven as indicated in

| **Significance:** | **Negative** | **Positive** |
|---|---|---|
| **Very high** | | |
| **High** | | |
| **Moderate** | | |
| **Low** | | |
| **Very low** | | |

. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated before mitigation and again after consideration of the mitigation has been applied; post-mitigation is referred to as the residual impact. The significance of an impact is determined and categorised into one of seven categories (The descriptions of the significance ratings are presented in ().

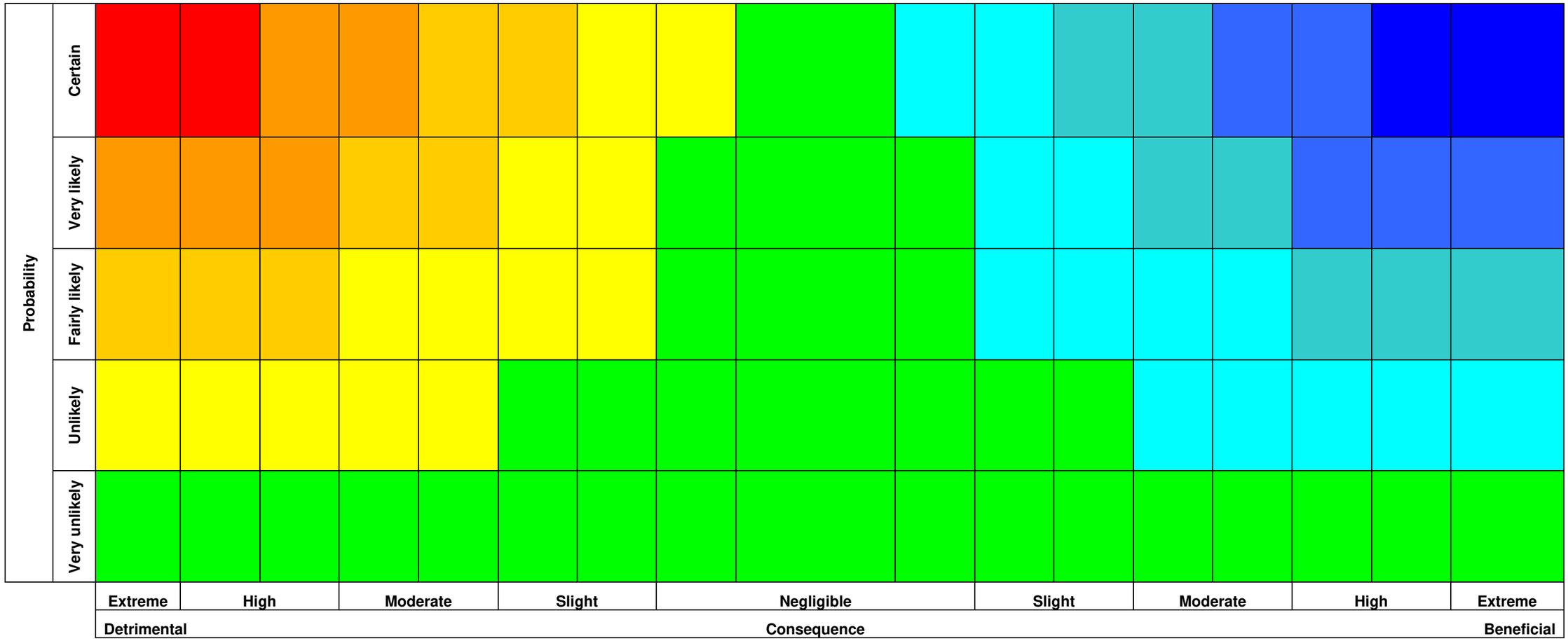
It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, (i.e., there may already be some mitigation included in the engineering design). If the specialist determines the potential impact is still too high, additional mitigation measures are proposed.

**Table 7-1: Impact Assessment Parameter Ratings**

| Rating | Intensity | | Extent | Duration/Reversibility | Probability |
|---|---|---|---|---|---|
| | **Negative Impacts (Nature = -1)** | **Positive Impacts (Nature = +1)** | | | |
| 7 | Irreplaceable loss or damage to biological or physical resources or **highly** sensitive environments.<br>Irreplaceable damage to **highly sensitive** cultural/social resources. | Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline. | International<br>The effect will occur across international borders. | Permanent: The impact is irreversible, even with management, and will remain after the life of the Project. | Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability. |
| 6 | Irreplaceable loss or damage to biological or physical resources or **moderate to highly** sensitive environments.<br>Irreplaceable damage to cultural/social resources of **moderate to highly** sensitivity. | Great improvement to the overall conditions of a large percentage of the baseline. | National<br>Will affect the entire country. | Beyond Project life: The impact will remain for some time after the life of the Project and is potentially irreversible even with management. | Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability. |
| *5* | Serious loss and/or damage to physical or biological resources or **highly** sensitive environments, limiting ecosystem function.<br>Very serious widespread social impacts. Irreparable damage to highly valued items. | On-going and widespread benefits to local communities and natural features of the landscape. | Province/ Region<br>Will affect the entire province or region. | Project Life (>15 years): The impact will cease after the operational life span of the Project and can be reversed with sufficient management. | Likely: The impact may occur. <65% probability. |
| *4* | Serious loss and/or damage to physical or biological resources or **moderately** sensitive environments, limiting ecosystem function.<br>On-going serious social issues. Significant damage to structures / items of cultural significance. | Average to intense natural and / or social benefits to some elements of the baseline. | Municipal Area<br>Will affect the whole municipal area. | Long term: 6-15 years and impact can be reversed with management. | Probable: Has occurred here or elsewhere and could therefore occur. <50% probability. |
| 3 | Moderate loss and/or damage to biological or physical resources of **low to moderately** sensitive environments and, limiting ecosystem function.<br>On-going social issues. Damage to items of cultural significance. | Average, on-going positive benefits, not widespread but felt by some elements of the baseline. | Local<br>Local extending only as far as the development site area. | Medium term: 1-5 years and impact can be reversed with minimal management. | Unlikely: Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur. <25% probability. |
| *2* | **Minor loss and/or effects** to biological or physical resources or low sensitive environments, not affecting ecosystem functioning.<br>Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected. | Low positive impacts experience by a small percentage of the baseline. | Limited<br>Limited to the site and its immediate surroundings. | Short term: Less than 1 year and is reversible. | Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate mitigation measures. <10% probability. |
| *1* | **Minimal to no loss** and/or effect to biological or physical resources, not affecting ecosystem functioning.<br>Minimal social impacts, low-level repairable damage to commonplace structures. | Some low-level natural and / or social benefits felt by a very small percentage of the baseline. | Very limited/Isolated<br>Limited to specific isolated parts of the site. | Immediate: Less than 1 month and is completely reversible without management. | Highly unlikely / None: Expected never to happen. <1% probability. |

**Table 7-2: Significance Rating Description**

## Significance Chart




| Significance: | Negative | Positive |
|---|---|---|
| Very high | | |
| High | | |
| Moderate | | |
| Low | | |
| Very low | | |

Using the methodology outlined in the previous section, this evaluation seeks to assess the relative significance of impacts on various environmental receptors due to the CHPP transport activities and to understand these impacts before and after the implementation of mitigation measures. This approach ensures a thorough and systematic evaluation of how the development may influence environmental and transport system conditions, allowing for informed decisions regarding necessary interventions to minimize adverse effects

## 7.3 Typical Hazards and Environmental Conditions

**Table 7-3: Typical hazards and Environmental Conditions** details common road hazards and environmental conditions, identified through data collection and site visits, that may pose safety risks and potentially lead to incidents along the routes to be used by the development traffic during construction and operations. The risks outlined here are applicable to the conditions anticipated throughout the various routes.

**Table 7-3: Typical hazards and Environmental Conditions**

| Category | Hazards |
|---|---|
| **Road Conditions** | Potholes: Potholes can cause vehicle damage and contribute to poor road conditions, reducing road rideability and capacity. |
| | Poor road conditions: The routes have unpaved access roads which also creates challenges for drivers if not well maintained. |
| | Dust: Although the greater portion of the route is paved, dust from the gravel roads will impact both road safety and adjacent communities.<br>Dust is also likely to be a concern for road visibility, especially when considering the use of trucks. |
| | Faded road markings: Some road sections and intersections have faded road markings which may create confusion and lead to erratic decision making and thus increase road safety risk. |
| **Human Activity** | Protest actions in communities along major roads usually lead to barricading of roads. This causes traffic jams and increases the journey times. Some protests turn violent and lead to the loss of life and property. |
| | Several vehicles travel at dangerous speeds along the R37, D4182, D4180, D4185 and D4190: where vehicles are observed to be travelling both above and abnormally below the speed limit. These vehicles cause dangerous conditions for other road users, resulting in unsafe passing manoeuvres done by speeding drivers and drivers trying to pass a slow-moving vehicle. |
| | Drivers need to be aware of the school crossings along the route, especially during the morning and afternoon peak periods. It is common for children to run across the road, which poses a safety hazard as heavy vehicles pass through communities. |
| | Since the route passes through communities, it is important to ensure that there are adequate safe pedestrian crossings within populated areas and that adequate signage is provided in areas that have gravel roads. This helps drivers to be aware of pedestrian movements along the roads. |

| Category | Hazards |
|---|---|
| **Animal hazards** | The route passes through areas that are predominantly rural. Therefore, drivers need to take caution as they travel through communities. It is also important that they are aware of stray animals from the populated areas. Animals such as cattle, sheep, goats, pigs and stray dog were a common sight along all of the routes. |
| **Other Hazards** | Vehicle Failure: Vehicle failure can lead to delays and congestion due to stationary heavy vehicles blocking the route. Particularly on narrower roads. |
| | Driver Fatigue: poses a significant risk of drowsiness, which can lead to crashes, resulting in injuries, vehicle damage, and loss of goods. |
| | Floods pose a risk to vehicles and drivers along the route. Heavy flooding may block roads and sweep away vehicles, leading to loss of life or property. Numerous culverts were also observed to be in poor condition on the D4180, indicating that surface runoff was is high. |
| | Hijacking: a serious threat to driver safety and the security of vehicular assets. financial implications are t be expected if assets are not recovered in their original state. |
| | Sun Glare: Reduces driver visibility. |
| | Inadequate lighting may cause low visibility, this may be an issue in the winter months where peak hour occurs under low light conditions. It is also a safety concern for pedestrians who travel at to school and to work in the early mornings. |
| | Fog/Smog: Reduces visibility on the road and surrounding elements. |
| | Informal roads and accesses may be a concern as the irregular nature of the layout is not consistent and may cause unexpected conditions for the drivers |

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From speeding and potholes to driver fatigue and hijacking, each factor contributes to the complexity of managing road transport and ensuring the well-being of drivers, passengers, and communities.

Addressing these hazards requires a multifaceted approach, including regular maintenance and inspections, strict enforcement of traffic regulations, comprehensive driver training, and robust emergency response plans.

Additionally, effective stakeholder engagement and continuous monitoring are essential to adapt to changing conditions and mitigate risks. By understanding and proactively managing these risks, stakeholders can enhance safety, reduce delays, and improve the overall reliability of transport along these critical routes.

## 7.4 Environmental Impact Assessment Matrix

The Environmental Impact Assessment (EIA) matrix provides a structured evaluation of potential risks along viable routes. It assigns impact scores under two scenarios: when no mitigation strategies are implemented and when proposed mitigation measures are adopted. This comparison highlights the effectiveness of the strategies in minimizing environmental and safety impacts.

**Table 7-4: Impact and Significance before Mitigation**

| Code | Impact | Pre-mitigation: | | | | | | Recommended mitigation |
|---|---|---|---|---|---|---|---|---|
| | | Duration | Extent | Intensity | Consequence | Probability | Significance | |
| 1 | Speeding | Long-term | Site-specific | Moderate - negative | Moderately detrimental | Certain | Moderate - negative | Implement speed humps, rumble strips, and raised intersections in collaboration with RAL and SANRAL to enhance road safety. |
| 2 | Potholes | Long-term | Site-specific | Low - negative | Slightly detrimental | Fairly likely | Low - negative | Establish a strong working relationship with RAL and SANRAL to ensure road maintenance protocols are followed throughout all phases of the project. |
| 3 | Vehicle Failure | Medium-term | Local | Moderate - negative | Moderately detrimental | Very likely | Moderate - negative | Conduct regular inspections and maintenance of all vehicles. Drivers should report failures immediately, and incidents along the route must be communicated to the relevant road authority. |
| 4 | Driver Fatigue | Medium-term | Local | Moderate - negative | Moderately detrimental | Very likely | Moderate - negative | Enforce regulated work hours, mandatory rest breaks, and task rotations to prevent monotony. Provide training on fatigue signs and encourage drivers to report when they feel tired. |
| 5 | Hijacking | Long-term | Regional | | Highly detrimental | Fairly likely | Moderate - negative | Install trackers on construction machinery and encourage private vehicle owners to undertake defensive driving courses. |
| 6 | Driving through urban areas | Long-term | Site-specific | Moderate - negative | Moderately detrimental | Certain | Moderate - negative | Install adequate road signage to alert drivers to speed reductions, especially in pedestrian zones. |
| 7 | Protest Action | Long-term | Site-specific | High - negative | Moderately detrimental | Fairly likely | Low - negative | Ensure safety personnel are informed promptly about protest action and coordinate with contractors and employees to manage risks. |
| 8 | Cattle/Stray Animals | Long-term | Regional | Moderate - negative | Highly detrimental | Certain | High - negative | Enforce lower vehicle speeds in rural areas with high cattle and stray animal movement. Install signage to alert drivers to potential crossings. |
| 9 | School and pedestrian zones | Long-term | Site-specific | Very high - negative | Highly detrimental | Certain | High - negative | Reduce speed limits during school hours with visible signage and flashing lights. Mark pedestrian crossings clearly, install speed bumps, and station an official to assist children crossing the road. |
| 10 | Pedestrian Crossings and Signage | Long-term | Local | Very high - negative | Highly detrimental | Certain | Very high - negative | Improve rural gravel road safety by installing reflective signs, visible road markings, and speed reduction measures near high-traffic pedestrian zones. Conduct public awareness campaigns on road safety. |

| Code | Impact | Pre-mitigation: | | | | | | Recommended mitigation |
|---|---|---|---|---|---|---|---|---|
| | | Duration | Extent | Intensity | Consequence | Probability | Significance | |
| 11 | Poor Road Conditions | Long-term | Local | Moderate - negative | Moderately detrimental | Fairly likely | Low - negative | Regularly grade gravel roads, apply binding agents, and ensure proper drainage to maintain smooth surfaces and minimize hazardous conditions. |
| 12 | Poor Lighting | Long-term | Local | Low - negative | Moderately detrimental | Fairly likely | Low - negative | Install solar-powered lights at intersections and crossings, complemented by reflective markers along road edges to improve nighttime visibility. |
| 13 | Road Geometry and Terrain | Long-term | Local | Moderate - negative | Moderately detrimental | Fairly likely | Low - negative | Address risks on sharp curves, steep inclines, and narrow roads by installing warning signs and implementing speed reductions. |
| 14 | Dust | Long-term | Site-specific | High - negative | Moderately detrimental | Certain | High - negative | Apply dust suppressants like water or calcium chloride, regularly grade gravel roads, and enforce lower speed limits in dusty areas to minimize airborne dust. |
| 15 | Vegetation | Medium-term | Regional | Moderate - negative | Moderately detrimental | Very likely | Moderate - negative | Trim or remove vegetation that blocks sightlines, obstructs pedestrians, or encroaches on roads to enhance visibility and safety. |
| 16 | Fog/Smog | Short-term | Regional | Low - negative | Slightly detrimental | Fairly likely | Low - negative | Install clear, reflective road signs, improve street lighting, and enforce lower speed limits in foggy or dim conditions. Encourage drivers to use fog lights and workers to wear high-visibility clothing. |
| 17 | Flooding | Medium-term | Regional | High - negative | Highly detrimental | Very likely | High - negative | In case of flooding, drivers must stop the vehicle, report to the safety operator, and avoid using new routes unless directed by a traffic marshal or police officer. |
| 18 | Infrastructure Failure | Medium-term | Regional | Very high - negative | Highly detrimental | Very likely | High - negative | Prioritize repairs and upgrades for dilapidated culverts and gravel roads through regular inspections, proper drainage systems, and timely interventions to prevent erosion and instability. |
| 19 | Sun Glare | Short-term | Site-specific | Negligible | Negligible | Very likely | Very low | If visibility is critically low, drivers must reduce speed and stop in a safe location, reporting the situation to the safety operator. |

**Table 7-5: Impact and Significance after Mitigation**

| Code | Speeding Potholes | Post-mitigation: | | | | | |
|---|---|---|---|---|---|---|---|
| | | Duration | Extent | Intensity | Consequence | Probability | Significance |
| 1 | Vehicle Failure | Long-term | Site-specific | Low - negative | Slightly detrimental | Fairly likely | Low - negative |
| 2 | Driver Fatigue | Long-term | Site-specific | Low - negative | Slightly detrimental | Fairly likely | Low - negative |
| 3 | Hijacking | Medium-term | Local | Low - positive | Slightly beneficial | Very likely | Low - positive |
| 4 | Driving through urban areas | Medium-term | Local | Low - positive | Slightly beneficial | Very likely | Low - positive |
| 5 | Protest Action | Long-term | Regional | Low - negative | Moderately detrimental | Very likely | Moderate - negative |
| 6 | Cattle/Stray Animals | Long-term | Site-specific | Moderate - negative | Moderately detrimental | Very likely | Moderate - negative |
| 7 | School and pedestrian zones | Long-term | Site-specific | Moderate - negative | Moderately detrimental | Fairly likely | Low - negative |
| 8 | Pedestrian Crossings and Signage | Long-term | Regional | Low - positive | Moderately beneficial | Very likely | Moderate - positive |
| 9 | Poor Road Conditions | Long-term | Site-specific | Very high - positive | Highly beneficial | Certain | High - positive |
| 10 | Poor Lighting | Long-term | Local | High - positive | Highly beneficial | Certain | High - positive |
| 11 | Road Geometry and Terrain | Long-term | Local | High - positive | Highly beneficial | Fairly likely | Moderate - positive |
| 12 | Dust | Long-term | Local | Moderate - positive | Moderately beneficial | Unlikely | Low - positive |
| 13 | Vegetation | Long-term | Local | High - positive | Highly beneficial | Fairly likely | Moderate - positive |
| 14 | Fog/Smog | Long-term | Site-specific | Moderate - positive | Moderately beneficial | Very likely | Moderate - positive |
| 15 | Flooding | Medium-term | Regional | Low - positive | Moderately beneficial | Fairly likely | Low - positive |
| 16 | Infrastructure Failure | Short-term | Regional | Low - negative | Slightly detrimental | Fairly likely | Low - negative |
| 17 | Sun Glare | Medium-term | Regional | Low - negative | Moderately detrimental | Fairly likely | Low - negative |
| 18 | Speeding | Medium-term | Regional | High - positive | Highly beneficial | Fairly likely | Moderate - positive |
| 19 | Potholes | Short-term | Site-specific | Low - positive | Negligible | Very likely | Very low |

# 8 Recommendations and conclusion

The aim of this TIA was to assess the impact of Phase 2F of the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP). Phase 2F comprises approximately 60 km of pipeline intended to convey water to the Olifantspoort Water Treatment Works (WTW).

The following points summarise the findings and recommendations made from this traffic study:

- The capacity analysis indicated that all key intersections in the study area is generally operating at acceptable LOS and well below capacity. The background traffic growth is expected to have negligible impact as the intersection is expected to continue operating at acceptable LOS with minimal additional delays until 2029.
- Phase 2F is expected to have negligible impact on the surrounding road network, therefore no road upgrades are proposed to mitigate project impact.
- Road Inspections - To maintain high road standards during both the construction and operational phases, the following aspects of the utilized routes should be reported to RAL:
    - Potholes;
    - Edge break;
    - Rutting;
    - Pavement Deformation;
    - Loose Aggregate;
    - Line-marking; and
    - Sign Condition.

An assessment of dust generation should be conducted on a regular basis.

- Contractor Requirements - The following should be required to develop and implement specific traffic management measures in accordance with the traffic impacts caused by their work in line with the broader measures propose. Key requirements include:
    - Appropriate speed limits and communication about these with vehicle operators;
    - Advance live warning system to all others involved in the Project of changed traffic conditions that may have impacts;
    - Mitigation measures for all activities with impacts on public roads; and
    - Planning start and finish times to minimise any impacts on school children and pedestrians
- Code of Conduct - A Code of Conduct for Vehicle Drivers will be integral for all employees, contractors and inspectors involved in the pipeline construction and operation. This should apply to all drivers of all light and heavy vehicles accessing the pipeline for both construction and operational phases. The Code of Conduct for Vehicle Drivers will be included as a transport contractual arrangement for those involved in the aforementioned phases. Provisions of the Code of Conduct for Vehicle Drivers which drivers must adhere to include:
    - Obeying all laws, rules, and regulations that apply to vehicle use on public and private roads;
    - Respecting the rights of all road users, including pedestrians and cyclists, to share the road;
    - Ensuring vehicles are roadworthy, in good mechanical condition, and clean;
    - Following designated access routes;
    - Avoiding restricted access routes unless explicitly permitted to do so;
    - Avoiding travel during school opening and closing times where possible, particularly over-size and over-mass heavy vehicles;
    - Not travelling in convoy unless under approved escort;

- Adhering to specified procedures for using causeways when water is present; and
- Minimising noise and dust emissions (primarily by minimising the use of unsealed roads) to the greatest practicable extent or by having water carts discharge water on the roads to minimise dust.

All employees and contractors should be informed of the provisions of the Code of Conduct for Vehicle Drivers and provides training and information (such as school opening and closing times) as appropriate.

- Training - Employees and construction contractors should implement appropriate training and site induction relevant to the mitigation actions mentioned chapter 7. All site attendees during both construction and operational phases are required to attend the site induction and safety brief sessions which should cover:
  - Emergency response procedures;
  - Incident/Accident management and reporting;
  - Code of Conduct for Vehicle Drivers and
  - General traffic management arrangements, in and out.
  - The procedures for reporting an emergency should be detailed in the site induction as will the incident and accident management procedures. All records should be kept and maintained based on their respective record management plans.
  - All construction and operational employees and contractors should provide inductions and training including:
    - Traffic restrictions that apply to public roads (for example nominated access points);
    - Construction and operational hours;
    - Site access locations, including those restricted for certain vehicle types;
    - Subcontractors to be informed of the existence of TMP and requirements relevant to their particular operations;
    - Procedures for reporting incidents, route deficiencies, hazards, etc.;
    - Code of Conduct for Vehicle Drivers;
    - Designated access routes;
    - Avoidance of certain roads, for example residential or severely deteriorated roads; and
    - Flood access.
- All contractors on site shall be responsible for keeping records of their employees, and those of their subcontractors, to ensure they have the appropriate license respective to the vehicles they are operating.

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In diversity there is beauty and there is strength.

**MAYA ANGELOU**

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# SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

**REPORT TITLE**
Baseline Traffic Impact Study Phase 2F - Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP – BRWSP)

**Kindly note the following:**

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)*', where applicable.

## 1. SPECIALIST INFORMATION

| | |
|---|---|
| Title of Specialist Assessment | Baseline Traffic Impact Assessment Phase 2F |
| Specialist Company Name | Zutari (Pty) Ltd |
| Specialist Name | Vera Duduzile Mpofu |
| Specialist Identity Number | 8202020628081 |
| Specialist Qualifications: | MEng, Bsc (Civil Engineering) |
| Professional affiliation/registration: | ECSA Pr ENG |
| Physical address: | 41 Matroosberg Road |
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| Postal address | 0040 |
| Telephone | 0124272000 |
| Cell phone | 0842110242 |
| E-mail | Vera.Mpofu@zutari.com |

## 2. DECLARATION BY THE SPECIALIST

I, Vera Duduzile Mpofu declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  - any decision to be taken with respect to the application by the competent authority; and;
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Vera Mpofu

Signature of the Specialist

Zutari (Pty) Ltd

Name of Company:

24 Nov 2024

Date

## 3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _Vera Duduzile Mpofu_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Vera Mpofu

Signature of the Specialist

Zutari

Name of Company

24/07/2025

Date

Signature of the Commissioner of Oaths

Certified as a true copy of the original document
Signed at PRETORIA on
2025 -07- 24
Commissioner Of Oaths

MELISSA SHAW
COMMISSIONER OF OATHS EX OFFICIO
RIVERWALK OFFICE PARK
41 MATROOSBERG ROAD
ASHLEA GARDENS, EXTENSION 6
PRETORIA, 0081
ATTORNEY, SOUTH AFRICA

Date