

## TRAFFIC IMPACT ASSESSMENT

SHONGWENI LANDFILL SITE SITUATED ON PORTION  
A OF THE FARM KIRKFALLS NO. 14227 CLIFTON  
CANYON, DURBAN, SOUTH AFRICA



AUGUST 2015



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SHONGWENI LANDFILL SITE  
SITUATED ON PORTION A OF  
THE FARM KIRKFALLS NO.  
14227 CLIFTON CANYON,  
DURBAN, SOUTH AFRICA**

**Durban Solid Waste**

Project no: 020235R  
Date: August 2015

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**COUNCIL:** eTHEKWINI MUNICIPALITY

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# 1 LETTER SIGNED BY THE ECSA REGISTERED PROFESSIONAL

# 2 COMPLETED CHECKLIST



# 3 INTRODUCTION

WSP Group was appointed by Durban Solid Waste (DSW) to perform a Traffic Impact Assessment (TIA) for the Shongweni Landfill Site in Clifton Canyon, KwaZulu Natal, South Africa as part of an application to maintain the land use rights. This TIA is submitted as part of an updated Environmental Impact Assessment (EIA) for the proposed landfill site.

This report aims to estimate the number of trips generated in the peak hours and assesses the impact of the new landfill site in terms of capacity at the access and surrounding junctions. The safety of heavy vehicles is assessed in the surrounding road network and recommendations are made where applicable. Other aspects such as access arrangement and public transport provision are also discussed. The guideline "Manual for Traffic Impact Assessments and Site Traffic Assessments" by the Ethekewini Transport Authority (ETA) is applied in this TIA.

# 4 DEVELOPMENT PARTICULARS

## 4.1 DEVELOPMENT DESCRIPTION AND REFERENCE NAME

The proposed development is for a landfill site where waste will be disposed on a daily basis. Due to the growing population and growing requirement for waste disposal within the eThekweni Municipality, Durban Solid Waste (DSW) has identified a site in Clifton Canyon that can serve as a landfill.

The previous application included a Traffic Impact Study performed by PD Naidoo and Brian Roberts, dated June 2003 that estimated the likely trip generation and impact on the surrounding intersections, the proposed access and made recommendations for geometric upgrades on the surrounding road network to accommodate heavy vehicle movements. This TIA will update the previous study and discuss the previous recommendations.

The following points are relevant to the proposed landfill site:

- This TIA refers to the proposed landfill as the “Shongweni” Landfill
- The proposed Shongweni landfill will be located on Portion A of the Farm Kirkfalls 14227 and will be located approximately 3km south of the N3 in Clifton Canyon, Kwa-Zulu Natal, South Africa.
- The proposed landfill site forms part of an Environmental Impact Assessment (EIA) – the EIA indicates that the landfill will have a total area of 195ha
- There is an existing Shongweni H: h landfill located just north of the proposed site and is operated and managed by “Enviroserv Holdings”.

## 4.2 LOCATION PLAN

- The locality plan of the proposed landfill site is shown on **Figure 1: Regional Locality Plan - Cato Ridge Landfill Site**

below. Please refer to **Appendix A** for the detailed outline and area of site. The proposed landfill will be located in the outer west region of the eThekweni district and an extract of this map is shown on Error! Reference source not found. below. A full copy of the whole map is included in **Appendix B** for more information.

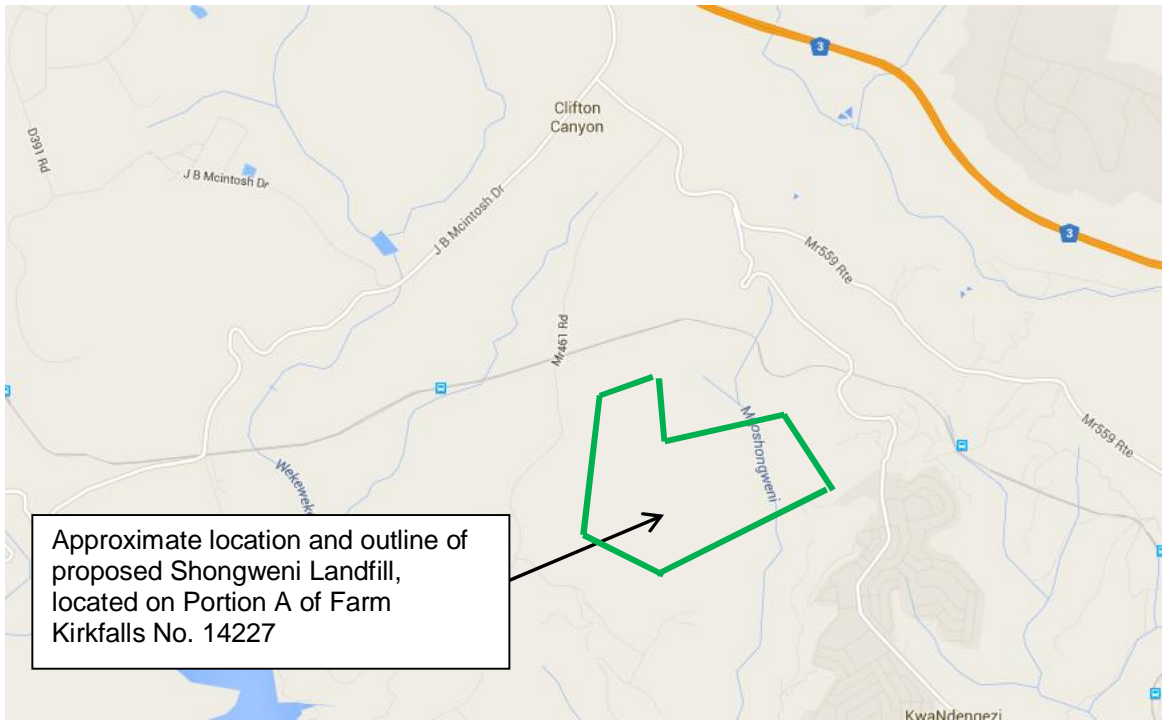


Figure 1: Regional Locality Plan - Cato Ridge Landfill Site

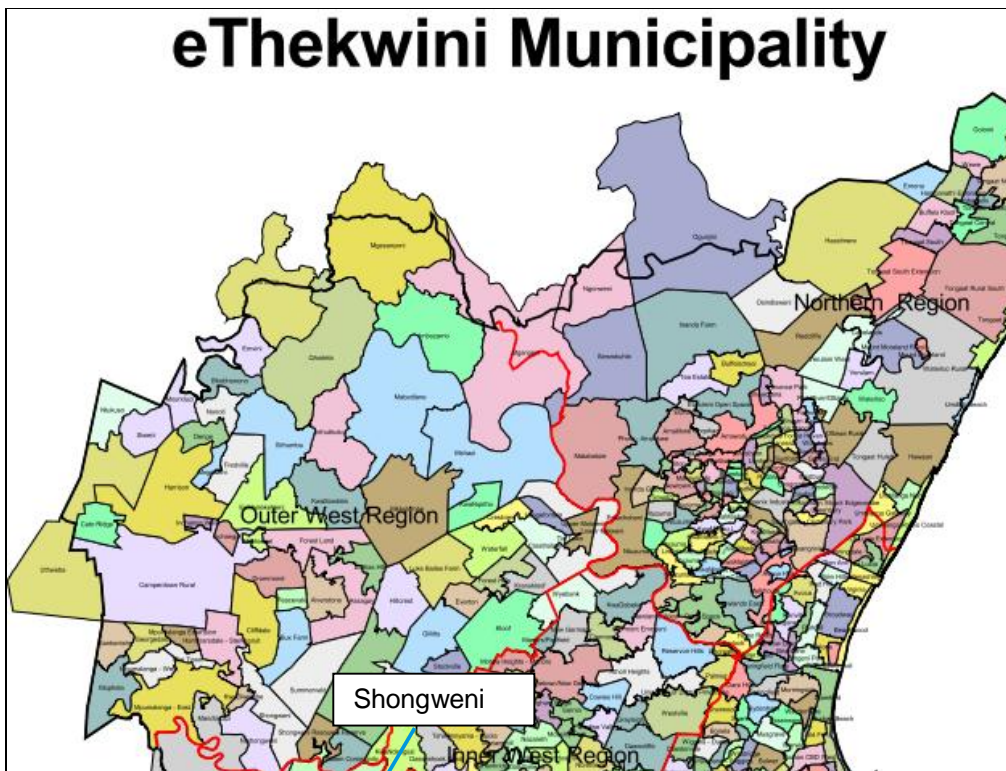


Figure 2: Extract of the eThekweni map showing the Shongweni area in the Outer West Region

### 4.3 LAND USE RIGHTS

The land use rights applicable for this application are for 'waste disposal purposes.' This application is to maintain and update this existing land use right for the next five year period.

The total size of the landfill is 195ha in size. The floor area ratio and GLA of the site is unknown.

# 5 STUDY AREA

The study area for the proposed Shongweni Landfill site includes the following:

- Access to the proposed Shongweni Landfill site

The intersection of JB Mcintosh Drive and and Mr 559 (P559)

- The intersection of Mr 559 (P559) and Mr 461 (P461)
- The intersection of Mr 559 (P559) and Mr 518 (D828)
- The existing road network surrounding the proposed landfill site

## 5.1 STUDY AREA MAP OR PLAN

The study area for the site is represented schematically on Error! Reference source not found. below.

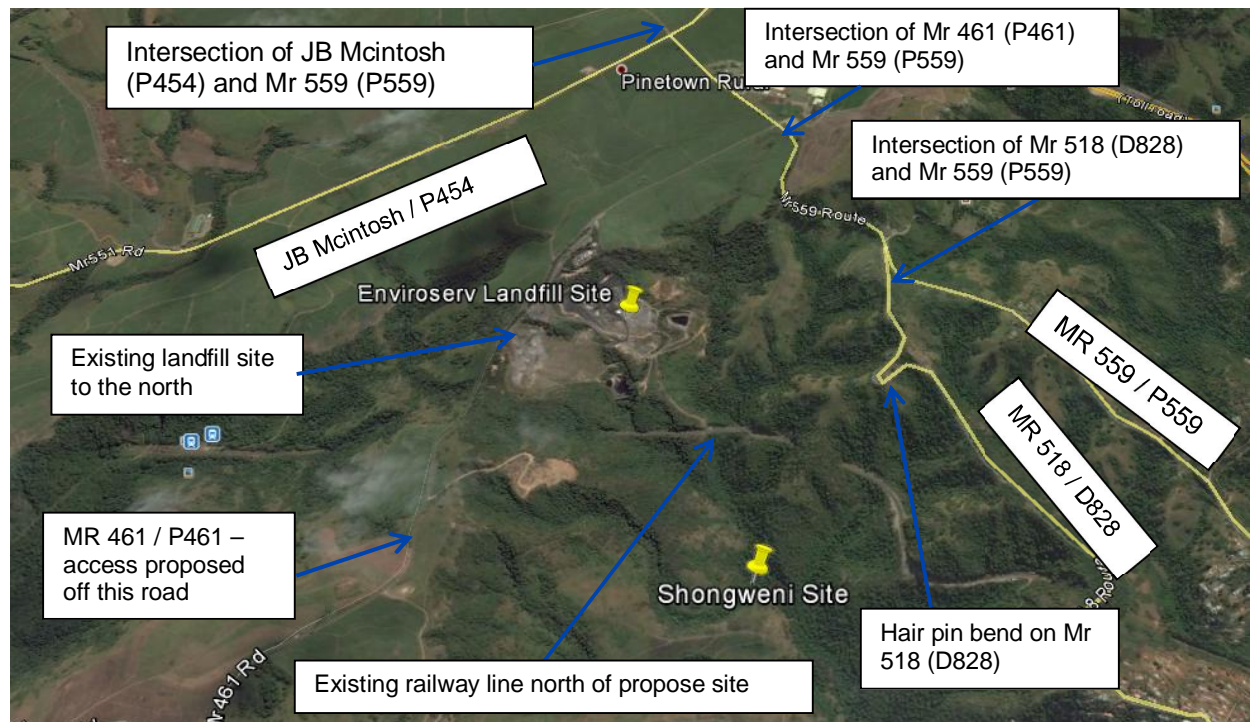


Figure 3: Plan Showing Proposed Shongweni Site and Elements in Study Area

# 6 BACKGROUND INFORMATION

The transportation facilities relevant to the proposed Shongweni Landfill site include the following:

## 6.1 TRANSPORTATION FACILITIES AND PLANNING

### 6.1.1 Existing roads and Intersections

**N3** – The N3 is a National Highway that carries traffic between the major cities of Durban and Johannesburg. This is a high mobility route with interchanges at regular intervals to provide access to areas along this road. This road exists as a dual carriageway with three lanes per direction and is under SANRAL's jurisdiction.

**JB McIntosh Dr (P454)** - JB McIntosh Drive or P454 is a provincial road and forms an interchange with the N3 further north of the site and therefore accessibility to the Shongweni area.

**Mr 559 (P559)** – The Mr 559 (P559) is a provincial road and carries traffic between JB McIntosh Drive (P454) and M1 road located southeast of the site.

**Mr 518 (D828)** – the Mr 518 (D828) road is a provincial district road and exists as a single carriageway road.

**Mr 461 (P461)** – The Mr 461 or P461 road is a provincial road and carries traffic between the Mr 559 (P559) and Dassenhoek to the south.

Please refer to **Figure 4** below for more information that is an extract from the KwaZulu Natal Department of Transport (KZN DoT) for the eThekweni District showing the provincial roads surrounding the proposed site.

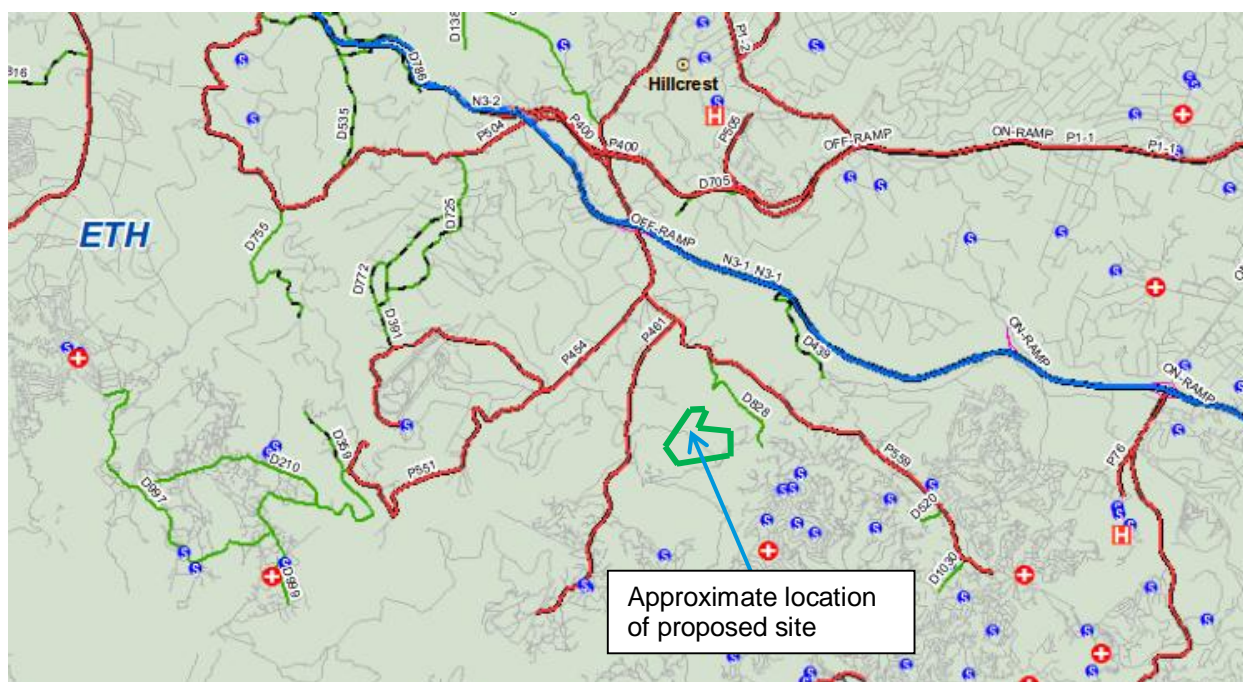


Figure 4: Extract from the Kwa-Zulu Natal Department of Transport (KZN DoT) showing the Provincial Roads in the Clifton Canyon Area

## PUBLIC TRANSPORT FACILITIES

There are no pedestrian walkways or formal taxi bays provided along Mr461 (P461).

### 6.1.2 Planned changes to transportation facilities

The document: “Shongweni LAP – A framework for sustainable urban development” identified the local distributor or collector roads as the roads to be upgraded by providing linking roads between them for better connectivity.

Please refer to Error! Reference source not found. below for more information on the proposed upgrades in the area with the purple roads shown as proposed links between the “district connector” roads. The future link roads south of the site will provide better access to areas south of the proposed landfill.

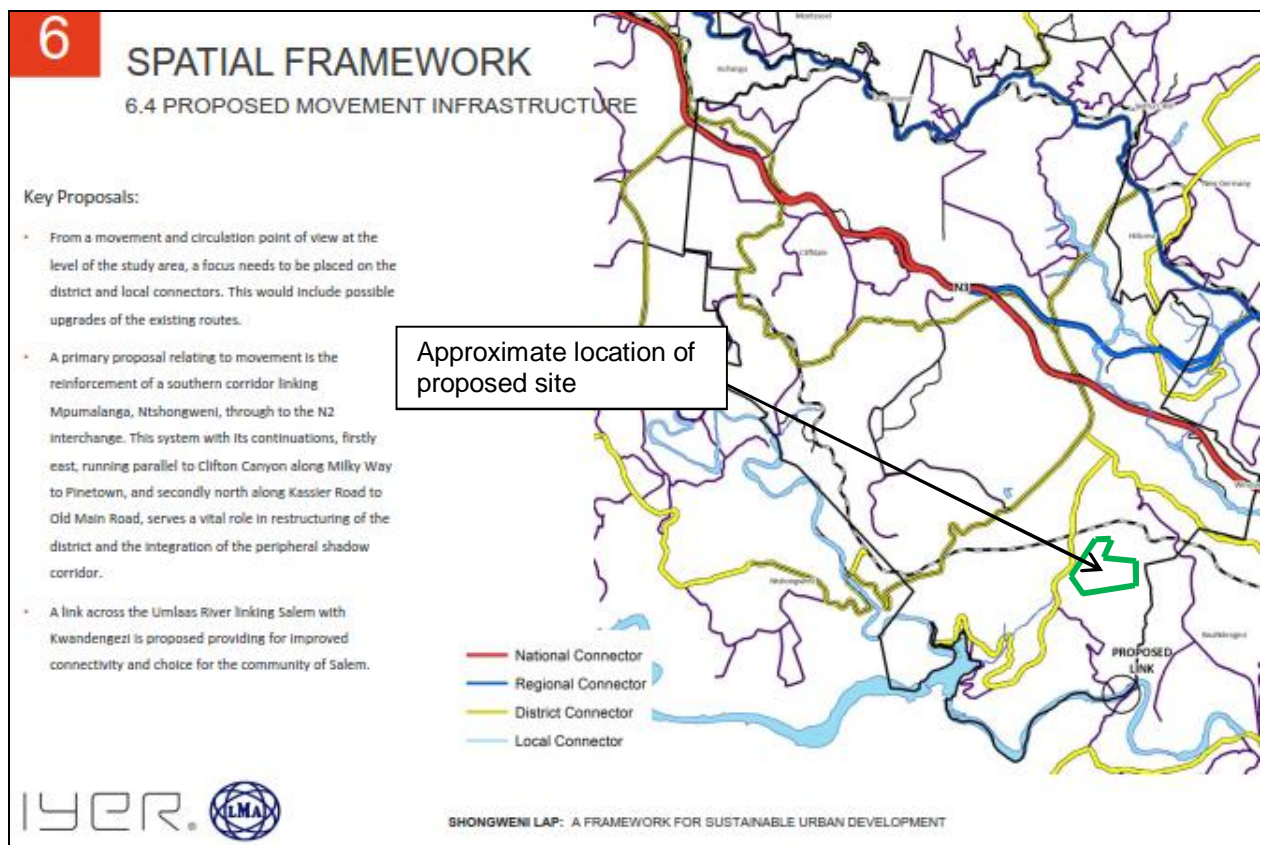


Figure 5: Proposed Upgrades and changes to Transportation Facilities for the Future

## 6.2 RELEVANT INFORMATION PROVIDED BY ETHEKWINI MUNICIPALITY

The eThekweni have provided plans and documents on the proposed Shongweni Local Area Plan (LAP). Please refer to **Appendix C** for more information.

### 6.2.1 Functional road classification

The existing road network is classified according to the COTO manual: "South African Road Classification and Access Management Manual" and the Shongweni LAP found in **Appendix C** refers:

- The **N3** highway is a Class 1 Principal Arterial and functions as a major mobility road between Johannesburg and Durban.
- **JB McIntosh Dr (P454)** - JB McIntosh Drive (P454) can be classified as a Class 3 Minor Arterial or "Regional Connector" on the Shongweni LAP. This road forms an interchange with the N3 highway north of the proposed site and runs in a predominantly north south direction with a few bends towards its southern end.
- **Mr 559 (P559)** – The Mr 559 (P559) can be classified as a Class 3 Minor Arterial or "Regional Connector" on the Shongweni LAP and lies in a northwest to southeast orientation. This road carries traffic between P454 to the north and the Mr 85 (M1) road to the south.
- **Mr 518 (D828)** – the Mr 518 (D828) road is a provincial district road and can be classified as a Class 4 Collector or "Local Collector" on the Shongweni LAP. This road does have some bends and there is a hairpin bend just south of the D828 / Mr 559 (P559) junction.



- **Mr 461 (P461)** – The Mr 461 or P461 can be classified as a Class 4 Collector or “District Connector” on the Shongweni LAP. This road provides access to the existing Enviroserv Landfill. Access to the Shongweni Landfill is proposed off this road.

### 6.3 SCHEMATIC DIAGRAM – NOT APPLICABLE

# 7 SITE INVESTIGATIONS

A site visit was performed on the XX to assess the following:

- To confirm the approaches and geometric layouts at the intersections in the study area
- To confirm signage and markings on the surrounding roads
- To confirm provision of pedestrian facilities and public transport facilities

A photographic record of the site visit is included in **Appendix D** for more information.

## 7.1 DOCUMENTED AND PHOTOGRAPHIC RECORD

# 8

## OTHER PLANNING AUTHORITIES

As part of the approval process, letters were sent in June, 2015 to eThekweni Transport Authority (ETA), KwaZulu Natal Department of Transport (KZN DoT) and SANRAL informing of the proposed Shongweni landfill site.

Approval and comments were also sought from KZN DoT to obtain access to the proposed landfill site of the P461. The contact persons from there are Mrs Judy Reddy and Mr. Roy Ryan. Comments have not been received yet from the KZN DoT.

# 9 TRAFFIC DEMAND ESTIMATION

## 9.1 WORST CASE TRIP DEMAND

The land use rights are for waste disposal purposes only and therefore the 'worst' case trip demand is based on the expected trip generation from the proposed landfill site.

## 9.2 ASSESSMENT YEARS

This TIA assumes the following for the assessment years:

- Design horizon year – the design horizon year is taken to be the year 2020, as the traffic generated from the proposed Shongweni landfill site will be less than 1000 trips
- Planning Horizon year – not applicable, as the demand for this development does not exceed 2000 peak hour passenger cars.

## 9.3 ASSESSMENT HOURS

The assessment hours for the proposed landfill site are taken to be as follows:

- AM peak hour : 06:30 – 07:30am
- PM peak hour : 16:30 - 17:30pm

The assessment hours above are based on peaks taken from the traffic counts performed for this TIA. An assumption is made that the development traffic from the proposed landfill site will coincide with the peak periods of the background traffic.

### 9.3.1 Peak hour factor

The peak hour factors in this report are not calculated as it is not certain if the traffic consists mostly of development traffic. The SIDRA in built values of 95% are used to account for some peaking of flows and this is deemed acceptable for this TIA.

## 9.4 TRAFFIC COUNTS

Traffic counts were performed to determine the background traffic volumes at the present 2015 year. The following information is provided for the counts:

- Name of intersections: JB McIntosh (P454) / Mr 559 (P559); Mr 461 (P461) / Mr 559 (P559); Mr 518 (D828) / Mr 559 (P559)
- Date counted: 25<sup>th</sup> of June, 2015
- Day of the week: Thursday
- Congestion levels noted during the count: None
- Name of person that undertook the count: Nonte Chala from Zizino Trading (Pty) Ltd

Detailed counts for these intersections can be found in **Appendix E** for more information.

The graphs of the traffic volumes versus time are also included on , Error! Reference source not found. and Error! Reference source not found. below for more information. The graphs indicate the distinct morning and afternoon peak hour traffic as well as the off peak hour traffic volumes.

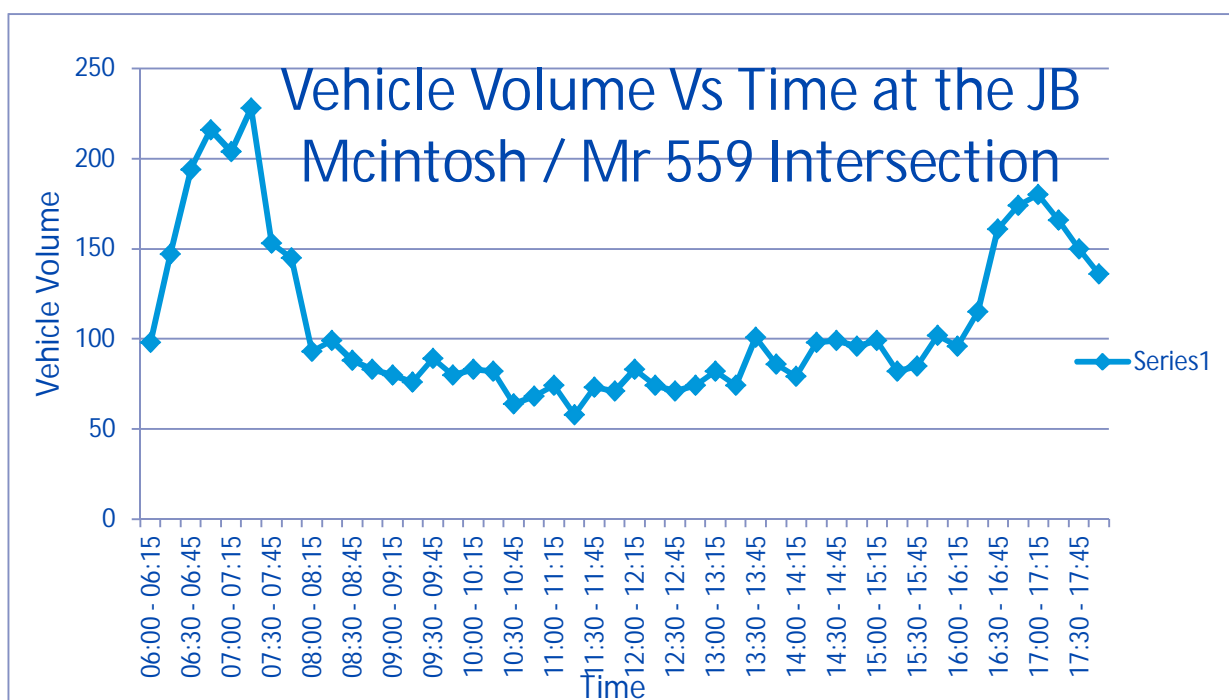


Figure 6: Graph for JB McIntosh (P454) and Mr 559 (P559) intersection

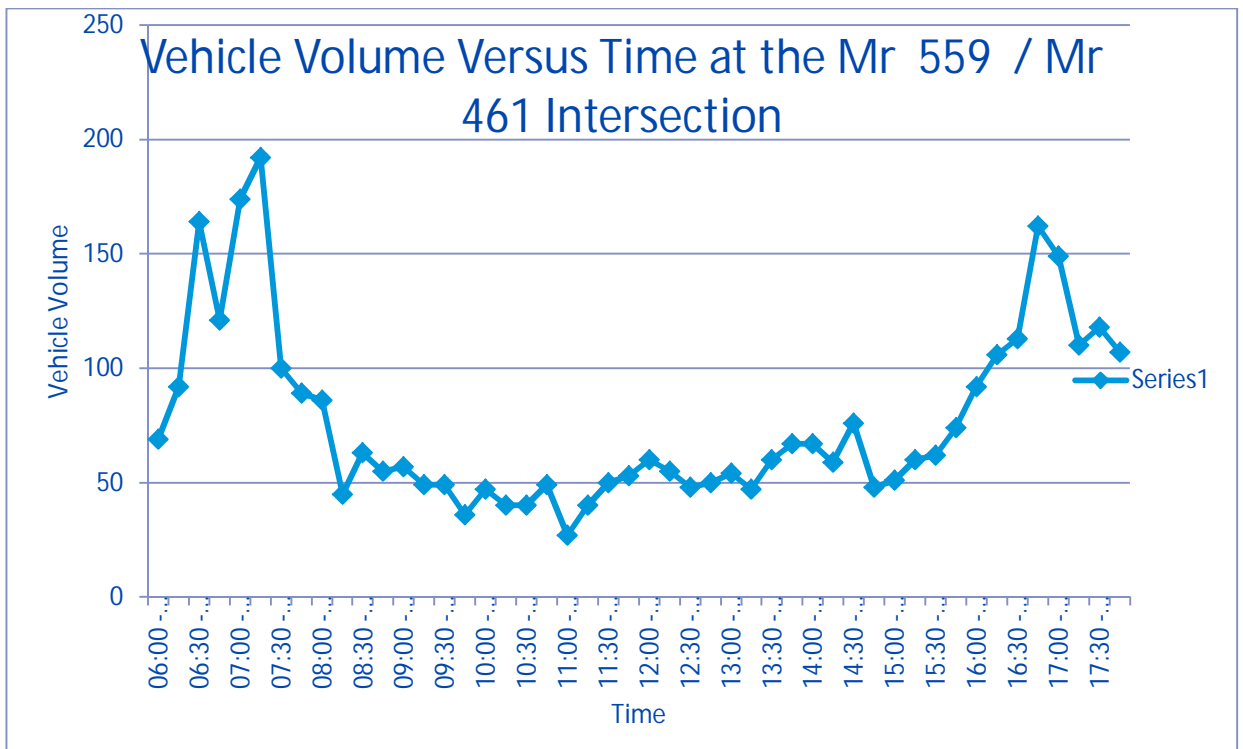


Figure 7: Graph for Mr 559 (P559) and Mr 461 (P461) intersection

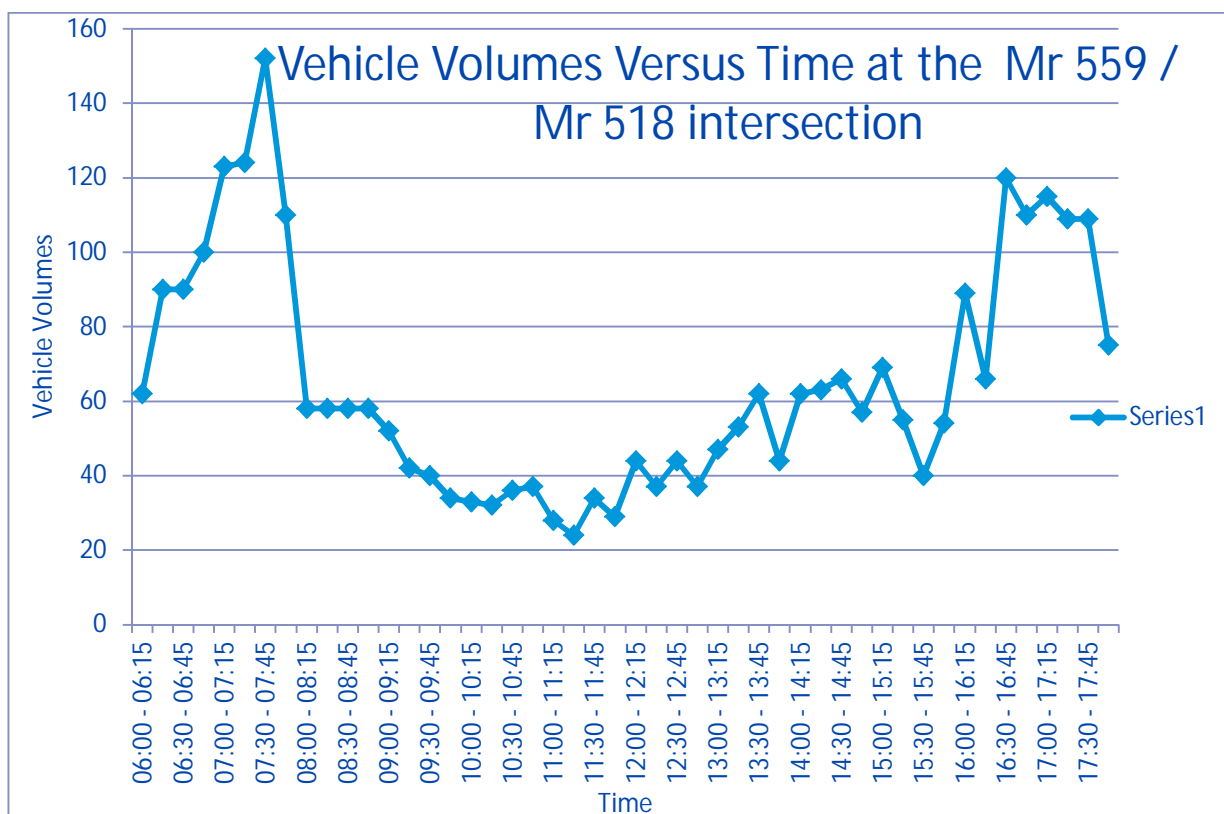


Figure 8: Graph for Mr 559 (P559) and Mr 461 (P461) intersection

## 9.5 TRAFFIC GROWTH

The traffic volumes counted are grown using an appropriate growth rate agreed to by the ETA on 15 July, 2015. A growth rate of 3% is applied that represents an average growth area.

## 9.6 TRIP GENERATION RATES

The COTO South African Trip Data Manual does not have any published trip generation rates for Landfill Sites. The trip generation is therefore calculated by using information provided by Durban Solid Waste, the previous EIA and TIA document and by making a number of assumptions.

The EIA estimated that the waste to be disposed at the proposed Shongweni Landfill will increase from 530 tons/ day in 2018 to 3550 tons/ day in 2095. A conservative assumption of 3550 tons per day is therefore applied in this study. DSW have also indicated that there will be a section of the proposed landfill site open to the public to come and dispose of their waste.

The trip generation for the proposed development is calculated by dividing the trips into different trip types and estimating the average daily traffic. The peak hour traffic then estimated by assuming that peak hour traffic makes up 10% of the daily traffic generated for both peak hours.

### i. Trip Generation based on waste collection

DSW have confirmed that there will be a transfer station used to collect and store waste. There is an existing transfer station located in Hammarsdale (Error! Reference source not found. refers) to the west of the proposed site and refuse from the surrounding areas will be brought and stored in this facility by the DSW standard "M150" trucks that have a carrying capacity of 6 tons per truck.

The trip generation is based on expected tonnage of waste and the capacity of the DSW long haul truck: the "Hooklift 4 x 2 15t Roll on / off" truck that can carry 18m<sup>3</sup> containers. DSW have also advised that these trucks will likely carry a trailer that will carry an additional 18m<sup>3</sup> container. Assuming the density of waste to be 1000kg / m<sup>3</sup>, this is equivalent to a carrying capacity of 36 tons. A conservative assumption of 30 ton carrying capacity is made to cater for bins not being filled completely when taking waste to the landfill site.

The expected trip generation based on tonnage is therefore calculated as follows:

Tonnage = 3550tons / day is required to be collected as advised by previous EIA

Hooklift Truck with trailer carry 30 tons / truck (capacity advised by DSW)

Truck trips required =  $3550 / 30 = 118$  truck trips (one way)

Two way trips required = 236 two way trips

Assume peak hour = 10% of two way trips

Peak hour traffic = 24 truck trips in peak hours (12 in and 12 out)



Figure 9: Hammarsdale Transfer Station used to Store Refuse



## ii. Trip Generation Based on Cover requirements

The EIA states that most of the daily cover will be sourced on site and estimates the additional cover material to be sourced externally as  $2 \times 10^6 \text{m}^3$

This amounts to an average demand of about  $75 \text{m}^3$  / day. Other materials may be used as cover, but for the purposes of trip generation soil is assumed as the means of achieving cover.

Based on truck information, a typical “tipper” truck is assumed to be used to offload soil with a capacity of  $6 \text{m}^3$  as per Error! Reference source not found. below.

The expected trip generation based on cover material is therefore calculated as follows:

Cover requirements =  $75 \text{m}^3/\text{day}$

Tipper trucks can carry approximately  $6 \text{m}^3$  of soil

This will amount to a total of  $75 / 6 = 13$  trips / day (one way)

Therefore, two way trips = 26 trips / day (14 in and 12 out)

Multiplying 26 trips by 10% = 3 trips in the peak hours (2 inbound and 1 outbound in AM Peak. In the PM peak, 1 inbound and 2 outbound trips are expected).



**Figure 10: Typical truck expected to offload material at Landfill**

### iii. Trips based on Site Staff

Staff trips are assumed to be made in the peak hour, as the document "Practical guide to solid waste management identified examples of landfill sites in South Africa as being open between 07:00am and 18:00pm. DSW have advised that the proposed landfill will operate between 07:00am and 17:00pm.

DSW have advised that typically, a landfill will consist of around twelve 12 to 16 staff working in the landfill. A conservative assumption of 20 onsite staff is therefore made in this study. Assuming a 50% split between staff that walk and use public transport, 10 persons are assumed to travel by taxi. This is equivalent to a demand of one (1) taxi trip in the peak hour.

The manager(s) / Site supervisors on site are likely to use their own private vehicles to commute to and from their place of work and therefore three vehicles will be generated in each peak hour

A total of 4 trips are therefore expected to be made in the peak hour by staff (4 inbound for AM peak and 4 outbound for PM peak)

### iv. Trips based on Public Trips to Site

Most public are assumed to use the proposed landfill in the afternoon peak and offload their waste accumulated from their work activities from that day.

A "bakkie" or four wheel drive vehicle is the type of vehicle expected to be mostly used by public to bring their waste to the site. These vehicles can carry a total of 1m<sup>3</sup> of waste and based on document cited in previous section, the communal site is expected to receive in approximately 25tons of waste per day. DSW did provide average cars entering the Marianhill Landfill site on a daily basis as a reference and the daily average was 137 private vehicles entering the site per day. This TIA expects fewer trips per day in the initial stages of the landfill being built due to the proposed Shongweni Landfill being located more on the outer urban edge of the eThekweni area.

The calculation of private vehicle trips expected for the first five to 10 years is shown below:

Private vehicle trips =  $25 / 1 = 25$  trips per day (one way)

Trips = 50 two way trips per day

Multiplying 50 trips by 10% ADT = 5 two way trips in the peak hour (3inbound and 2 outbound in PM peak only).

In summary, the expected trip generation is shown in Error! Reference source not found. below. From the table:

- A total of 31 two way trips are expected to be generated in the AM peak with 18 inbound and 13 outbound trips.
- A total of 36 two way trips are expected to be generated in the PM peak hour with 16 inbound trips and 20 outbound trips expected.

**Table 1: Expected Trip Generation for Proposed Landfill Site**

Trip Component	AM			PM		
	In	Out	2 – way	In	Out	2-way
Trips Landfill trucks	12	12	24	12	12	24
Trips Cover material	2	1	3	1	2	3
Staff trips	4	0	4	0	4	4
Public trips	0	0	0	3	2	5
Total	18	13	31	16	20	36

## 9.7 MODAL SPLIT

The trip generation calculation above includes a number of trips by staff .No reduction in the trip generation is therefore applied.

# 10 TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

## 10.1 TRIP DISTRIBUTION

The peak hour trips are distributed in accordance with the gravity model discussed in the ETA guidelines. This study also assumes that the proposed Shongweni Landfill site will service areas in the western areas of the eThekweni Municipality as per the previous EIA.

The waste transfer station in Hammarsdale west of the proposed landfill will store waste and the long haul ("Hooklift 4 × 2 15t Roll on / off") trucks will transport waste from the transfer station to the proposed landfill. Based on the trip generation, approximately 70% of the trips generated make up the long haul trucks expected to transport waste to the proposed site. The remaining trips are distributed in accordance with the gravity model recommended in the ETA guidelines. Please refer to Error! Reference source not found. below for more information.

The document Integrated Waste Management Plan also indicates that the proposed Shongweni Landfill could also accept waste from the inner West Region stored at the Chatsworth Transfer Station. This may only happen in the future years, but for now the Hammarsdale transfer station is taken as the main transfer station that will bring waste to the site.

The development traffic from the trip distribution is assigned to turning movements at the various intersections. It is expected that the majority of the development traffic will turn right onto Mr 461 Road from the site, turn left onto Mr 559 and then turn right at the M559 (P559) / JB McIntosh (P454) intersection onto P454. Traffic leaving the site is expected to use the major mobility roads north of the proposed site to get to Hammarsdale, Hillcrest etc.

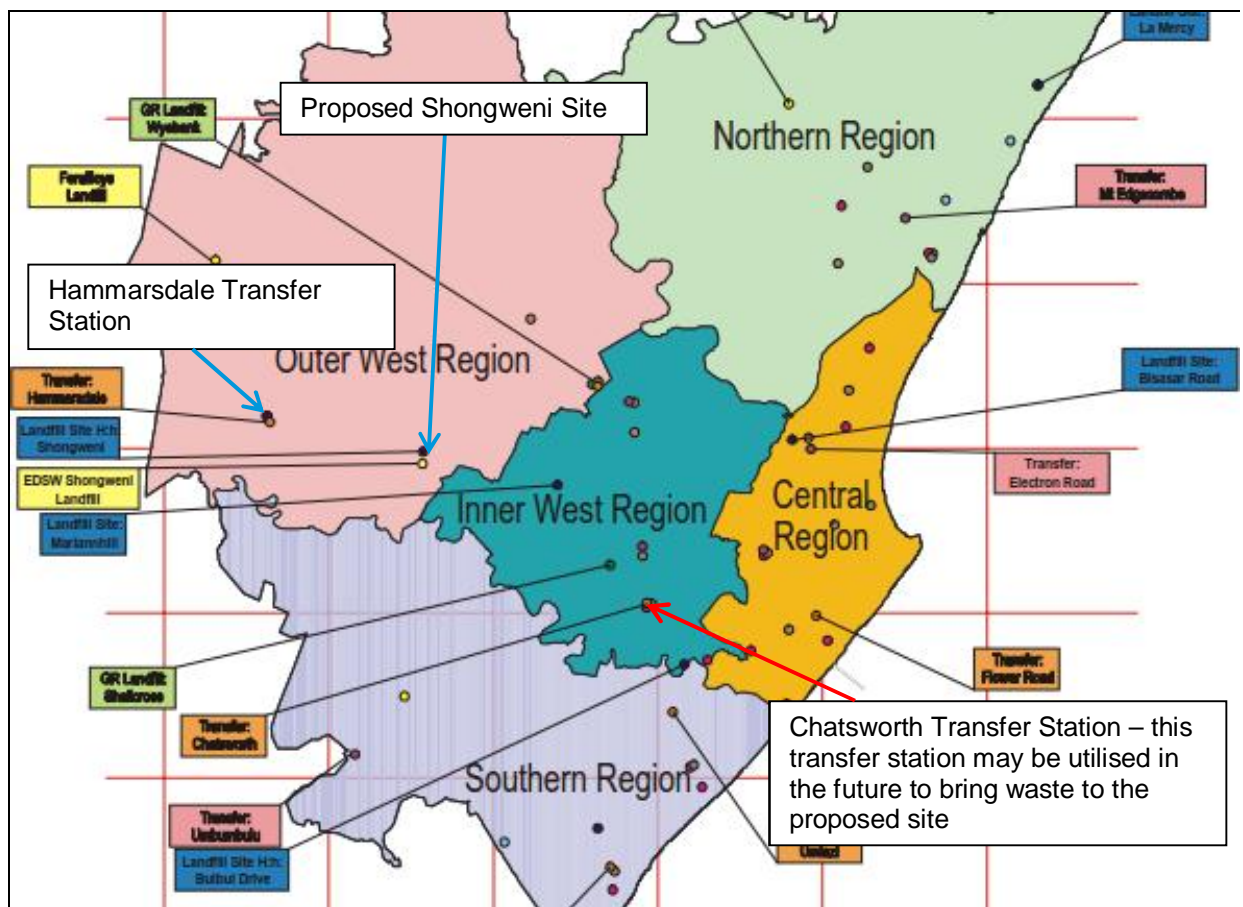


Figure 11: Extract Showing Landfills and Transfer Stations Surrounding the Proposed Shongweni Site

## 10.2 SIMULATION SOFTWARE USED FOR TRIP DISTRIBUTION AND ASSIGNMENT – NOT APPLICABLE

## 10.3 SUPPORTING INFORMATION DOCUMENTED FOR TRAFFIC DISTRIBUTION AND ASSIGNMENT

The previous EIA was used as a guide in determining the trip distribution as well as information provided by DSW.

The EIA states that: “If a large general waste landfill site were not established within the West Zone of the EMA there would be a number of consequences - there would not be the convenience of a landfill site situated within an economic haulage distance of the main waste producing area in the West Zone.” This statement suggests that the proposed landfill will service areas within a radius that is economically viable and only within the west zone of the eThekweni’s district. The landfill may service other areas further away such as Durban towards the end of its design life.

In a conversation dated 23 July 2015 with DSW, DSW advised of the waste transfer station in Hammarsdale to store refuse with long haul trucks used to transport this refuse from the waste transfer station to the proposed landfill site.

### 10.4 TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT DIAGRAMS

The trip distribution for the proposed development is shown on Error! Reference source not found. below. The resultant trip assignment for the proposed development is shown schematically on Error! Reference source not found. below

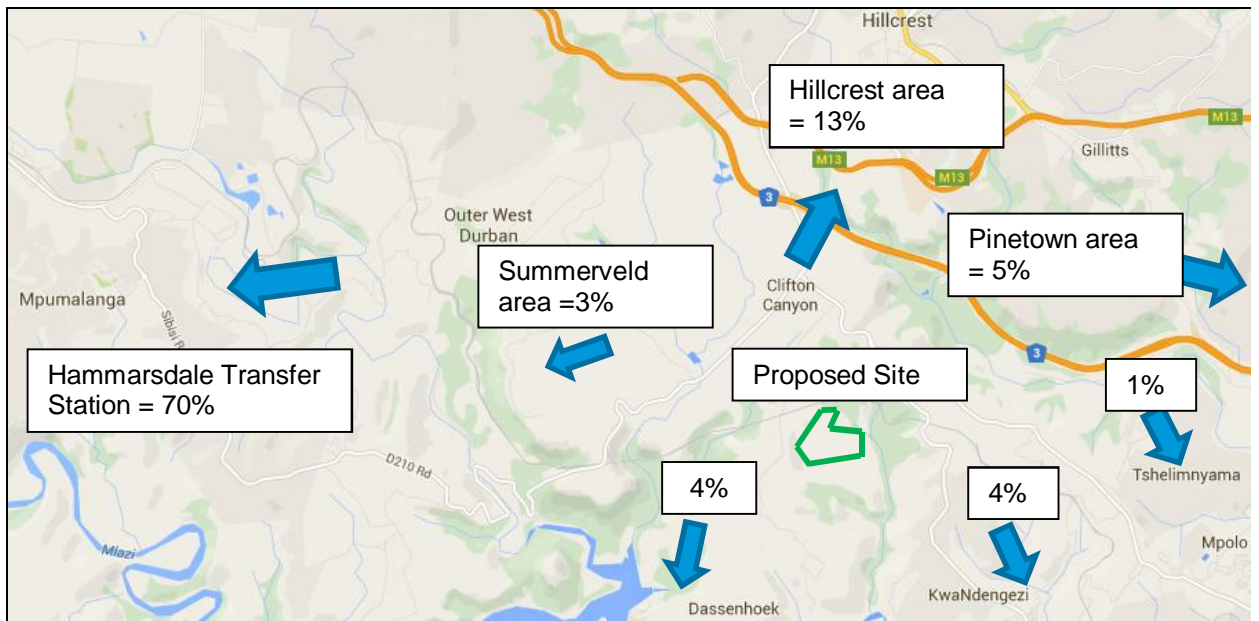


Figure 12: Trip Distribution around the Proposed Landfill Site

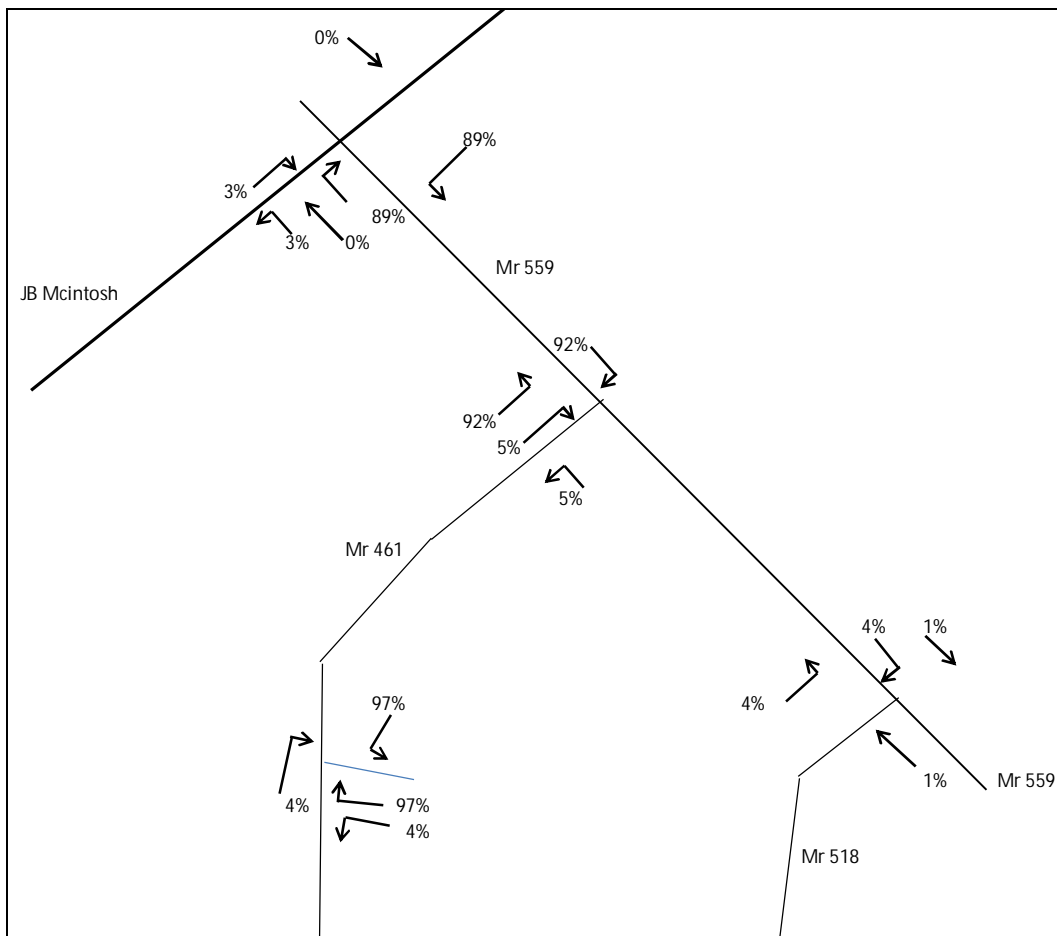


Figure 13: Trip Assignment for AM and PM peak hour

# 11 TOTAL TRAFFIC DEMAND

## 11.1 INTRODUCTION

The total traffic demand is estimated for the 2020 horizon year. The background traffic is estimated from the traffic counts performed. A 3% growth rate is then applied to determine the background traffic for the horizon year. The development traffic is then added to determine the total traffic demand for the proposed development. More information is provided in the following sections.

## 11.2 REQUIRED INFORMATION

### 11.2.1 Background Traffic

#### i. Existing Peak hour Traffic (Counts)

The background traffic is estimated from the traffic counts performed (**Section 8.4** refers) and the traffic volumes for the AM and PM peak period are shown schematically on Error! Reference source not found. and Error! Reference source not found. respectively.



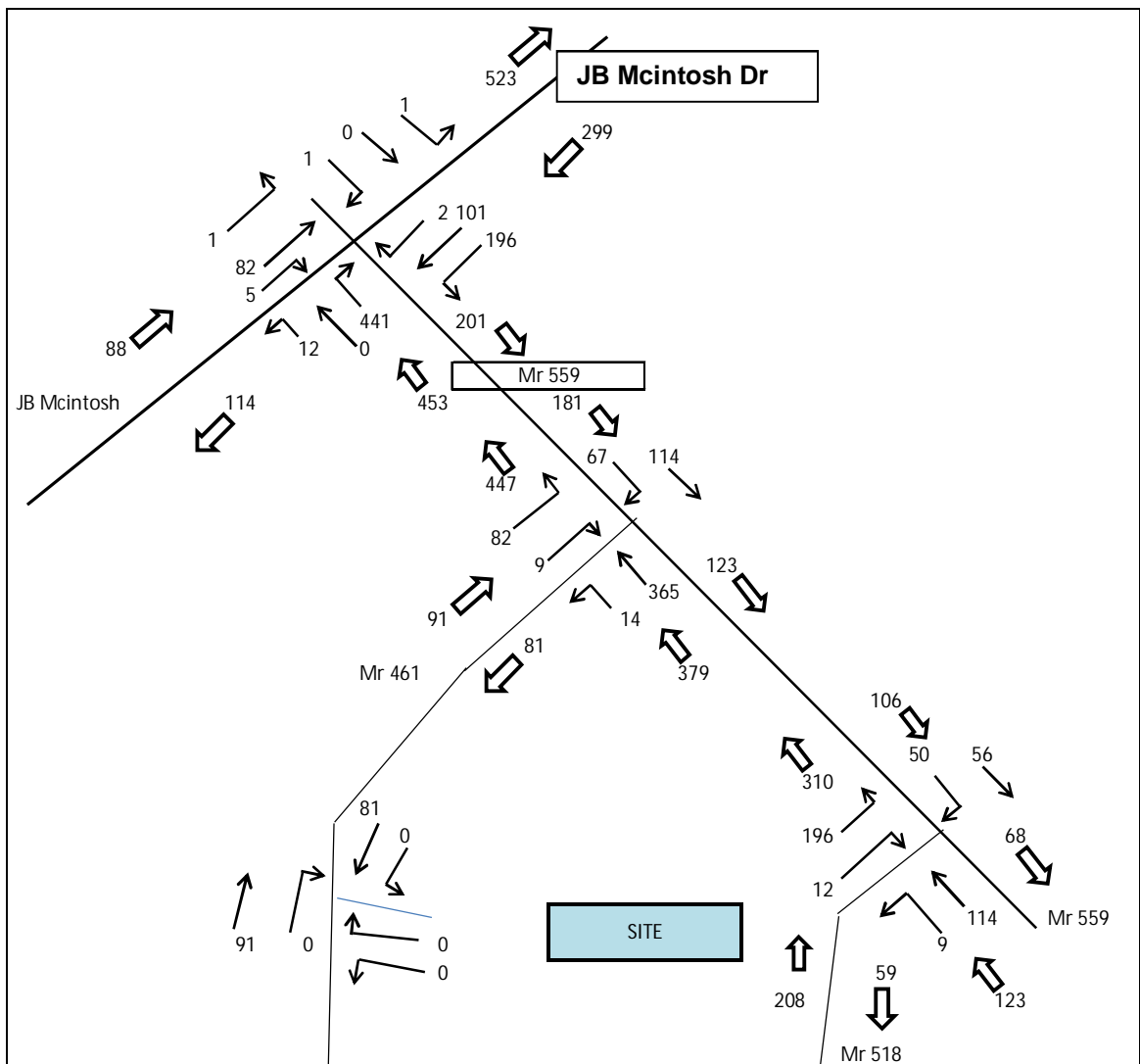


Figure 14: Background Traffic 2015 AM Peak

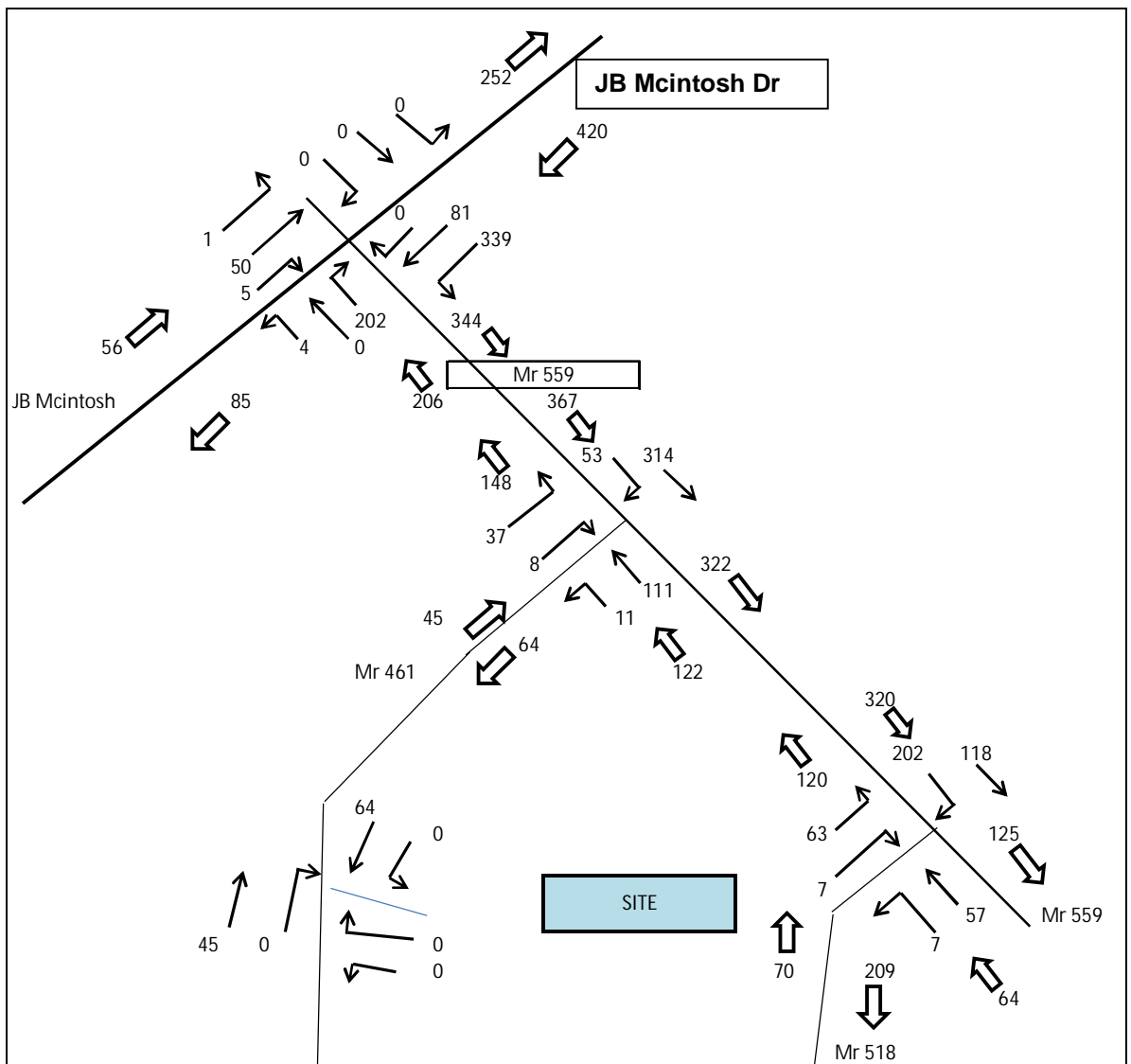


Figure 15: Background Traffic 2015 PM peak

**ii. Trip generation of development with existing land use rights**

The proposed landfill site is currently a “greenfield” or vacant site and does not generate any trips.

**iii. Peak hour traffic less trip generation with exercised rights**

No reduction is applied to the background traffic counted, as there is no existing landfill operating on the proposed site.





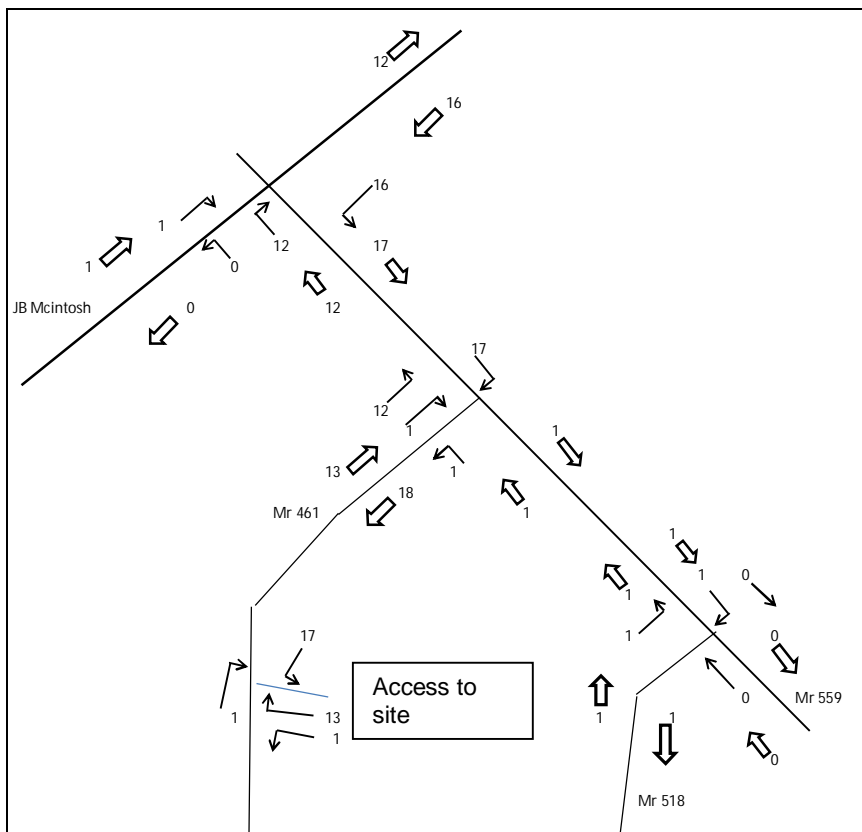


Figure 18: Development Traffic AM Peak



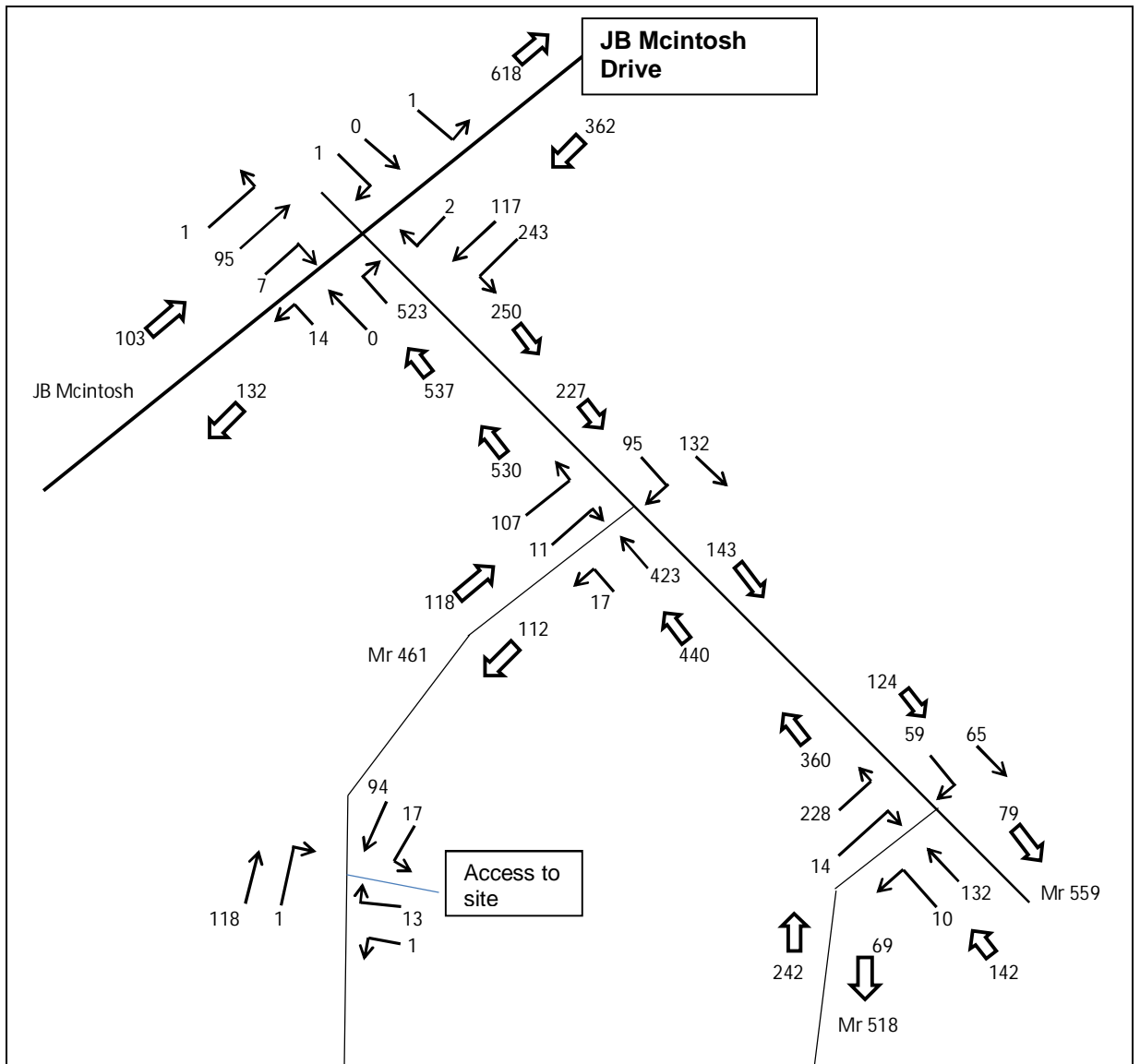


Figure 20: Total Expected "With" Development Traffic for 2020 AM Peak





# 12 DEMAND SIDE MITIGATION – NOT APPLICABLE TO PROPOSED LANDFILL DEVELOPMENT

# 13 PROPOSED IMPROVEMENTS

The following improvements are proposed in this TIA:

- Widening of the Mr 461 at the access to the site to include additional turning lanes with acceleration and deceleration lanes. The road reserve is wide enough to allow additional lanes to be provided for this access. Refer to **Section 13.2.1 iii** for more information.
- Adding a bypass lane at the Mr 559 and Mr 461 intersection. The layout of the upgrade is shown on **Figure 26**. Please refer to **Section 13.2.2** for more information.

# 14 TRAFFIC IMPACT ASSESSMENT SCENARIOS

## 14.1 ASSESSMENT BASED ON WORST CASE LAND USE SCENARIO

The capacity of the total traffic demand as per Error! Reference source not found. and Error! Reference source not found. is checked at the 2020 horizon year. The following scenarios are evaluated:

- Without proposed mitigating measures or the existing intersection layouts
- With proposed mitigating Measures – the capacity results did not warrant any mitigating measures, but certain upgrades are investigated to promote safe traffic conditions

The capacity analysis of the junctions is performed using the “SIDRA Intersection6.1” Software available. Please refer to **Appendix F** for summaries of the capacity analyses.

The average percentage of heavy vehicles for background traffic and development traffic is calculated for the traffic at junctions and is included in the capacity analyses. The percentage values for heavy vehicles are shown on the SIDRA results in **Appendix F**.

## 14.2 DESIGN YEAR HORIZON ASSESSMENT

### 14.2.1 Without Proposed Mitigating Measures

#### i. JB Mcintosh (P454) and Mr 559 (P559)

The JB Mcintosh (P454) and Mr 559 (P559) intersection operates as a priority controlled junction with priority given to vehicles along JB Mcintosh Drive (P454)

The layout of the existing intersection is shown on Error! Reference source not found. below. The capacity of this junction is assessed in the AM and PM peak and the results are summarised in Error! Reference source not found. below. The junction operates below capacity with minimal delays. The LOS C performance for vehicles at the MR 559 approach is due to the high number of right turn volumes expected. The LOS C performance is acceptable and no further upgrades are required.

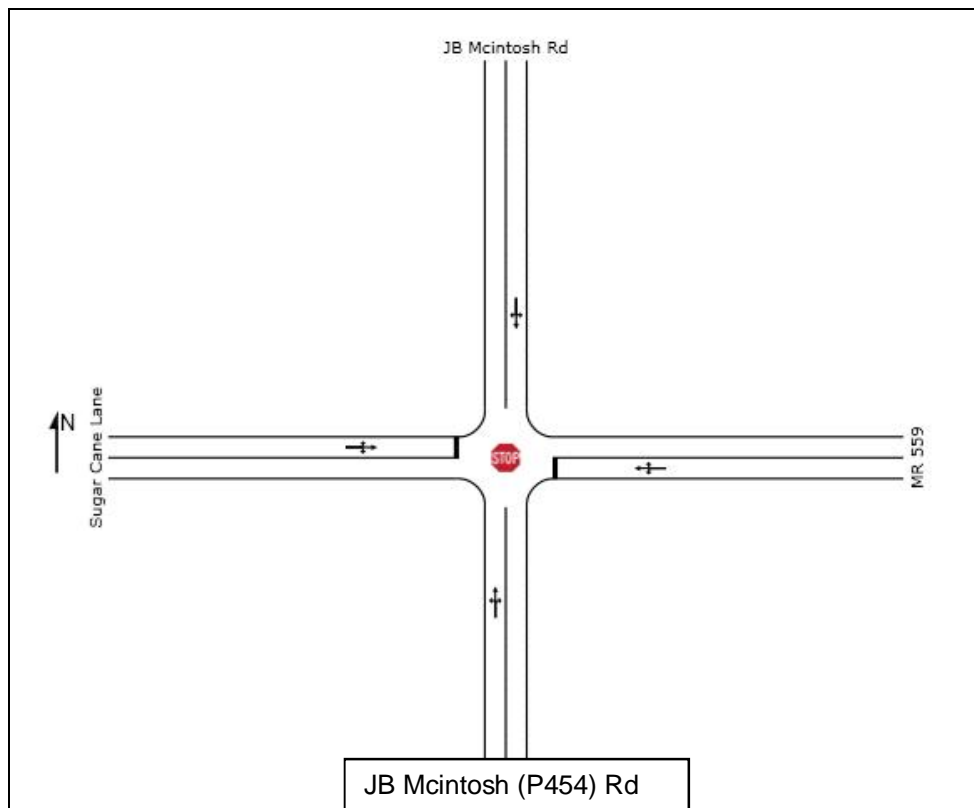


Figure 22: Layout of the Existing JB McIntosh (P454) / Mr 559 (P559) intersection

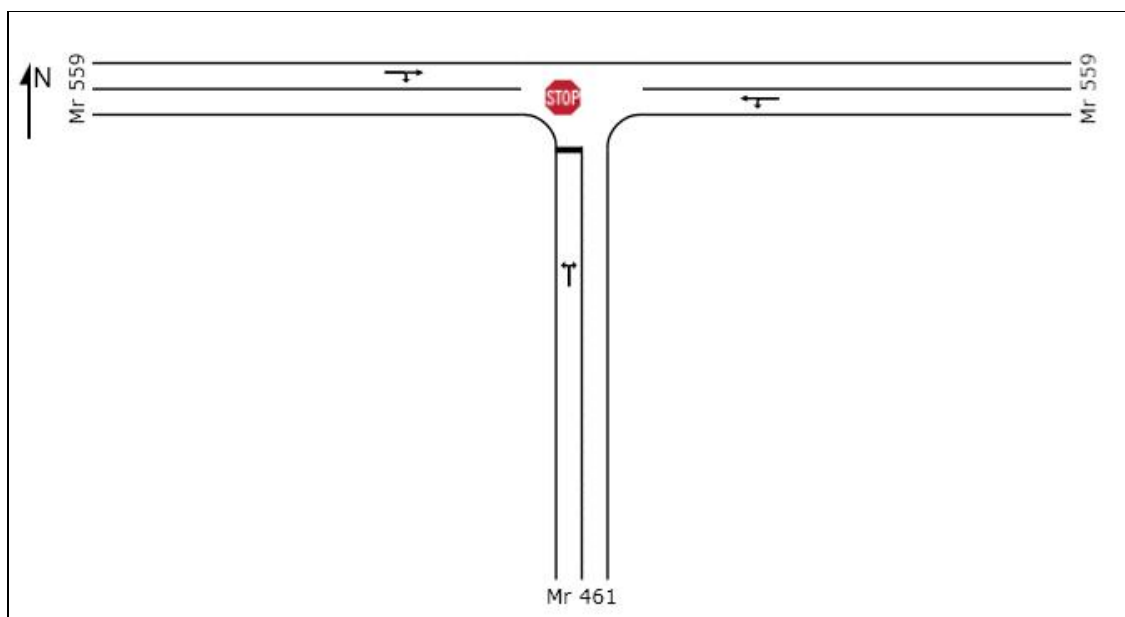
Table 2: JB McIntosh (P454) and Mr 559 (P559) - Capacity Analyses Results for 2020 Total Traffic Demand

Peak	Approach	Average Delay (s)	LOS
AM	South - JB McIntosh	0.8	N/A
	East - Mr 559	22.8	LOS C
	North - JB McIntosh	3.8	N/A
	West - Sugar Cane Lane	9.4	LOS A
	All vehicles	13.7	N/A
PM	South - JB McIntosh	1.5	N/A
	East - Mr 559	13.3	LOS B
	North - JB McIntosh	4.6	N/A
	West - Sugar Cane Lane	9.7	LOS A
	All vehicles	7.1	N/A

ii. **Mr 461 (P461) and Mr 559 (P559)**

The Mr 461 (P461) and Mr 559 (P559) intersection operates as a priority controlled T-junction with priority given to vehicles on Mr 559 (P559). The existing layout is shown on Error! Reference source not found. below. The capacity of this junction at the AM and PM peak is assessed and the results summarised in

**Table 3** below. The results show the junction will operate below capacity with minimal delays expected.



**Figure 23: Layout of the existing Mr 559 (P559) and Mr 461 (P461) T-Junction**

**Table 3: Mr 559 (P559) and Mr 461 (P461) – Capacity Analysis Results for 2020 Total Traffic Demand**

Peak	Approach	Average Delay (s)	LOS
AM	South - Mr 461 (P461)	11.9	LOS B
	East - Mr 559	0.2	N/A
	West - Mr 559	4.5	N/A
	All vehicles	3.2	N/A
PM	South - JB Mcintosh	10.3	LOS B
	East - Mr 559	0.6	N/A
	West - Mr 559	1.3	N/A
	All vehicles	2.1	N/A

### iii. Mr 559 (P559) and Mr 518 (D828)

The intersection of Mr 559 (P559) and Mr 518 (D828) consists of a priority controlled T-junction with priority given to vehicles along Mr 559. The existing layout of this junction is shown on **Figure 24** below. The capacity of this junction is checked in the AM and PM peak and the results summarised in **Table 4** below. The capacity results show that the junction will operate below capacity with minimal delays expected.

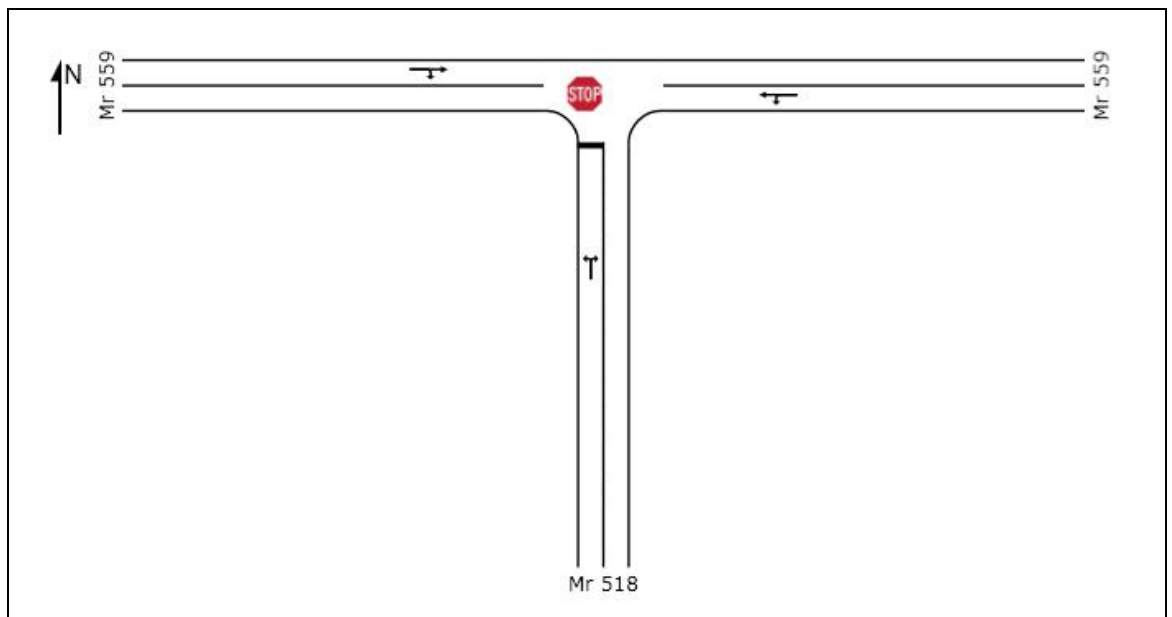


Figure 24: Existing layout of the Mr 559 / Mr 518 T-Junction

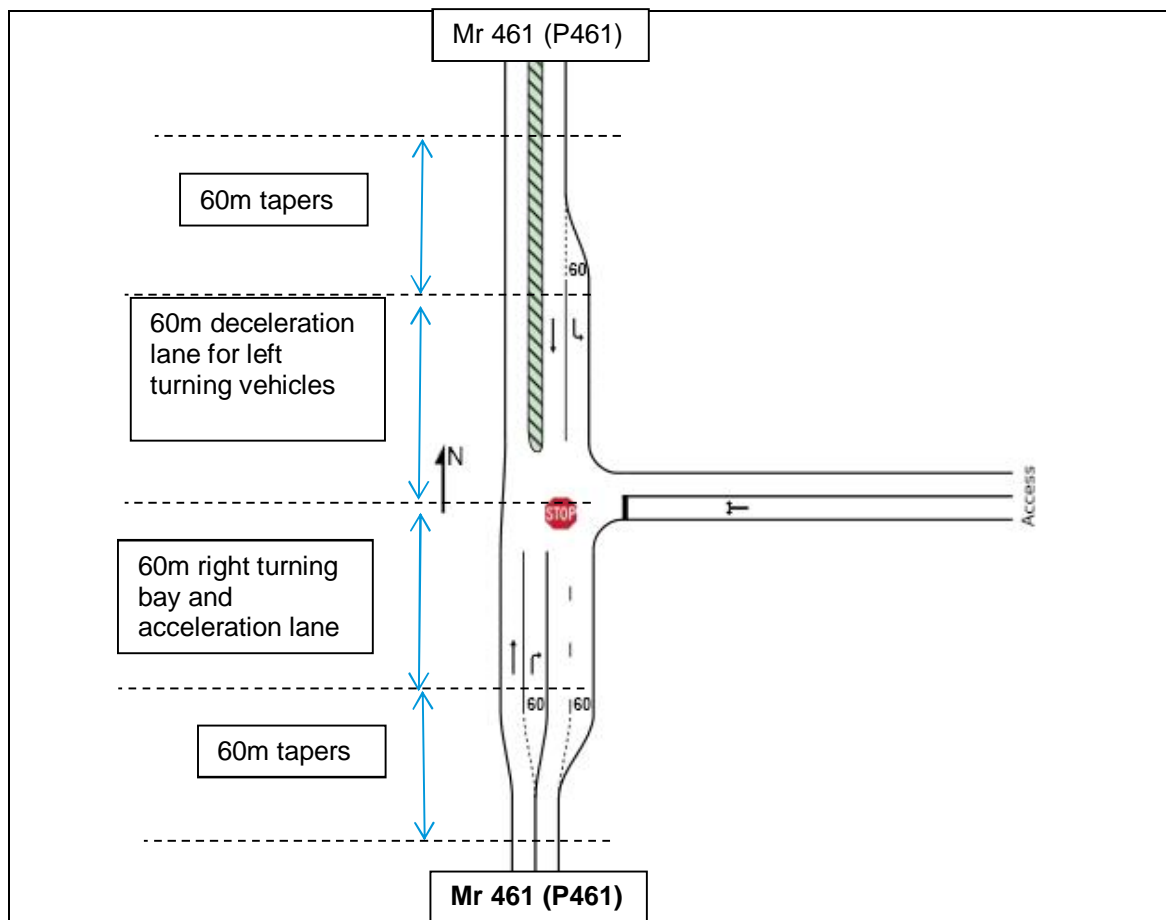
Table 4: Mr 559 (P559) and Mr 518 (D828) – Capacity Analysis Results for 2020 Total Traffic Demand

Peak	Approach	Average Delay (s)	LOS
AM	South - Mr 518 (D828)	8.8	LOS A
	East - Mr 559	0.4	N/A
	West - Mr 559	3	N/A
	All vehicles	5	N/A
PM	South - Mr 518 (D828)	8.7	LOS A
	East - Mr 559	0.6	N/A
	West - Mr 559	3.7	N/A
	All vehicles	4.1	N/A

#### iv. Proposed Access and Mr 461 (P461)

The landfill site will obtain access off Mr 461 with priority given to vehicles on Mr 461. The expected layout of the access with Mr 461 is shown on **Figure 25** below. For safety requirements, provision is made for a 60m right turning bay at the south approach for vehicles turning right from Mr 461 as well as deceleration and acceleration lanes for vehicles entering and leaving the proposed site with 60m tapers.

Please refer to **Appendix G** for more information on the typical layout of an access to the site off a provincial road. The access will need to be in accordance with KZN DoT Standards.



**Figure 25: Schematic layout of junction with access**

The capacity at the access junction is analysed and the results are summarised in **Table 5** below. The access junction is expected to operate below capacity with minimal delays expected.

**Table 5: Access and Mr 461 – Capacity Analysis 2020 Total Traffic Demand**

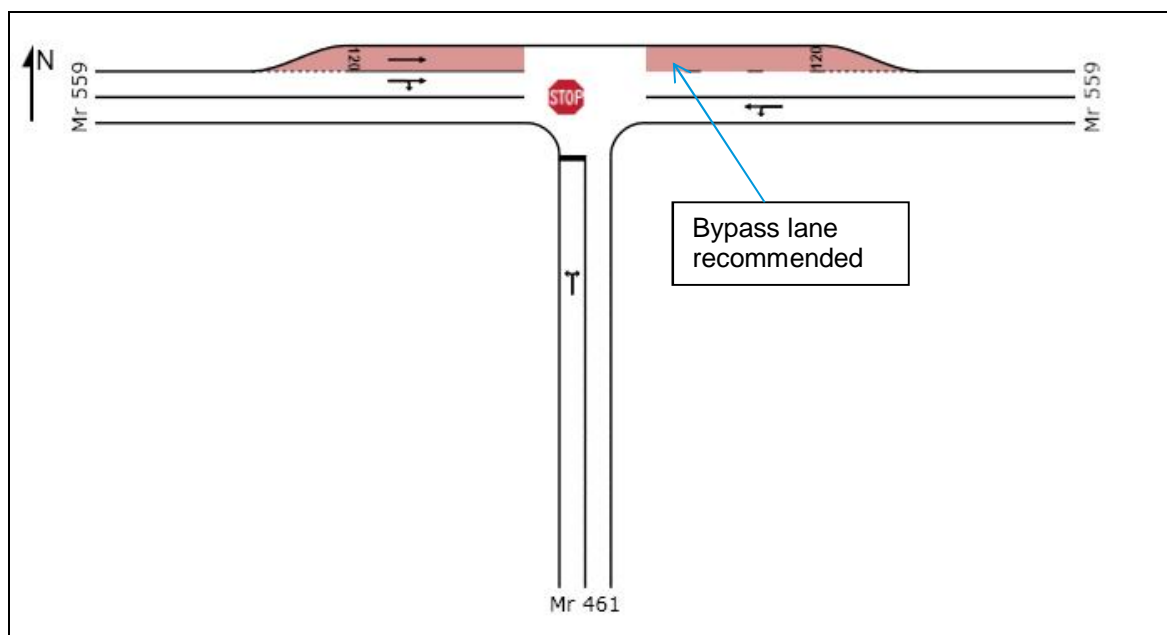
Peak	Approach	Average Delay (s)	LOS
AM	South - Mr 461	0.1	N/A
	East - Access	14.2	LOS B
	North - Mr 461	1	N/A
	All vehicles	1.3	N/A
PM	South - Mr 461	0.1	N/A
	East - Access	12.7	LOS B
	North - Mr 461	1.2	N/A
	All vehicles	2.2	N/A

## 14.2.2 With Mitigating Measures

### The Mr 461 and Mr 559 Junction

The Austroads report: “Roads Geometry Study for Improved Rural Safety”) recommends that at intersections, conflict movements are to be separated by providing auxiliary lanes. This TIA therefore recommends that a bypass lane be provided to separate the vehicles turning right from the through movements to prevent a rear end collision. The proposed upgrade is shown schematically on **Figure 26** below.

The capacity of this intersection is checked and the analyses results summarised in **Table 6** below. The performance of this junction will operate below capacity with minimal delays expected.



**Figure 26: Proposed Bypass lane recommended at the Mr 559 (P559) and Mr 461 (P461) junction**

**Table 6: Mr 559 (P559) with Bypass lane and Mr 461 (P461) – Capacity Analysis Results for 2020 Total Traffic Demand**

Peak	Approach	Average Delay (s)	LOS
AM	South - Mr 461 (P461)	12.2	LOS B
	East - Mr 559	0.2	N/A
	West - Mr 559	3.4	N/A
	All vehicles	2.9	N/A
PM	South - JB Mcintosh	10.6	LOS B
	East - Mr 559	0.6	N/A
	West - Mr 559	1.2	N/A
	All vehicles	2.1	N/A



### 14.3 PLANNING YEAR HORIZON ASSESSMENT – NOT APPLICABLE

### 14.4 RESIDENTIAL ROAD CAPACITY

A check is done to assess the capacity of Mr 461 that will carry development traffic to and from the proposed development using **Table 7**. The total two-way traffic expected along Mr 461 between the access and Mr 461/ Mr 559 junction is 230 and 160 veh / hr in the AM and PM peak hour respectively.

These traffic volumes are below the capacity for Class 4 roads according to the guidelines below and the road can therefore remain in its existing condition (single carriageway with a single lane per direction).

**Table 7: Table from ETA guidelines on Capacity of Residential Roads**

Residential	Maximum Width (m)	Capacity (Veh / hr) (two - way)
Class 5	7	500
Class 4	9	1000

# 15 SITE TRAFFIC ASSESSMENT

Please refer to plan in **Appendix A** that shows the proposed site layout. This plan is not strictly a Site Development Plan (SDP) and an SDP may not likely be produced for this landfill site due to the nature of operations. The buildings on site are also likely to be temporary and not fixed buildings that one expects to find in a typical SDP.

The proposed landfill is also expected to have paved roads at the access from Mr 461, but the internal roads will likely be gravel and there will be a large open area for trucks to offload waste in the waste disposal area. There should be adequate space for trucks to manoeuvre in this area and they are likely not to be encumbered by kerbs or a 'formal' internal road network.

The details required for the access are discussed further under the separate headings, using ETA guidelines.

## 15.1 HEAVY VEHICLE ACCESS

### 15.1.1 Access location and spacing

Access to the site is proposed off Mr 461, a Class 4 Collector Street. The access will therefore be provided on the western side of the proposed site. The access is proposed here, as the Mr 461 is generally straight in alignment and is considered a safer option than the D828 road proposed in the previous TIA. The existing landfill operated by Enviroserv also currently takes access off this road.

The COTO manual: "South African Road Classification and Access Management" is applied for access spacing requirements and the access should be at least 300m from other access roads and preferably located directly opposite any other proposed access in the vicinity.

### 15.1.2 Access width at Road Edge

The maximum width allowed is 9m based on heavy vehicle tracking.

### 15.1.3 Minimum Access Width

The minimum access width should be 7.5m wide as per the COTO Manual "South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual". This width is recommended, as the majority of vehicles expected to enter and exit the site will be heavy vehicles. To allow for pedestrians, an additional 1.2m width should be added and the total width of the access required is therefore 8.7m.

#### 15.1.4 **Maximum gradient for Access/Driveway**

The ETA guidelines recommend a maximum gradient of 1:10 for the access.

## 15.2 **ACCESS THROAT LENGTH**

### 15.2.1 **Egress Throat Length**

The access into the proposed site operates as a priority controlled junction with priority given to vehicles along Mr 461. Based on ETA guidelines, the egress throat length should be a minimum of 15 to 25m to allow efficient operation. Heavy vehicles are expected to mostly use this access gate. Provision should be made for at least a single truck to queue from the access gate and this requires a 30m throat length, assuming a Hooklift with a trailer is queued from the access gate to the Mr 461 (P461) Road as per advice given by DSW.

### 15.2.2 **Access Control**

The proposed access into the site is expected to have access control with a boom gate and a guard who will open the gate for staff trucks and contracted trucks who will bring in material and earth to cover the waste. The access gate will likely also be used by the public who will then drive internally to the designated public site.

The ETA guidelines indicate a service rate of 220-360vph for a control type where a button is pressed to produce a ticket. A conservative service rate of 220vph is assumed for staff even though the staff will not need to obtain a ticket upon entry into the site. It is expected that the public will pay a fee on entry to offload their waste. The ETA recommends a service rate of 120vph for a service rate that requires a fee to be paid on entry. Based on the expected trip generation (**Section 8.6** refers), 18 and 16 inbound vehicles are expected to enter the site in the AM and PM peak respectively. The PM peak will likely have 3 public and 13 staff inbound trips. The service rate is therefore calculated by obtaining the weighted mean:

$$\text{Weighted Service rate} = \frac{(13 \times 220) + (3 \times 120)}{16}$$

$$\text{Weighted Service rate} = 201 \text{ Veh/hr}$$

The traffic ratio is calculated based on this service rate to determine the storage length. The total volume is taken as 16 vehicles per hour and the PHF is taken as 0.95 as per PHF used in capacity analysis. The traffic ratio is therefore calculated below:

$$\textit{Traffic Ratio} = \frac{\frac{\textit{Total Volume}}{\textit{PHF}}}{\textit{Service Flow Rate}} \times 100$$

$$\textit{Traffic Ratio} = \frac{\frac{16}{0.95}}{201} \times 100$$

$$\textit{Traffic Ratio} = 9$$

Based on the calculation above for a single channel and using the Table in ETA guidelines for required storage lengths, provision needs to be made for a single vehicle queued at the access gate. Assuming a Hooklift vehicle with a trailer is queued at the access gate, the access gate should be set back at least 30m.

### 15.3 RAMPS – NOT APPLICABLE FOR THIS SITE

### 15.4 PARKING AND LOADING –NOT APPLICABLE, AS LANDFILL WILL NOT HAVE FORMAL PARKING AND LOADING AREAS

# 16 ROAD NETWORK MASTER PLANNING

The Shongwenil LAP is shown in **Appendix B** and shows the surrounding road network with future proposed roads to be built.

This TIA does not require any additional elements to the road network to be constructed to accommodate the proposed development.

# 17 GEOMETRIC UPGRADES REQUIRED FOR SAFETY OF HEAVY VEHICLES

The trip generation of the proposed site is expected to consist mostly of heavy vehicles. In order to promote safety, recommendations for geometric upgrades are discussed below.

## 17.1 UPGRADES AT THE MR 461 AND MR 559 JUNCTION

The development traffic (Error! Reference source not found. and

refers) indicates that a large proportion of the inbound vehicle trips will turn right from the Mr 559 onto the Mr 461. This TIA recommends that a bypass lane be provided to prevent rear end collisions. Please refer to **Section 13.2.2** for more information.

## 17.2 UPGRADES RECOMMENDED IN PREVIOUS TIA

The geometric upgrades recommended in the previous TIA are now assessed and the figures showing the proposed geometric improvements are included in **Appendix H** for further reference and information. The following recommendations were made in the previous TIA:

- The area on the hairpin bend on D828 (Error! Reference source not found. refers) is to be widened. This TIA does not expect a high volume of heavy vehicles to use this road, but due to the tight radius, this TIA recommends that road widening be investigated further by ETA and KZN DoT to determine if these upgrades are warranted. The typical road widening on a bend is shown on Error! Reference source not found. below.

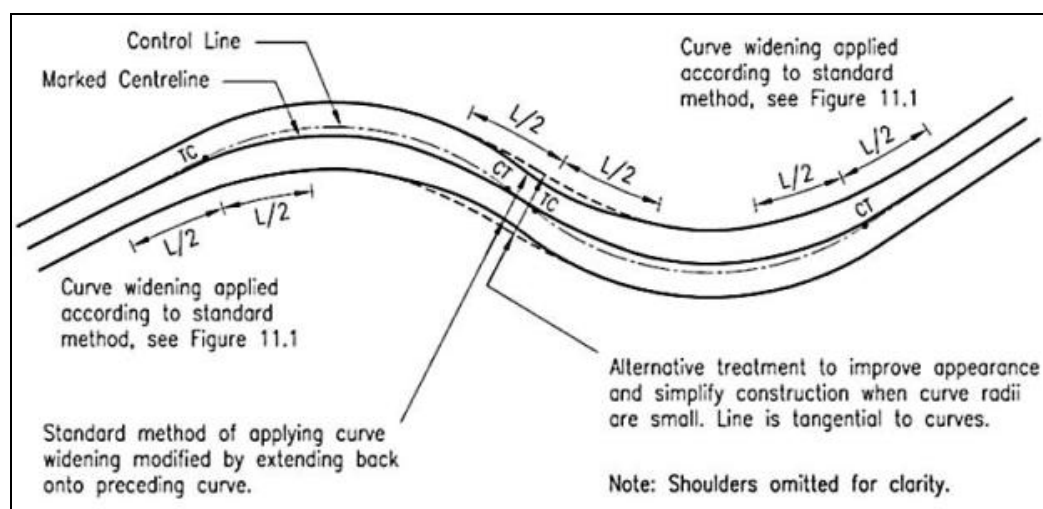


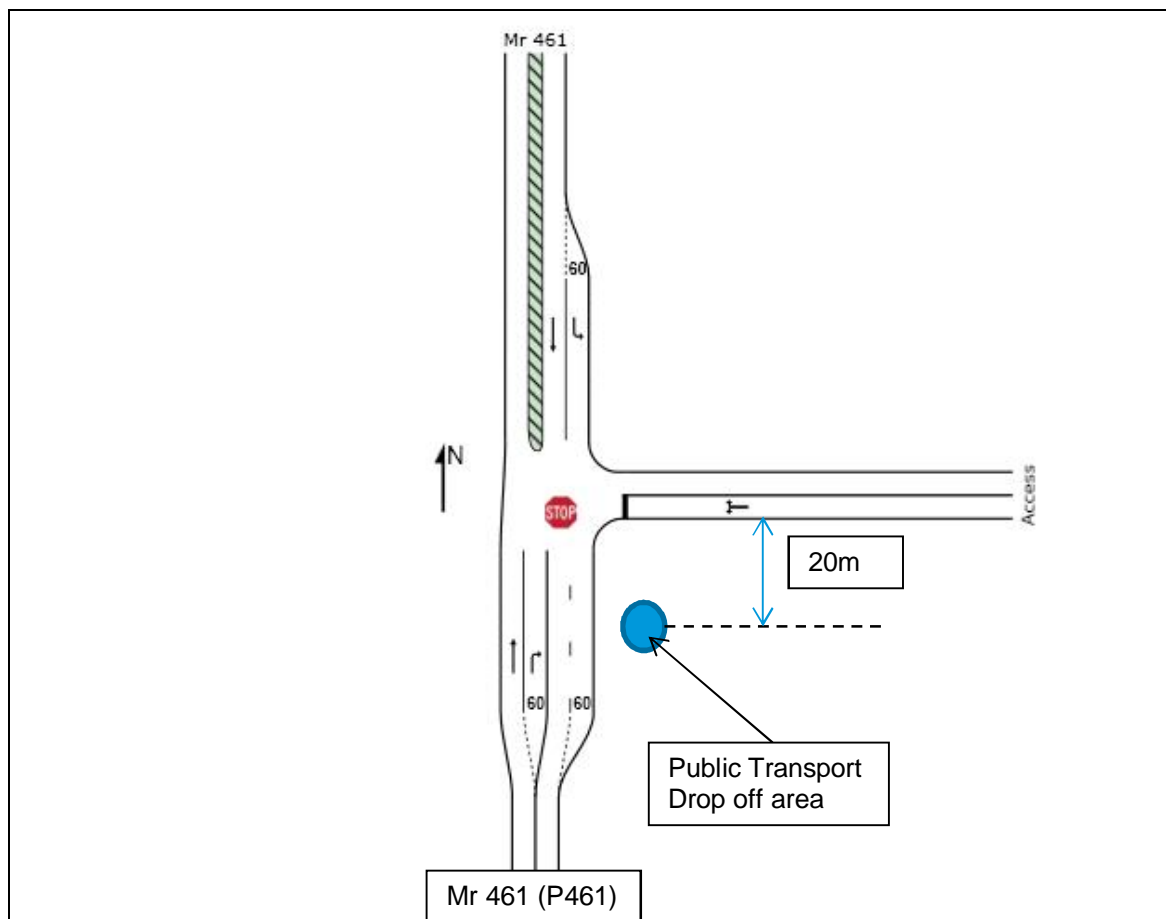
Figure 27: Typical Road Widening Diagram

- The sight distance at the Mr 518 (D828) and Mr 559 (P559) intersection is inadequate to allow safe traffic operations. Recommendations were made to improve sight distance by widening both edges of Road D828. Due to the low vehicle volumes using this junction, this TIA would also recommend that these upgrades be investigated further by ETA and KZN DoT to determine if this upgrade is warranted.

# 18 PUBLIC TRANSPORT FACILITIES

The trip generation calculation (**Section 8.6** refers) estimated the number of person trips and persons expected to use public transport. This TIA expects that around 10 persons will use public transport per day and this is equivalent to a demand of one taxi per day.

The public transport demand is not great and so no upgrades are required, but it is suggested that a public transport drop off area be provided as per **Figure 28** below.



**Figure 28: Schematic Showing Location of Suggested Public Transport Drop of Area**



# 19 NON-MOTORISED TRANSPORT (NMT) AND UNIVERSAL ACCESS

This section assesses if provision needs to be made for pedestrian/cyclist facilities using the 'point score' warrant as per ETA guidelines. The following warrants are investigated:

- Road verge
- Vehicular Traffic Volume
- Number of pedestrians using route
- Pedestrian Related collisions on route

## 19.1 ROAD VERGE

The width of the road verge along M461 (P461) is greater than 1.5m with a 0-4% cross fall and so the point score of zero (0).

## 19.2 VEHICULAR TRAFFIC VOLUME

The traffic counts reveal that the 12 hour traffic volumes and therefore the 24 hour traffic volumes are within the 501 - 1800 vehicles per hour range for Mr 461. The point score is therefore 20 based on the vehicular traffic volume on this road.

## 19.3 NUMBER OF PEDESTRIANS USING THE ROUTE

A pedestrian traffic count was not performed for this study, but based on the development in the area, the pedestrian volumes are assumed to be low. The number of pedestrians per day is assumed to be in the 250-1000 range. The point score is therefore 12 based on this number.

## 19.4 PEDESTRIAN RELATED COLLISIONS ON ROUTE

It is unknown what the EAN for this site is and so the point score is not included in the warrant check.

## 19.5 CONDITIONS FOR IMPLEMENTATION

Based on the point score system, the total point score is estimated as lysing in the order of 30 points achieved and so no pedestrian sidewalks are warranted according to the ETA scoring system.

# 20 TRANSPORT REQUIREMENTS AND COSTS

## 20.1 CHANGE TO TRANSPORT MASTER PLANNING – N/A

## 20.2 TRANSPORT / ROAD SERVICES COST CONTRIBUTION – N/A

## 20.3 IMPROVEMENT COSTS ESTIMATES

This section estimates the cost of installing the proposed access and bypass lane at the Mr 559 / Mr 461 junction. The COTO “South African Trip Data Manual” was used to estimate the costs using their table on Road design standards and quantities. The costs were adjusted using an assumed CPI rate of 4.4% and grown to figures appropriate in this present financial year.

The costs of the upgrades are shown in **Appendix I** and the costs are summarised in Error! Reference source not found. below. This TIA estimates that the costs of the proposed upgrades will be in the order of R1.4 million (VAT Excl.)

**Table 8: Summary and Estimate of the Costs for Upgrades**

Upgrade Proposed	cost ( R ) VAT Excl.
access junction	729653.96
bypass lane Mr 559 / Mr461	667682.89
public transport drop off (optional)	40000
Total	1 437 336.85

# 21 CONCLUSIONS AND RECOMMENDATIONS

Based on the content of this assessment, the following conclusions and recommendations are relevant:

## CONCLUSIONS

- The trip generation is calculated based on tonnage and it is expected that 31 and 36 two way trips will be generated in the AM and PM peak hour respectively. Refer to **Section 8.6** for more information.
- The following intersections were checked in this TIA and no additional upgrades in terms of capacity are required:
  - JB McIntosh (P454) and M559 (P559) - This junction performs well below capacity with minimal delays expected. The worst performance is LOS C at the M559 approach in the morning peak due to a large volume of right turners. The LOS C performance is still acceptable and no further upgrades are required.
  - Mr 559 (P559) and Mr 461 (P461) – this T-junction performs well below capacity and no further upgrades are required.
  - Mr 559 (P559) and MR 518 (P518) – this T-junction performs well below capacity and no further upgrades are required.
  - Access and Mr 461 (P461) – the proposed junction performs adequately and no further improvements are required.
- In terms of pedestrian facilities, the warrant as per the ETA guidelines were used and it was found that pedestrian footpaths or sidewalks are not warranted for this site.

### 21.1 CHANGE IN LAND USE

- The proposed landfill is located on Portion A of the Farm Kirkfalls No. 14227
- The land use applied is for “Waste disposal purposes”

### 21.2 PROPOSED TYPE AND LOCATION OF ALL ACCESSES

- This TIA proposes to give access to the proposed Shongweni landfill off Mr 461 (P461)

### 21.3 IMPROVEMENTS CHANGES AND MITIGATION MEASURES REQUIRED

- The access into the site will need to be to Provincial Road standards and will have separate auxiliary lanes as well as deceleration and acceleration lanes for vehicles entering and exiting the site. The typical layout of the access into the proposed site is shown schematically on **Figure 25** and the detailed layout can be found in **Appendix G**. The layout will need to be confirmed by the KZN DoT.
- In terms of public transport provision, it is expected that a single taxi is required to service the needs of the proposed site. This demand does not require a public transport facility to be provided, but this TIA suggests a public transport drop off area be provided as per **Figure 28**
- The majority of development traffic is expected to consist of heavy vehicles and the following upgrades are therefore recommended:
  - A bypass lane is recommended at the Mr 559 (P559) and Mr 461 (P461) junction to allow for vehicles to pass the inbound heavy vehicles expected to turn right at this junction. The capacity of this junction was checked in this TIA and this junction is expected to perform adequately with minimal delays expected.
- The following upgrades are made based on the previous TIA (please refer to **Appendix H** for more information) and due to the low volumes expected through these roads, should be investigated further by the council:
  - The hairpin bend on Mr 518 road required widening and a typical; curved section is shown on Error! Reference source not found.
  - The sight distance at the Mr 518 (D828) and Mr 559 (P559) is not adequate and road widening was recommended.
- The cost of implementing all upgrades for the proposed landfill will be in the order of R1.4 million rand. Please refer to **Section 19** and **Appendix I** for more information on the estimate of the costs.

In terms of the Site Traffic Assessment performed, there is no formal SDP, but the plan shown in **Appendix A** refers and the following recommendations are made:

- The access should be at least 300m spaced from other access roads and should preferably be directly opposite any other access roads in the vicinity.
- The minimum access width into the site is to be 8.7m to accommodate heavy vehicles and pedestrians entering and exiting the site.
- The maximum grade allowed for the access is 1:10 to cater for heavy vehicles that will use this access.
- The ingress and egress throat length should be at least 30m to allow for a queue of a "Hooklift" vehicle with a trailer (type of vehicle advised by DSW) entering or leaving the site.

- 21.4 ELEMENTS OF THE TRANSPORT / ROAD NETWORK MASTER PLAN THAT SHOULD BE IMPLEMENTED – N/A**
- 21.5 TRAFFIC MANAGEMENT MEASURES AIMED AT PROTECTING RESIDENTIAL OR OTHER SENSITIVE AREAS – N/A**

## BIBLIOGRAPHY

- Ethekewini Transport Authority – Manual for Traffic Impact Assessments And Site Traffic Assessments – July 2015
- COTO TRH 26 – South African Road Classification and Access Management Manual, Version 1.0 – August 2012
- COTO TMH 16 – South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual
- Shongweni LAP, A framework for Sustainable Urban Development (IYER) – October, 2010
- Austroads Technical Report AP-T295-15: Road Geometry Study for Improved Rural Safety – June, 2015
- A Practical guide to Municipal Solid Waste Management (Padco / Aecom)
- Integrated Waste Management Plan for eThekewini Municipality (SKC Engineers) – August, 2004

# Appendix A

**SITE LAYOUT OF PROPOSED SHONGWENI LANDFILL**





# Appendix B

**MAP OF THE ETHEKWINI CUNCIL'S REGION**



# Appendix C

**PLANS PROVIDED BY THE ETHEKWINI COUNCIL**



# Appendix D

**PHOTOGRAPHIC RECORD OF SITE VISIT**



# Appendix E

**TRAFFIC COUNTS**

APPENDIX E-1

**TRAFFIC COUNTS AT JB MCINTOSH (P454) AND  
MR 559 (P559)**

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APPENDIX E-2

**TRAFFIC COUNTS AT MR 559 (P559) AND MR 461  
(P461)**

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APPENDIX E-3

**TRAFFIC COUNTS AT MR 559 (P559) AND MR 518  
(D828)**

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# Appendix F

**CAPACITY ANALYSES RESULTS**

APPENDIX F-1

**CAPACITY ANALYSIS AT JB MCINTOSH (P454)  
AND M559 (P559)**

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APPENDIX F-2

**CAPACITY ANALYSIS AT MR 559 (P559) AND MR  
461 (P461)**

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APPENDIX F-3

**CAPACITY ANALYSIS AT MR 559 (P559) AND MR  
518 (D828)**

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APPENDIX F-4

**CAPACITY ANALYSIS AT MR 461 (P461) AND  
ACCESS**

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# Appendix G

**TYPICAL LAYOUT OF AN ACCESS ROAD OFF A PROVINCIAL  
ROAD**



# Appendix H

**FIGURES SHOWING RECOMMENDATIONS FROM PREVIOUS TIA**



# Appendix I

**COST ESTIMATES OF UPGRADES RECOMMENDED**