KOLEKO
TRANSPORTATION ENGINEERING & PLANNING

REPORT

NEWCASTLE LANDFILL PROJECT

Traffic Impact Assessment

MARCH 2018

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Project Name	**TRAFFIC IMPACT: NEW CASTLE LANDFILL**
Date of issue	March 2018
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DECLARATION OF INDEPENDENCE

Koleko Solutions (Pty) Ltd, as Traffic and Transport Engineering consultants, were appointed to conduct a Traffic Impact Assessment for New Castle Landfill project. The Company does not have a vested interest in the proposed activity proceedings, have no and will not engage in conflicting interest in the undertaking of the activity. Koleko Solutions (Pty) Ltd has provided all information at their disposal regarding the application, whether such information is favourable to the Client or not.

23/03/2018

Ivandra Udoyen (Pr. Eng.) **DATE**

Project Leader

Director

Koleko Solutions (Pty) Ltd

REQUIREMENT	STATUS
1. A specialist report prepared in terms of these Regulations must contain—	Section 1.4
(a) details of—	
(i) the specialist who prepared the report; and	Page i
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Appendix B
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.4 and Section 3.3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 2 and Section 3.3.4
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.4
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 4.2
(g) an identification of any areas to be avoided, including buffers;	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.3
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 5
(k) any mitigation measures for inclusion in the EMPr;	Section 4.2
(l) any conditions for inclusion in the environmental authorisation;	Section 4.2
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion—	

REQUIREMENT	STATUS
(i) whether the proposed activity, activities or portions thereof should be authorised;	Section 6
(iA) regarding the acceptability of the proposed activity or activities; and	Section 6
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 4.2
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 3.3
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 3.3
(q) any other information requested by the competent authority.	N/A
2. Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

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Annexures:

1. INTRODUCTION

1.1 Background

The Newcastle Municipality is planning to construct a landfill to collect and dispose waste materials from in and around the Newcastle area. The landfill is planned to be implemented in 7 phases starting from January 2019 to June 2056. Most of the waste materials to be disposed at the landfill site will originate from in and around the Newcastle Central Business District (CBD). That capacity of the proposed landfill is approximately 15 million m^3.

Koleko Solutions (Pty) Ltd was appointed by GCS (Pty) Ltd to carry out a Traffic Impact Assessment (TIA) for the proposed New Castle Landfill. The report aims to summarize the results of the study.

1.2 Objective of the study

The objective of this study was to provide findings of the traffic investigation conducted to assess the impact of the traffic generated by the proposed Newcastle Landfill on the existing external road network surrounding the development area. The scope of work for the traffic study entailed the following:

- Identification of the affected external roads;
- Collection of traffic information and other relevant information to determine the status quo;
- Determination of trip generation due to the proposed Newcastle Landfill activities;
- Assessment of the impact of the trips generated by the landfill on the road network (capacity analysis of the affected routes including the intersection analysis);
- Assessment of the potential environmental impacts as a result of the activities of the proposed Newcastle Landfill project from the traffic impact perspective;
- Assessment of the surrounding road network in terms of road safety;
- Assessment the access position in terms of geometrical standards;
- Propose site-specific mitigation measures, if and where applicable.

1.3 Locality

The proposed site is located approximately 12 km south of Newcastle CBD on a portion of the farm Greenwich 8784, in Newcastle Municipality in Kwazulu-Natal (KZN) Province. **Figure 1** and **2**, **Annexure A**, show the locality map and the regional network.

1.4 Methodology

The traffic study was conducted according to the requirements of the *TMH 16 (COTO, 2012)*[1], the Department of Transport Manual for Traffic Impact Studies published by the *South Africa National Roads Agency Limited (SANRAL), 2012*. In terms of the guideline, a fully-fledged traffic impact analysis was required to be carried out for the proposed development. This included conducting vehicle count surveys, intersection performance analysis and road safety assessment applicable. Measures such as level of service, delay, and volume or capacity ratio were used to quantify the performance of an intersection or a roadway facility. Based on this assessment, mitigation measures were recommended for the proposed development to minimize the potential impacts on the existing road network.

As mentioned, the proposed Newcastle Landfill site is planned to be implemented in 7 phases starting from January 2019 to June 2056. **Table 1-1** shows the anticipated phases of implementation. The *TMH 16 (COTO, 2012*) stipulates that an approved Traffic Impact Study is valid for a period of 5 years from the date of assessment. Therefore, the study was conducted for only Phase 1 of the project: construction period (January 2019 – December 2019) and operational period (January 2020 – December 2026).

Table 1-1: Phases of implementation

Phase	Anticipated Date of Construction	Anticipated Operational Period
1	January 2019 - December 2019	January 2020 - January 2026
2	January 2025 - June 2025	June 2025 - June 2031
3	January 2030 - June 2030	June 2030 - June 2036
4	January 2035 - June 2035	June 2035 - June 2041
5	January 2040 - June 2040	June 2040 - June 2046
6	January 2045 - June 2045	June 2045 - June 2051
7	January 2050 - June 2050	June 2050 - June 2056

[1]Committee of Transport Officials. Technical Methods for Highways, South African Traffic Impact and Site Traffic Assessment Manual. Volume 1. 2012

2. BASELINE ASSESSMENT

This section of the report provides details and findings of the baseline assessment conducted.

2.1 Site Visit

A site visit was conducted on Tuesday, 20th February 2018. The site visit focused on observing the general road network layout, road conditions, modes of transport available in the area, traffic safety and some land-use aspects that were relevant to this study.

2.1.1 Traffic conditions

A smooth flow of traffic was observed on the road network that is within close proximity of the proposed development. At the time of the site visit, the possibly affected major roads; the N11 and the R34 were observed to have relatively low traffic volumes. On the proposed access route, however, no vehicles were observed. The traffic survey that was later conducted (see section 2.2) showed that traffic volumes on the major roads were on average ranging between 200 to 700 vehicles per hour while the access route has less than 5 vehicles per hour during the peak periods.

2.1.2 Non-Motorized Transport and Public Transport

The land-use around the proposed development is mainly a sparsely populated residential area called Kilbarchan and a mine located approximately 1 kilometre north of the proposed landfill site. On the section of the N11 close to the proposed landfill and along the access route, there were no public transport or NMT facilities observed.

The activities of a landfill (see section 3.3) do not trigger a need for public transport or NMT facilities as there are no pedestrians expected to walk to a landfill to deposit waste materials. Only vehicles; construction vehicles, private vehicles for supervisors and trucks delivering waste products are expected at the landfill.

2.1.3 Road Condition and Road Safety

Most of the road network surrounding the proposed landfill was in a good condition – with visibly clear the road marking, road signs and a good pavement surface.

At the access intersection (Road A/N11), Road A is also in a fairly good condition – paved with two lanes (3 meters wide) – one lane per direction. At approximately 0.3 kilometres away from the access intersection, the road is deteriorated and the road-width keeps decreasing. On Road A, approximately 1.8 kilometres before the access point of the proposed landfill site, the road passes through a small residential area. At that point, the road is only one lane – serving traffic from the eastbound and westbound directions. There is thus not enough space for expansion to serve traffic from both directions. This may be of concern for truck traffic going to and from the proposed landfill site. **Figure 2-4** shows the condition of the access road.

Figure 2-4: Condition of Road A

The condition of the Road A closer to the N11	The condition of the Road A approximately 1 km west of the N11
	
The condition of the Road A approximately 1.5 km west of the N11	The condition of the Road A at the access gate to the property to be developed.
	
Road A going through a residential area	The condition of Road A between the residential area

2.2 Traffic survey

On Thursday 22th February 2018, a traffic survey was conducted at the selected intersections surrounding the proposed Newcastle Landfill to determine the existing traffic volumes. The light vehicles, heavy vehicles (typically 2-4 axels) and very heavy vehicles (typically 5 and more axels) were all counted during the scoping process. The weekday AM and PM peak hour were determined based on the highest traffic volumes registered during the morning and afternoon periods respectively.

2.3 Existing external road network

The existing surrounding roads that might be impacted by the traffic generated by the proposed Newcastle Landfill site, are described below.

- **N11**

N11 is a Class 1 paved road with two lanes – one lane per direction. The road has mainly mobility function and a low accessibility function. In the vicinity of the proposed development, this road carries traffic volumes, in order of 700 vehicles (both directions) during the weekday AM and PM peak hours respectively. This road will be used by most of the vehicles transporting the waste materials from Newcastle to the landfill. Access (Road A) to the proposed Newcastle Landfill will also be provided off the N11 approximately 7 km from the N11/R34 intersection. **Figure 2-1** shows the surface condition along the N11.

Figure 2-1: N11

- **R34**

R34 is a Class 2 paved road with two lanes per direction. The road performs a mobility function with some accessibility function. The road is located to the north of the proposed development. The road generally carries low traffic volumes (approximately 250 vehicles during the most critical peak hour). **Figure 2-2** shows the surface condition of the R34.

Figure 2-2: R34

- **Road A (Access to the proposed Newcastle Landfill site)**

  Road A is an unnamed class 4 road with two lanes – one lane per direction. The road performs an accessibility function only. The road is located to the east of the proposed Newcastle Landfill. Currently, the road carries very low traffic volumes (Less than 5 vehicles during the most critical peak hour). **Figure 2-3** shows the surface condition of the Road A.

Figure 2-3: Road A

Two other unnamed roads will be affected by the traffic from the development. For the purpose of this report, these roads were labelled as Road B and Road C. **Figure 3 - Appendix A** shows the configuration of these roads.

2.4 Access to Proposed development

Access to the proposed Newcastle Landfill will be provided off Road A. Road A is approximately 3 km long and connects the proposed Newcastle Landfill site with the N11. **Figure 1, Annexure A** shows the location of the access road.

2.5 Influence area

As mentioned in **Section 2.2** above, the following external link roads might be directly affected by new traffic generated by the proposed Newcastle Landfill development:

- N11;
- R34;
- Road A;
- Road B; and
- Road C

The influence area for this study was determined based on the Newcastle Landfill development transport needs. The waste material to be transported to the landfill will most likely originate from in and around New Castle CBD.

The following intersections have been investigated as part of this Traffic Impact Assessment (refer to **Figure 3 - Appendix A**):

- Intersection 1: N11/Road A/Road B;
- Intersection 2: N11/Road C; and
- Intersection 3: N11/ R34

2.6 Assessment variables

The following variables have been considered to assess the impact of the traffic generated by the proposed development:

2.6.1 Level of Service (LOS)

A measure of intersection or roadway performance determined based on delay for un-signalised intersections. The LOS definitions in terms of delay are shown in **Table 2-5**.

Table 2-5: LOS definitions based on vehicle delay

LEVEL-OF-SERVICE DEFINITIONS BASED ON VEHICLES DELAY		
Level of Service	**Control Delay per vehicle in seconds**	**Level of Acceptability**
A	$d \leq 14.5$	Acceptable
B	$14.5 < d \leq 28.5$	Acceptable
C	$28.5 < d \leq 42.5$	Acceptable
D	$42.5 < d \leq 56.5$	Acceptable
E	$56.5 < d \leq 70.5$	Not Acceptable
F	$70.5 < d$	Not Acceptable

In most urban areas overall rating of A to D are normally considered acceptable. Levels of service D or better are considered desirable and levels of service E and F are normally undesirable. *(Department of Transport, 1995)*

2.6.2 Delay

Delay is a measure of intersection or roadway performance which is measured based on the driver discomfort, frustration, fuel consumption and lost travel time. Delay at intersections depends on various factors such as the type of signal control, the volume of traffic and volume/capacity ratio of each approach at an intersection (*C A O'Flaherty, 1997*). The intersection performance has been rated based on the average delay, i.e. the LOS of the intersections under investigation (including the access to the Landfill) will be measured based on the intersection average delay.

2.6.3 Volume / capacity ratio

Volume / capacity ratio (v/c) is a measure of intersection or roadway performance. It is the ratio of a number of vehicles on the road to the available capacity of the roadway. The road link capacity in the study area was rated based on the volume/capacity ratio. According to the National Department of Transport Manual for Traffic Impact Study (2012), the intersection capacity should be evaluated as follows:

- v/c<1: the intersection operates under capacity,
- v/c=1: the intersection operates at capacity,
- v/c>1: the intersection operates over capacity,

Road upgrades should be investigated when the v/c ratio exceeds 0.95.

3. TRAFFIC IMPACT ASSESSMENT

The impact assessment of the transportation aspects related to the proposed Newcastle Landfill activities was determined based on the evaluation of the worst traffic scenario during the existing, construction, and operational phases.

3.1 Assessment scenarios

Based on the information above, the following scenarios were considered critical for the assessment:

- **Scenario 1: No-Go Phase: 2018 Existing AM and PM Peak Hour Traffic Volumes.**

  This refers to the assessment of the existing traffic on the surrounding road network – the 2018 AM and PM peak hour base year traffic volumes and analysis results. This scenario determined existing intersection operating conditions and road upgrade requirements for the year 2018 AM and PM peak hour traffic volumes based on the existing geometry and intersection control. Refer to **Figures 4** and **5 Appendix A**.

- **Scenario 2 – Construction phase: 2019 Projected AM and PM Peak Hour Traffic Volumes with development traffic during the construction phase.**

  This refers to the assessment of traffic generated during the construction phase. The construction phase will generate traffic to the surrounding road network through the construction workforce, and delivery of materials and equipment to site. The developer of the proposed Newcastle Landfill anticipates that the construction phase and its associated provision of the will take place over a period of 12 months (January 2019 to December 2019). A growth rate of 1.5% per annum was applied to the 2018 existing traffic to determine the projected 2019 traffic volumes. Refer to **Figures 9** and **10 Appendix A**.

- **Scenario 3 – Operational phase: 2026 Projected AM and PM Peak Hour Traffic Volumes with development traffic.**

  This refers to the assessment of the traffic generated during the first phase of operation of the landfill. It was anticipated that operations of the landfill will commence in 2020 and operate for a period of 6 years. A growth rate of 1.5% per annum was applied to the 2018 existing traffic in order to determine the projected 2026 traffic volumes. The analysis results can be seen in **Figures 13** and **14**.

3.2 Analysis Peak Hours

The assessment of the impact was done for the critical peak hour. The critical peak hours, from a road capacity point of view, occurs when the highest combination of existing road traffic and traffic generated by the development occurs. Based on the expected trip generation and traffic volumes on the surrounding road network, the critical peak hours on the surrounding road network will occur during the weekday

morning peak hour (AM) and weekday afternoon peak hour (PM). The following peak hours were thus determined for analysis:

- AM Peak Hour: 06:45 to 07:45, and
- PM Peak hour 16:00 to 17:00.

3.3 Traffic Capacity Analysis

3.3.1 Assumptions

The expected trip generation during the AM and PM Peak hours was determined based on the assumptions made from the data supplied to the Traffic Specialists. The operations of a landfill are as follows:

- During the construction period, construction vehicles (earth moving equipment) would be deployed at the site to excavate for the construction of the landfill. During the construction, there are supervisors at the site to guide the construction processes.
- During the operational period, waste trucks would collect waste materials from the areas around the Newcastle CBD and transport it to the proposed landfill site.

Thus the transport requirement for the proposed Newcastle Landfill would be mainly the transportation of waste materials from in and around the Newcastle Central Business District (CBD) as well private vehicles of construction supervisors.

Based on the data supplied, the waste materials will be transported by various vehicle sizes – ranging from bakkies to municipal waste trucks whose size range from 5 tonnes to 10 tonnes. For the purpose of the traffic study, an average vehicle size of 7 tonnes was assumed.

In the starting year of operation, it is anticipated that the average rate of waste materials deposition will be 375 tonnes per day. This equals to 54 loaded trucks per day (375 tonnes/vehicle capacity (7 tonnes)) with an equal number of empty trucks in the opposite direction.

An estimated 54 trucks are anticipated to be generated in the year 2020 by the proposed Newcastle Landfill site during the AM and PM peak hours in the operational phase. The average rate of waste materials deposition is expected to increase at a rate of 3% per year over a 40-year lifespan. **Table 3-1** shows the quantities of waste materials transported during AM and PM peak periods.

Table 3-1: Estimated raw materials transported

Duration	Production tonne rate per day						
	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025	FY2026
Tones per day	375	386	398	410	422	435	448
Tones per month	11250	11588	11935	12293	12662	13042	13433
Tonnes per year	135000	139050	143222	147518	151944	156502	161197

Based on similar studies conducted by Koleko (Pty) Ltd, it was assumed that approximately 5 construction vehicles and private vehicles (supervisors and construction vehicle drivers) will operate on the site during the weekday AM and PM peak periods during the construction phase. **Table 3-2** and **Table 3-3** show the transport requirements in the starting years of the construction and operational phases.

Table 3-2: Transport Requirements during construction phase

Transport Requirements/ Per Hour	
Construction vehicles	5
Private vehicles	5
Total number of vehicles	**10**

Table 3-3: Transport Requirements during operation phase

Transport Requirements/ Per Hour	
Waste materials (Trucks)	54
Total number of vehicles	**54**

3.3.2 Trip generation

Based on the assumptions above, the directional split (trips in and out of the site) of additional vehicle trips generated during the weekday AM and PM peak hours were determined.

Table 3-4 and **Table 3-5** summarize the typical peak hour expected transport requirements of the Newcastle Landfill site.

Table 3-4: Newcastle Landfill AM Expected Trip Generation

Expected AM Peak Hour Trip Generation						
	2019 Construction trips			**2026 Operational Phase (Year 6 Newcastle Landfill trips)**		
Analysis scenario	**Total**	**In**	**Out**	**Total**	**In**	**Out**
Construction vehicles (vph)	5	5	0	0	0	0
Private vehicle (vph)	5	4	1	0	0	0
Waste material trucks (vph)	0	0	0	64	48	16
Total number of vehicle trips	**10**	**9**	**1**	**64**	**48**	**16**

Table 3-5: Newcastle Landfill PM Expected Trip Generation

Expected PM Peak Hour Trip Generation						
	2019 Construction trips			2026 Operational Phase (Year 6 Newcastle Landfill trips)		
Analysis scenario	**Total**	**In**	**Out**	**Total**	**In**	**Out**
Construction vehicles (vph)	5	0	5	0	0	0
Private vehicle (vph)	5	1	4	0	0	0
Waste material trucks (vph)	0	0	0	64	16	48
Total number of vehicle trips	**10**	**1**	**9**	**64**	**16**	**48**

Based on the aforementioned assumptions, a total of 10 vehicle trips will be generated during weekday AM and PM peak hour periods during the construction phase – contributing additional 10 vehicle trips during the weekday AM and PM peak hours. During the operational phase, a total of 64 vehicles are expected to be generated hours – contributing additional 64 vehicle trips during the weekday AM and PM peak hours.

3.3.3 Trip Distribution and Trip Assignment

The trip distribution of the additional traffic expected to be generated by the proposed development was determined based on the expected origins and destinations of the development traffic.

- **Transportation of the waste materials**: It is expected that 100% of the waste trucks will travel north/south through the N11 between the landfill site and Newcastle CBD.
- **Private and construction vehicle trips:** It is expected 80% of the vehicle trips will travel to/from Newcastle CBD and 20% of the vehicle trips would travel to/from Ladysmith or Dundee/Glencoe areas.

These additional vehicle trips that are expected to be generated by the Newcastle Landfill were assigned to the adjacent road network. **Annexure A, Figure 6** depicts the expected trip distribution of the proposed development. The expected development trip assignment is shown in **Figure 7** and **8,** for the construction phase and **Figure 11** and **12** for the operational phase – during the weekday AM and PM peak hours.

3.3.4 Capacity Analysis

Capacity analysis of the intersections on the surrounding road network was conducted using a *TRAFFIX 8.0* analytical software. The performance characteristics and expected traffic demand of every intersection were determined for the different traffic scenarios. The results of the traffic analysis are summarized as follows:

- **Scenario 1 – No-Go Phase: 2018 AM and PM Peak Hour Traffic.**

  This scenario evaluated the existing 2018 weekday AM and PM peak hour traffic volumes and capacity analysis results.

During the weekday AM and PM peak period, all the intersections under investigation operated at the acceptable level of service (LOS < D) and under capacity.

The summary of the capacity analysis for scenario 1 is illustrated in **Figures 4** and **5**, for the weekday AM and PM peak hours respectively.

- **Scenario 2 – Construction phase: 2019 Projected AM and PM Peak Hour Traffic Volumes with development traffic.**

  The construction phase is anticipated to generate approximately 10 vehicle trips during the weekday AM and PM peak hour periods. Traffic volumes during this phase are considerably low and therefore it is expected that the traffic impact will be negligible.

  All the intersections under investigation operate at the acceptable level of service (LOS < D) and under capacity. **Figures 9** and **10** summarise the results of the capacity analysis for the weekday AM and PM peak hours respectively, under this scenario.

- **Scenario 3 – Operational phase: 2026 Projected AM and PM Peak Hour Traffic with development traffic.**

  The operational phase is anticipated to be the critical period in terms of additional trips generation. All the intersections under investigation operate at the acceptable level of service (LOS < D) and under capacity. **Figures 13** and **14** summarise the results of the capacity analysis for the weekday AM and PM peak hours respectively, under this scenario.

3.3.5 Proposed Intersection Upgrades

Based on the impact assessment presented above, the additional traffic volumes will not have significant impacts on the performance of the intersections – all the intersections under investigation will still operate at the acceptable level of service (LOS < D) and under capacity.

From the site visit, however, it was observed that at the section of Road A at access intersections is narrow (3 meters). The trucks coming to and from the N11 may not be able to conveniently make the turning movements onto the access road. Given that the speed limit on the N11 is high, this may pose traffic safety issues. It is therefore recommended that the access intersection be upgraded to accommodate the truck movements. The access road should also be upgraded to a two-lane road (3 meters wide) – one lane per direction.

4. ASSESSMENT OF TRAFFIC IMPACTS IN TERMS OF ENVIRONMENTAL IMPACT CRITERIA

This section of the report identifies the potential environmental impacts associated with the proposed Newcastle Landfill from a traffic impact perspective. The significance (quantification) of traffic impacts is based on specifications and methodology provided by the GCS (Pty) Ltd which is compliant with the NEMA regulations.

4.1 Methodology

All specialists working on the Newcastle Landfill Project are required to utilize a common method of assessing significance that will enable comparisons to be made between impacts and will enable authorities and stakeholders to understand the process and rationale upon which risks/impacts have been assessed.

The impact associated with the Newcastle Landfill were evaluated according to the following characteristics:

- Spatial scale,
- Magnitude (severity),
- Duration, and
- Probability (likelihood).

Each impact identified will be assessed in terms of scale (spatial scale), magnitude (severity) and duration (temporal scale). The consequence was then determined as follows:

Consequence = Severity + Spatial Scale + Duration

The Risk of the activity was then calculated based on the frequency of the activity and impact, how easily it can be detected and whether the activity is governed by legislation. Thus:

Likelihood = Frequency of activity + frequency of impact + legal issues + detection

The risk is then based on the consequence and likelihood.

Risk = Consequence x likelihood

In order to assess each of these factors for each impact, the ranking scales in **Tables 4-1** to **4-7** were applied.

Table 4-1: Severity.

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful / within a regulated sensitive area	5

Table 4-2: Spatial Scale - How big is the area that the aspect is impacting on?

Area-specific (at impact site)	1
Whole site (entire surface right)	2
Local (within 5km)	3
Regional / neighboring areas (5km to 50km)	4
National	5

Table 4-3: Duration.

One day to one month (immediate)	1
One month to one year (Short term)	2
One year to 10 years (medium term)	3
Life of the activity (long-term)	4
Beyond life of the activity (permanent)	5

Table 4-4: Frequency of the activity - How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

Table 4-5: Frequency of the incident/impact - How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4

Daily / highly likely / definitely / >100%	5

Table 4-6: Legal Issues - How is the activity governed by legislation?

No legislation	1
Fully covered by legislation	5

Table 4-7: Detection - How quickly/easily can the impacts/risks of the activity be detected on the environment, people and property?

Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Significance indicates the importance of the impact in terms of the impact characteristics defined above and therefore indicates the level of mitigation required. The significance of the impact was determined through a synthesis of impact characteristics. Environmental effects were rated as either of high, moderate or low significance on the basis provided in **Table 4-8**.

Table 4-8: Impact Ratings.

RATING	CLASS
1 – 55	(L) Low Risk
56 – 169	M) Moderate Risk
170 – 600	(H) High Risk

4.2 Results of assessment

Impact Significance Rating Tables were compiled for Phase 1 of the Newcastle Landfill Project. This was done for the activities deemed to have a potential impact with reference to the aspects identified. **Table 4-9** below was compiled in accordance with the methodology in order to summarize the results of the assessment.

Table 4-9: Impact rating for the scenarios

Potential impacts	**Before Mitigation**		**After Mitigation**
	The significance rating of impacts	**Proposed mitigation:**	**The significance rating of impacts**
	NO-GO PHASE		
▪ At the Road A/N11 intersection, the left turn lane northbound of the N11 is too narrow to accommodate the size of trucks. Additionally, the curve from the N11 to Road A is quite tight. Trucks might find it difficult to turn from the N11 onto the Road A. Given that the speed limit is high (100 km/h). This may pose safety issues at the intersection ▪ The section of Road A close to the Road A/N11 intersection is narrow (3 meters) and may not accommodate the size of trucks. This may also pose road safety risks. ▪ Road A is deteriorated and reduces to a one-lane road. This is of concern, as there need to be two lanes – to provide for vehicles going in and out of the site as well as for other vehicles using the road. This deteriorated road may result into higher vehicle operating costs and longer travel times.	**S S D F F L D** **3 3 3 5 5 5 1** **- 144 (MODERATE RISK)**	▪ From a safety standpoint, a 20m left turn lane should be provided on the northbound of the N11/Road A intersection in order to accommodate the trucks, ease the flow of traffic, and improve the safety at the intersection. ▪ The section of Road A at the Road A/N11 intersection should be widened to 3.5 meters in order to accommodate the size of the trucks and construction vehicles. ▪ The entire length of Road A should be upgraded to a 2-lane road – one lane per direction to allow for vehicles going and out of the site.	**S S D F F L D** **1 3 1 1 2 5 1** **- 45 (LOW RISK)**

	CONSTRUCTION PHASE		
▪ Additional 10 vehicle trips will be generated during the peak hour periods by the development onto the external roads. Given that the access road to be used by the construction and private vehicles is deteriorated and not wide enough to accommodate the additional vehicles. This may pose road safety issues.	**S S D F F L D** **1 1 2 5 2 1 2** **-40 (L0W RISK)**	▪ The entire length of Road A should be upgraded to a 2-lane road – one lane per direction to allow for vehicles going and out of the site. Once it is upgraded, road markings and warning signs should be implemented during the construction phase for safety purposes.	**S S D F F L D** **1 2 2 3 1 1 1** **-24 (L0W RISK)**
	OPERATIONAL PHASE		
▪ Additional 64 vehicle trips will be generated during the peak hour periods by the development onto the external roads. Given that the access road to be used by the waste trucks is deteriorated and not wide enough to accommodate the additional vehicles. This may pose road safety issues.	**S S D F F L D** **1 4 3 4 3 1 1** **-72 (MODERATE RISK)**	▪ The entire length of Road A should be upgraded to a 2-lane road – one lane per direction to allow for vehicles going and out of the site. Once it is upgraded, road markings and warning signs should be implemented during the construction phase for safety purposes. Given the additional traffic on to the road, it is recommended that waste trucks transporting waste materials should access the site at specific times that do not coincide with peak traffic flow – AM period (6:00 -9:00) and PM period (15:00 – 18:00).	**S S D F F L D** **1 4 3 4 1 1 1** **-56 (MODERATE RISK)**

Based on the impact rating discussed in **Table 4-9**, it can be concluded that the transportation aspects related to the activities of the Newcastle Landfill Project during the construction and operational phases

will have low and moderate risks respectively. Therefore, mitigation measures were proposed to minimise the impacts.

5. CONCLUSIONS

The following conclusions are drawn based on the findings of the traffic impact assessment conducted for proposed Newcastle Landfill operations.

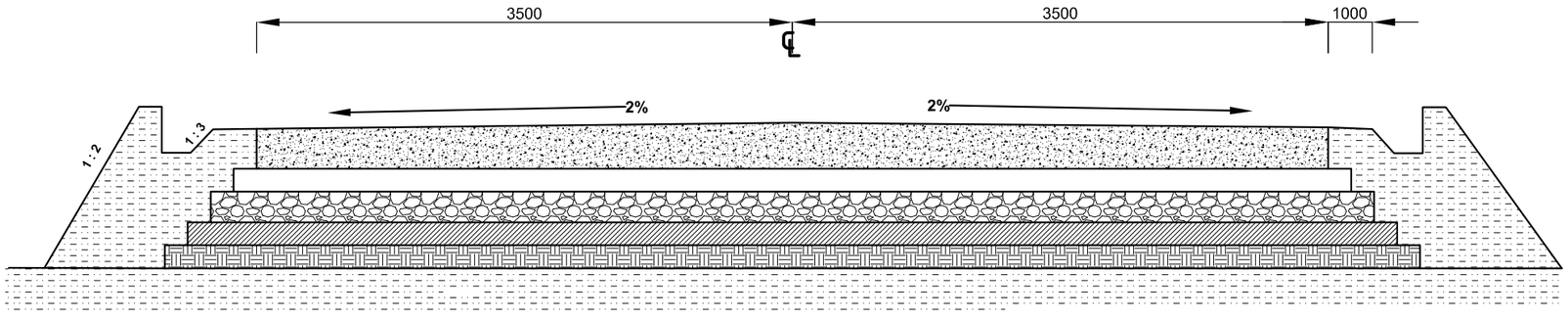
- The proposed development will have a lifespan of approximately 40 years and will be implemented in 7 phases. The traffic study was conducted for Phase 1 of construction and Phase 1 of operations. According to the development plan, the following scenarios were considered for capacity analysis:
    - No-Go Phase: 2018 Existing AM and PM Peak Hour Traffic
    - Construction Phase: 2019 Projected AM and PM Peak Hour background ttraffic including the traffic generated by the proposed development during its construction phase.
    - Operational phase: 2026 Projected AM and PM Peak Hour background traffic and development traffic once Phase 1 will be fully operational.
- Using the Newcastle Landfill transport requirements, 10 vehicle trips are expected to be generated during a typical weekday AM and PM peak hour of the construction phase and 64 vehicle trips are expected to be generated during a weekday AM and PM peak hour during the operational phase.
- The capacity analysis results show that the intersections under investigation as well as the affected external road link are anticipated to operate at acceptable LOS i.e. the surrounding road network has sufficient capacity to accommodate the future traffic demand generated by the proposed development.
- The proposed development will gain access off the N11.
- The following upgraded may be required at the access point, intersection or roadway close to the proposed development:
    - The section of Road A at the Road A/N11 intersection should be expanded to accommodate the size of the trucks and construction vehicles.
    - Road A should be upgraded to a 2-lane road to allow for vehicles going and out of the site.
    - Appropriate road markings and warning signs should be implemented during construction and the operational phases for safety purposes.
- Regarding the impact on the environment, the results of the assessment show that the significance of the impact is averagely low. In order to minimize the significance of the impact, it was recommended that the trucks transporting waste materials should access the site at specific times that do not coincide with peak traffic flow – AM period (6:00 -9:00) and PM period (15:00 – 18:00).

6. RECOMMENDATIONS

The findings of the traffic impact assessment for proposed Newcastle Landfill conclude that the proposed development will not have a significant negative impact on the existing road networks within the project area. However, certain mitigation measures have been recommended to accommodate the background traffic demand and any adverse effects on the environment. Based on the conclusions of this assessment, it is recommended that the proposed development should be favourably considered from a traffic engineering point of view by the relevant authorities.

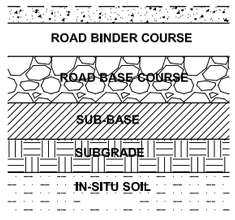
Annexure A

Figures



ACCESS ROAD TYPICAL CROSS SECTION

SCALE: N.T.S



30mm ASPHALT WEARING COURSE

150mm THICK BINDER COURSE LAYER (G1 QUALITY MATERIAL) COMPACTED TO 93% OF MOD AASHTO MAXIMUM DENSITY

200mm THICK BASE COURSE LAYER (G3 QUALITY MATERIAL) COMPACTED TO 93% OF MOD AASHTO MAXIMUM DENSITY

150mm THICK BASE PREPARATION LAYER (G7 QUALITY MATERIAL) COMPACTED TO 93% OF MOD AASHTO MAXIMUM DENSITY

150mm THICK BASE PREPARATION LAYER (G9 OR SIMILAR) COMPACTED TO 93% OF MOD AASHTO MAXIMUM DENSITY

RIP AND COMPACT IN SITU TO 93% OF MOD AASHTO MAXIMUM DENSITY

ROAD LAYERWORKS DETAIL

SCALE 1 : 10

PRELIMINARY DESIGN

AMENDMENTS

NO.	DATE	APPROVED	DESCRIPTION
1	05/03 /2015	VS	FOR DISCUSSION

DESIGNED: VS

DESIGN CHECKED: ND

DRAWN: VS

DRAWING CHECKED: SJ

ENGINEER

DATE:

CLIENT

DATE:

CONSULTANT

envitech solutions

Gauteng:
22 Seventh Avenue
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Benoni, 1501
South Africa
Tel: +27-11-425 2810
Fax: +27-11-425 4731
info@envitech.co.za

Kwa-Zulu Natal:
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Greenwich Office Park
4/6 St. Mary's Road
Kloof 3610
Tel: +27-31-764 1555
Fax: +27-31-764 1555
brendon@envitech.co.za

CLIENT

Newcastle Municipality

Private Bag X 6621
Newcastle 2940

PROJECT TITLE

DESIGN AND CONSTRUCTION OF A NEW LANDFILL SITE FOR NEWCASTLE MUNICIPALITY

DRAWING TITLE

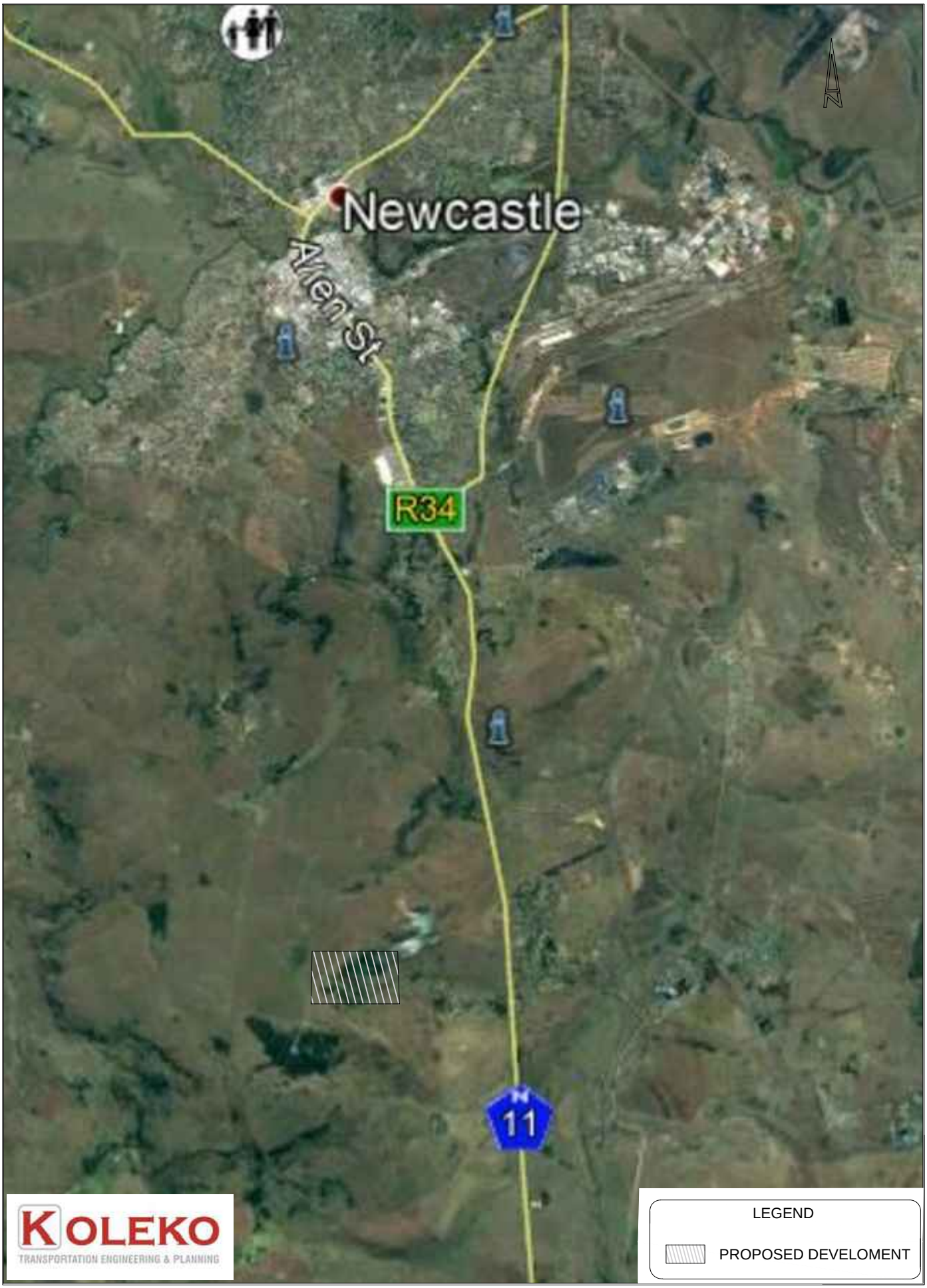
PROPOSED ACCESS ROAD FROM THE N11

SCALE: NTS

JOB NUMBER: 207-2008

SHEET NO.: 12 OF 13

DRAWING NO.: 207-2008-12-REV1



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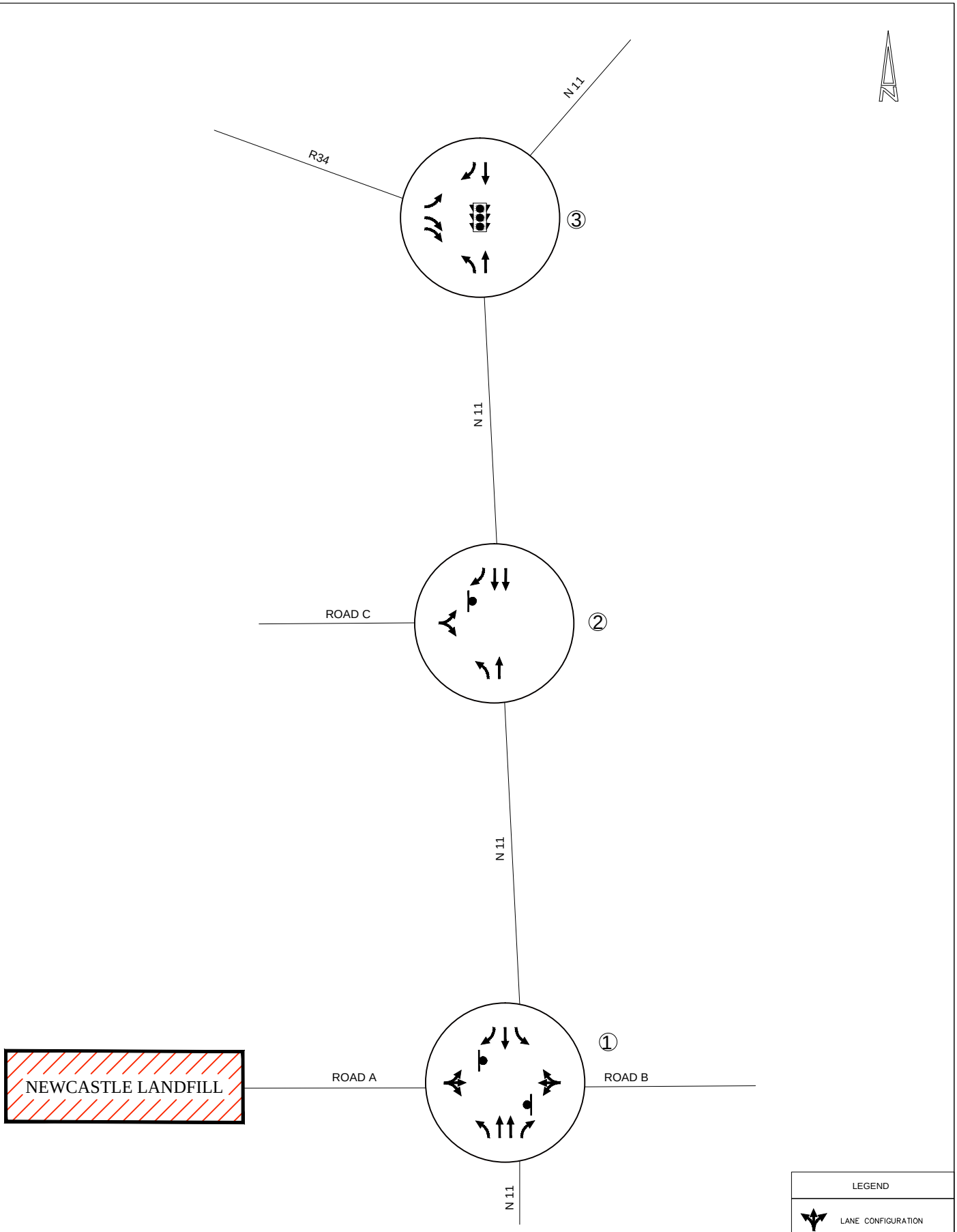
PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	REGIONAL NETWORK	2



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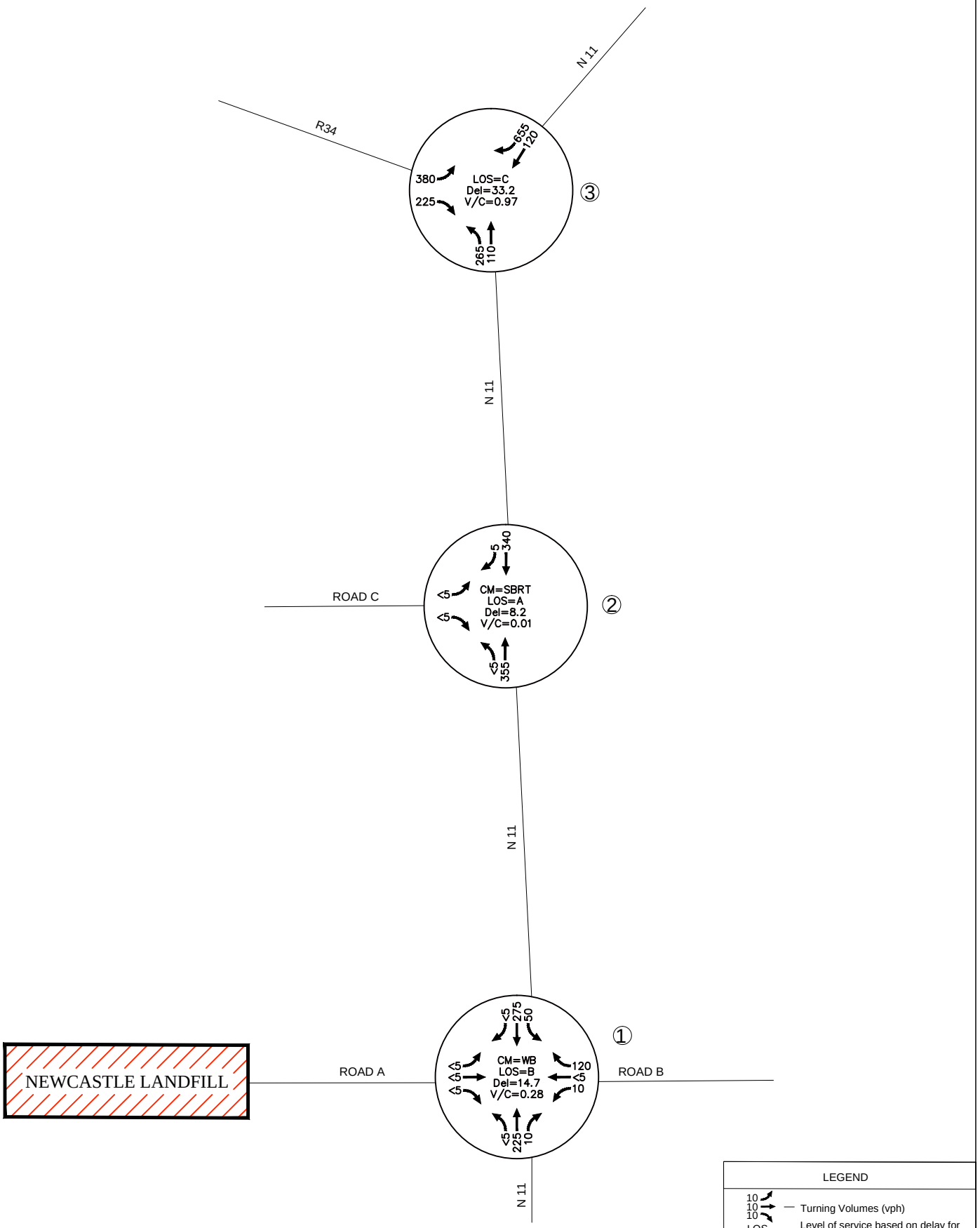
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	2018 EXISTING GEOMETRY	3



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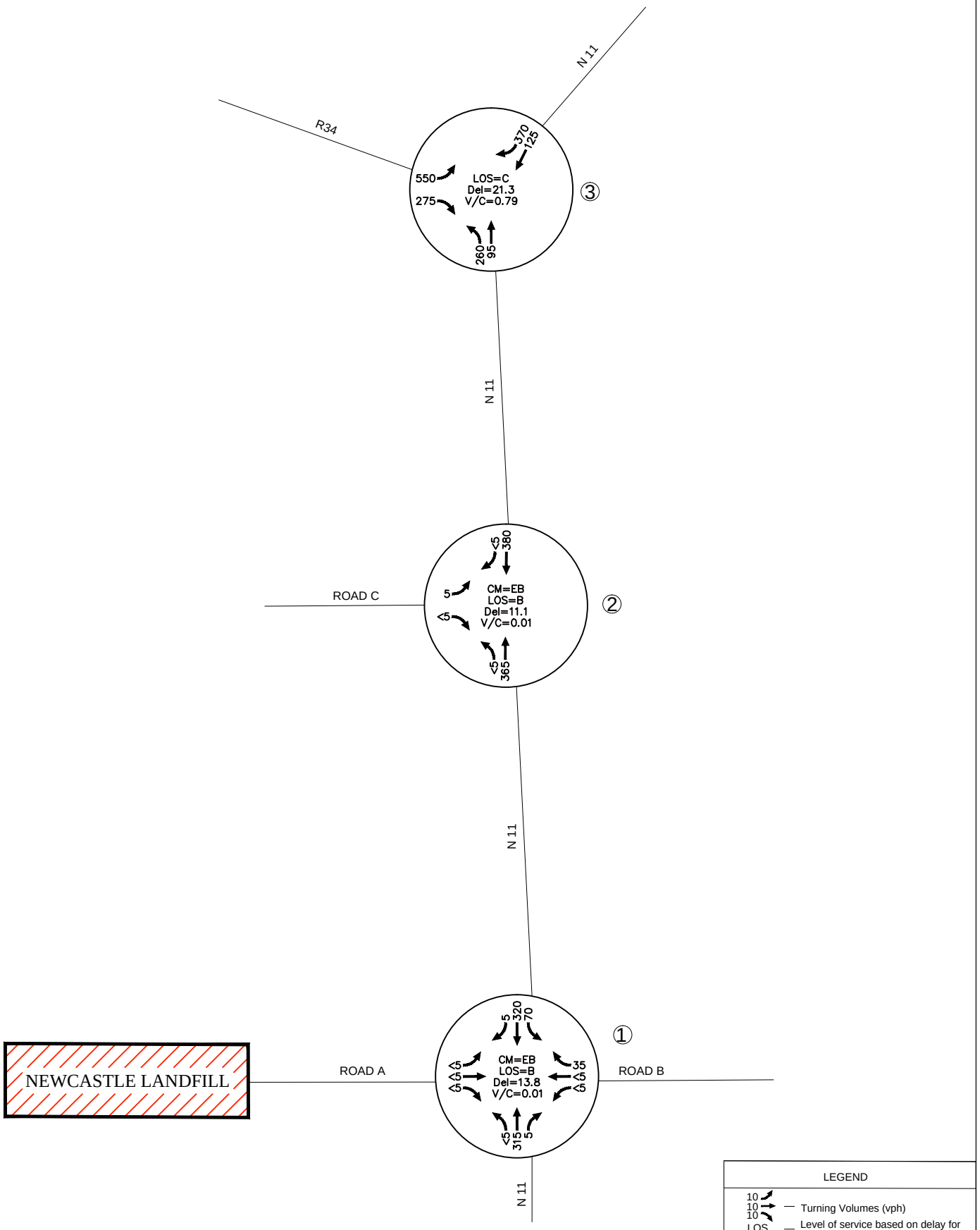
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 1A: 2018 EXISTING AM PEAK HOUR VOLUMES AND CAPACITY ANALYSIS RESULTS	4



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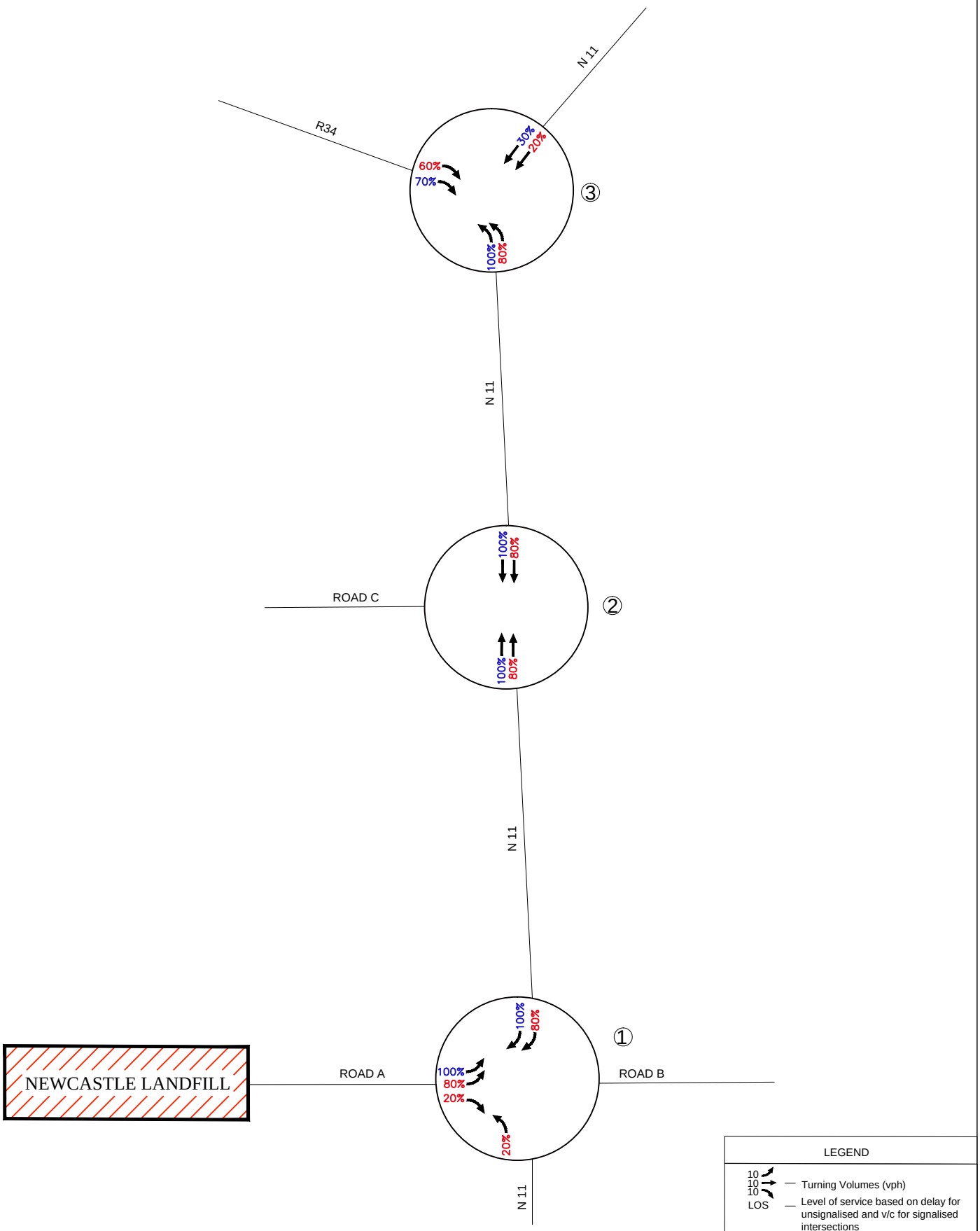
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 1B: 2018 EXISTING PM PEAK HOUR VOLUMES AND CAPACITY ANALYSIS RESULTS	5



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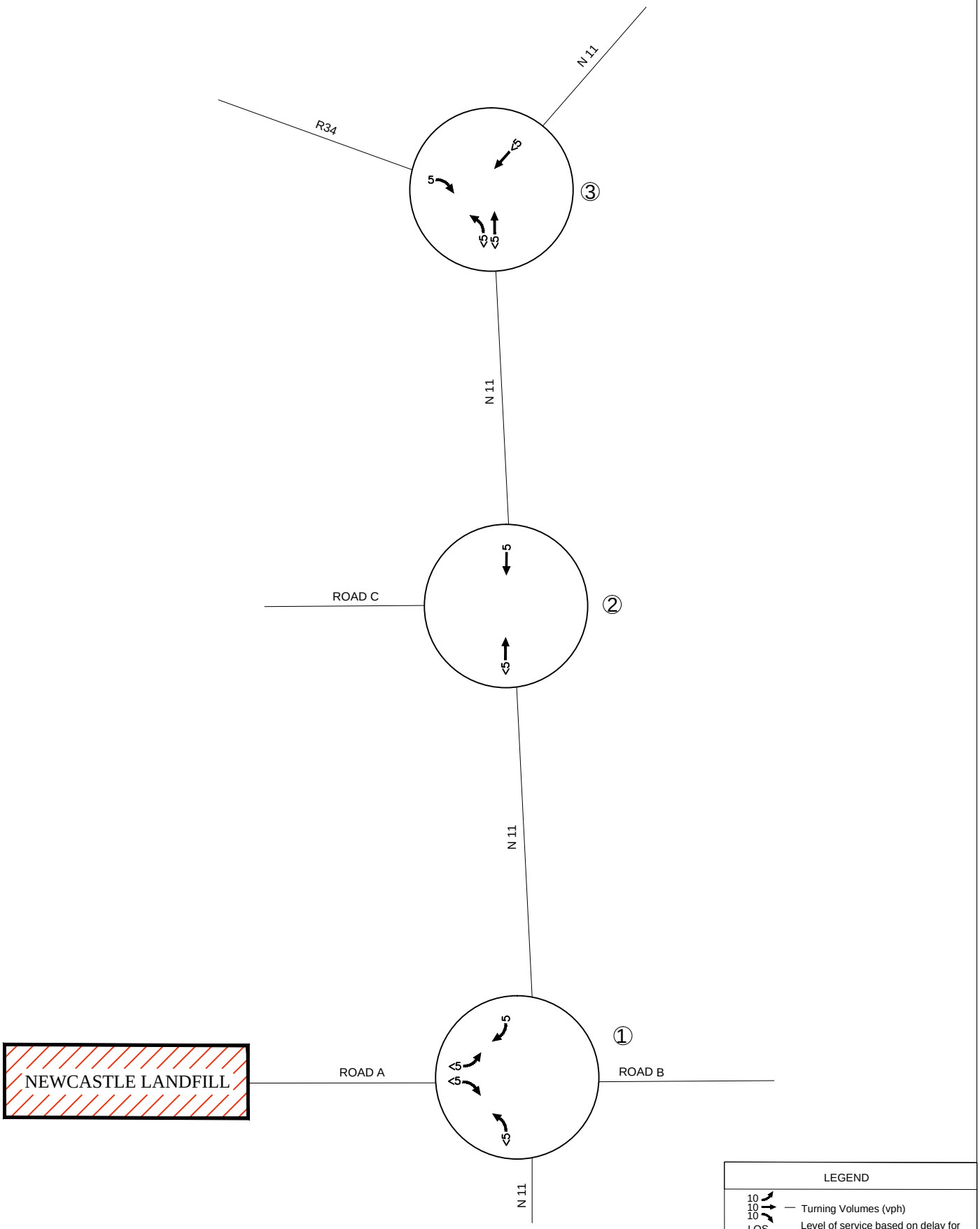
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	EXPECTED TRIP DISTRIBUTION	6



LEGEND

10 / 10 / 10 — Turning Volumes (vph)

LOS — Level of service based on delay for unsignalised and v/c for signalised intersections

Del — Delay (seconds)

V/C — Volumes / Capacity Ratio

— Proposed Development

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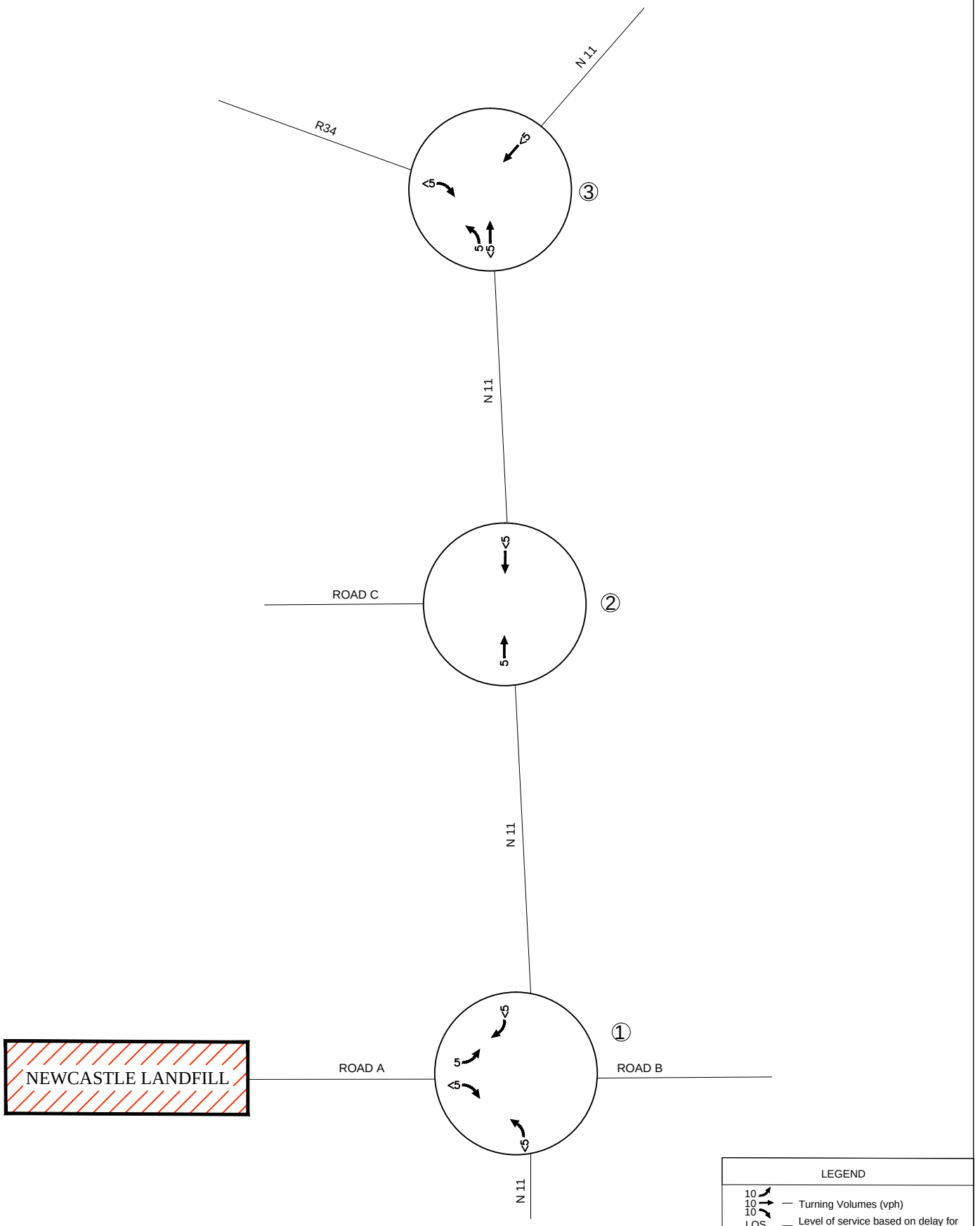
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	CONSTRUCTION PHASE: EXPECTED AM TRIP ASSIGNMENT	7



LEGEND

10 / 10 / 10 — Turning Volumes (vph)

LOS — Level of service based on delay for unsignalised and v/c for signalised intersections

Del — Delay (seconds)

V/C — Volumes / Capacity Ratio

— Proposed Development

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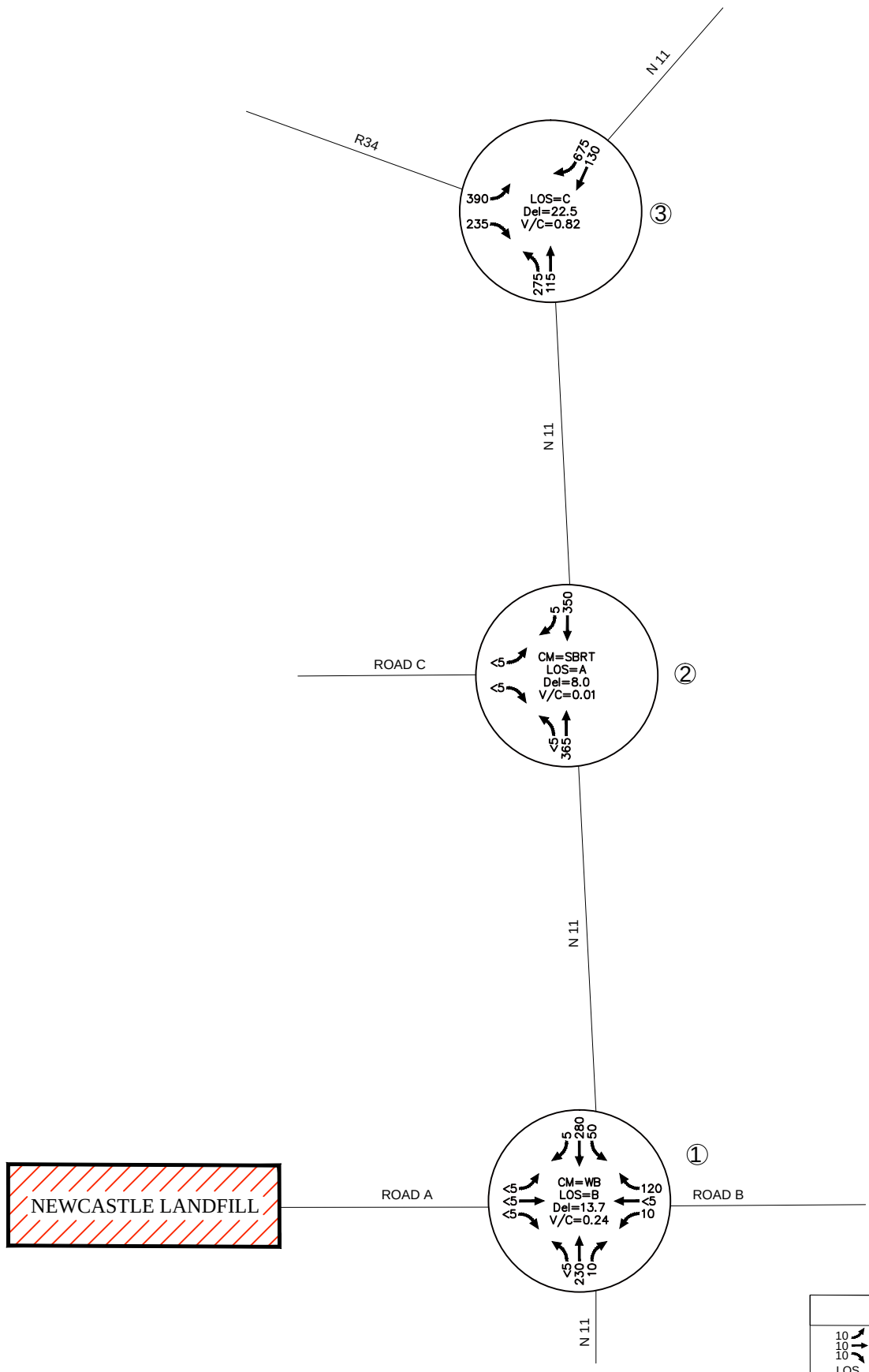
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	CONSTRUCTION PHASE: EXPECTED PM TRIP ASSIGNMENT	8



LEGEND

10 / 10 / 10 — Turning Volumes (vph)

LOS — Level of service based on delay for unsignalised and v/c for signalised intersections

Del — Delay (seconds)

V/C — Volumes / Capacity Ratio

Proposed Development

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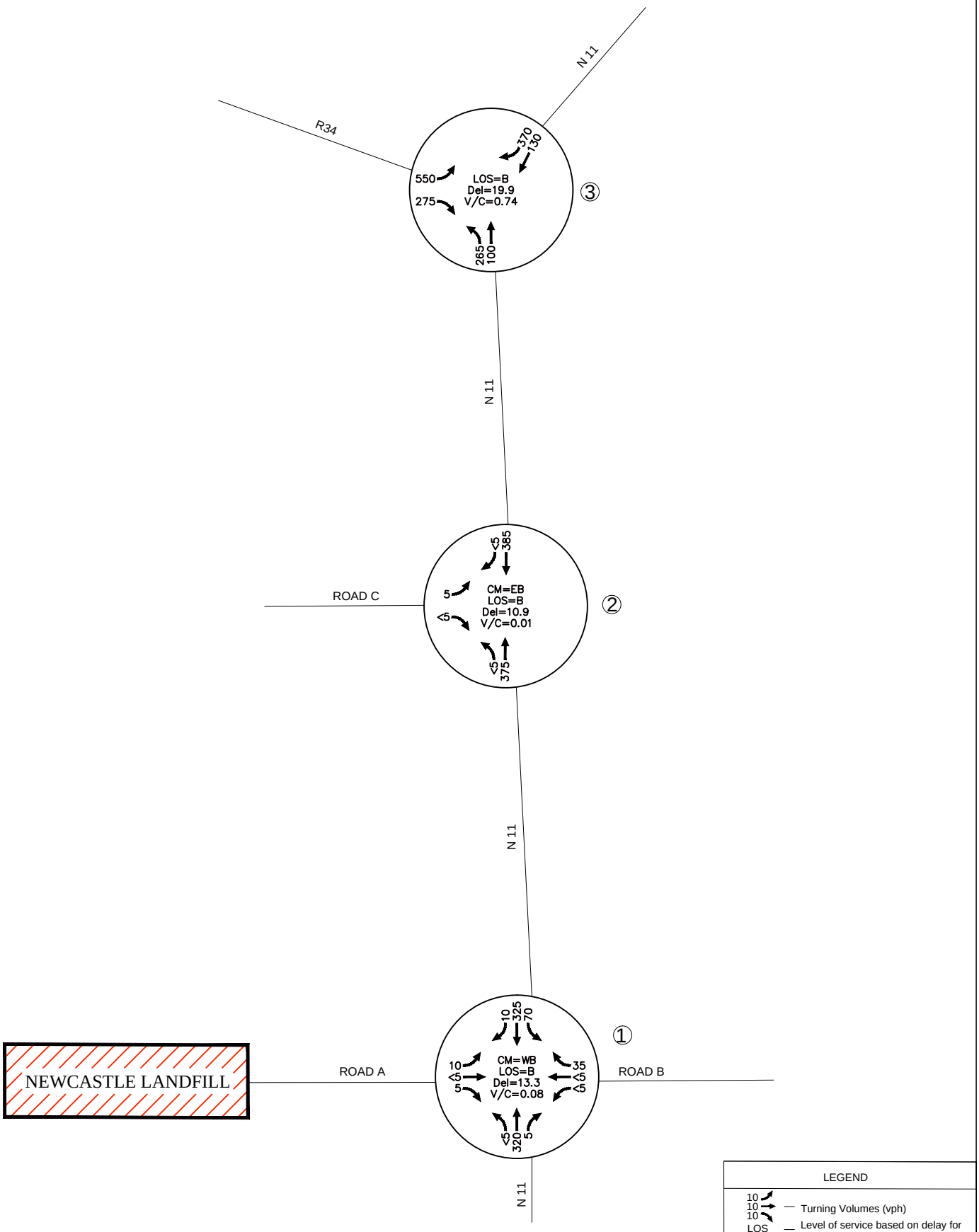
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 2A: 2019 PROJECTED AM PEAK HOUR TRAFFIC VOLUMES AND DEVELOPMENT TRAFFIC CAPACITY ANALYSIS RESULTS	9



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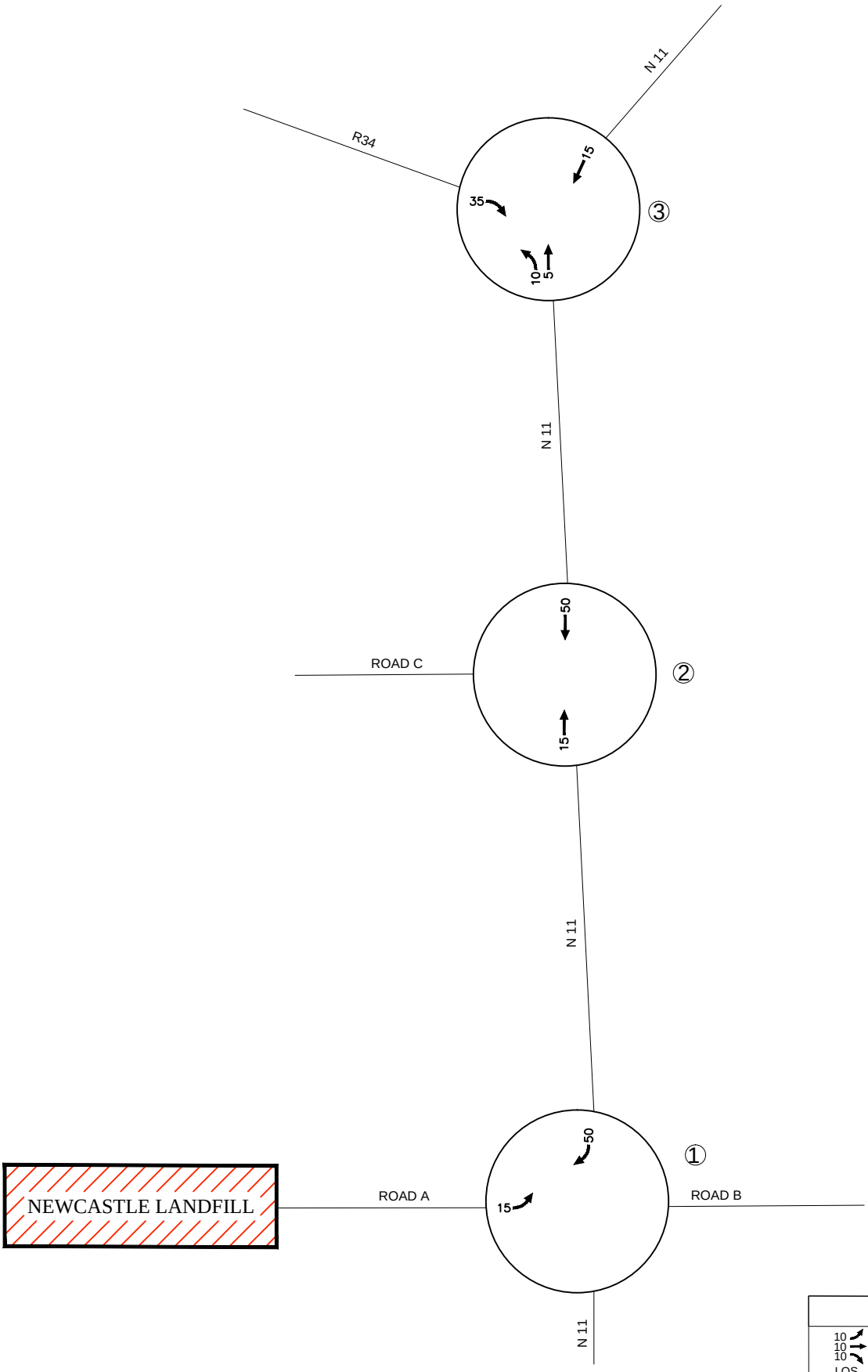
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 2B: 2019 PROJECTED PM PEAK HOUR TRAFFIC VOLUMES AND DEVELOPMENT TRAFFIC CAPACITY ANALYSIS RESULTS	10



LEGEND

10 / 10 / 10 — Turning Volumes (vph)

LOS — Level of service based on delay for unsignalised and v/c for signalised intersections

Del — Delay (seconds)

V/C — Volumes / Capacity Ratio

— Proposed Development

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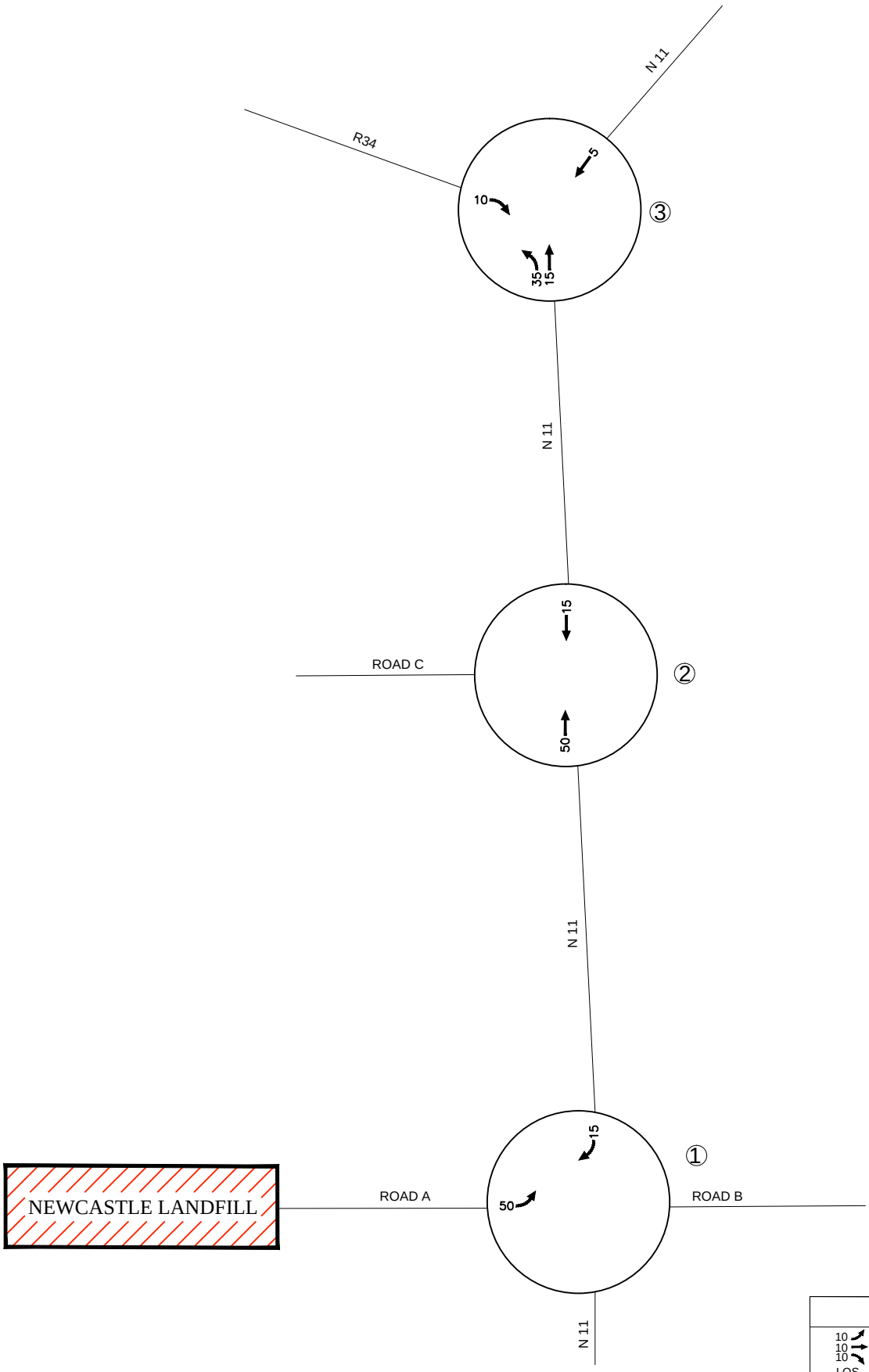
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	OPERATIONAL PHASE: EXPECTED AM TRIP ASSIGNMENT	11



LEGEND

10 / 10 / 10 — Turning Volumes (vph)

LOS — Level of service based on delay for unsignalised and v/c for signalised intersections

Del — Delay (seconds)

V/C — Volumes / Capacity Ratio

— Proposed Development

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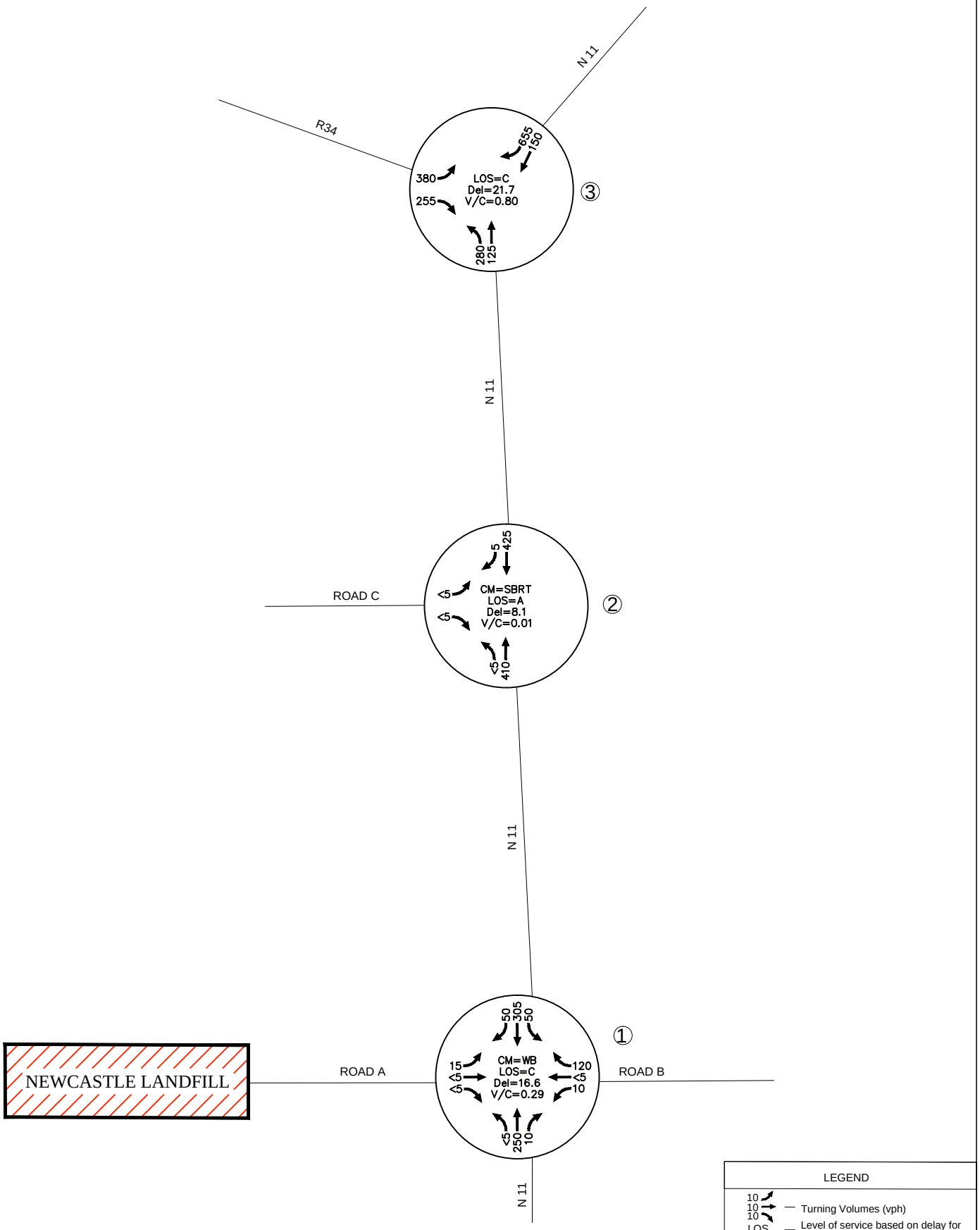
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	OPERATIONAL PHASE: EXPECTED PM TRIP ASSIGNMENT	12



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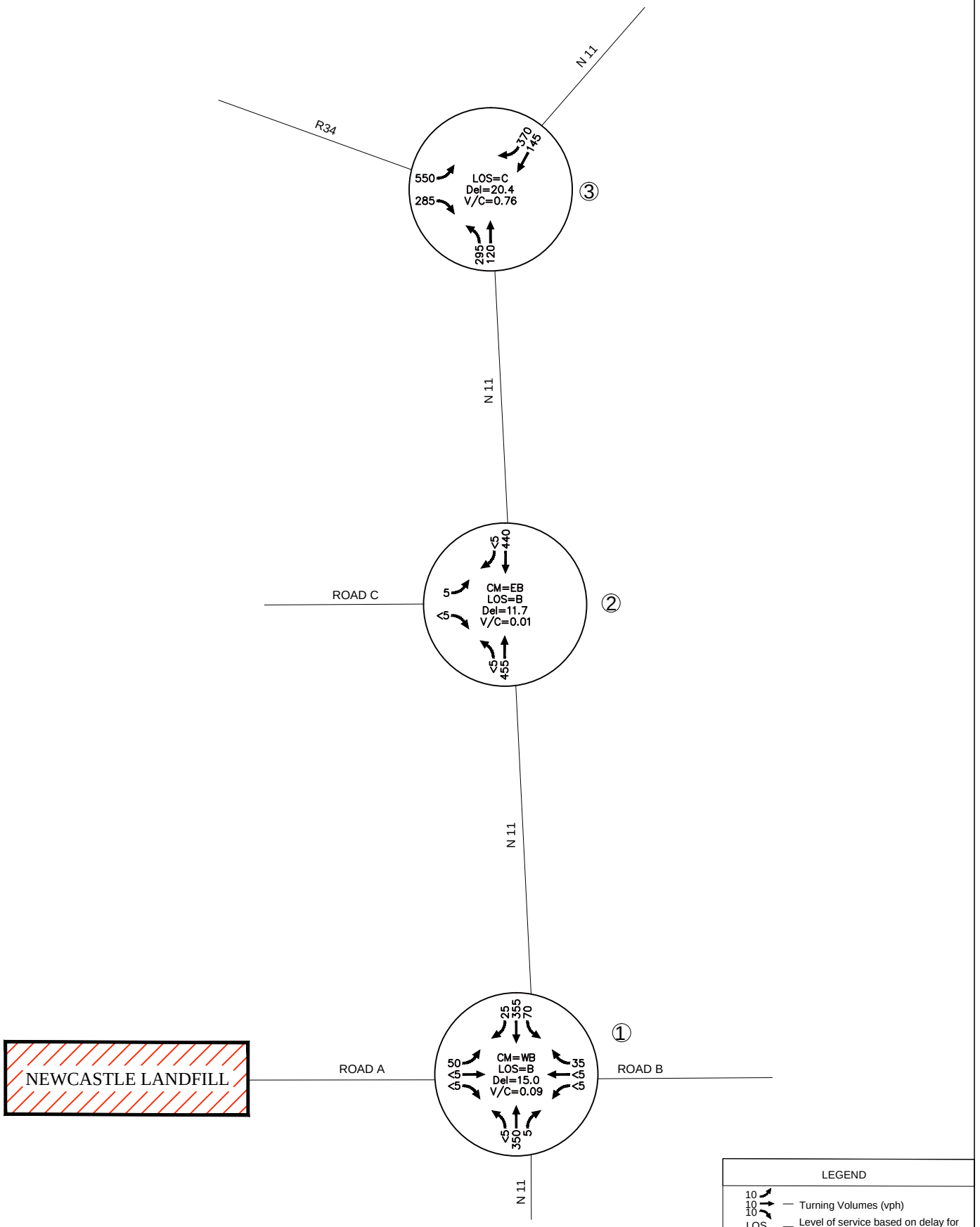
SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 3A: 2026 PROJECTED AM PEAK HOUR TRAFFIC VOLUMES AND DEVELOPMENT TRAFFIC CAPACITY ANALYSIS RESULTS	13



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SCHEMATIC FIGURE

PROJECT:	FIGURE:	NUMBER:
NEWCASTLE LANDFILL - TRAFFIC IMPACT STUDY	SCENARIO 3B: 2026 PROJECTED PM PEAK HOUR TRAFFIC VOLUMES AND DEVELOPMENT TRAFFIC CAPACITY ANALYSIS RESULTS	14

Annexure B

Qualifications of the specialist

Ivandra Juisse Udoyen Pr.Eng

Director: Koleko Solutions (Pty) Ltd

Email: ivandrau@koleko.co.za

Cell: +27 83 988 1734

Career Summary

Mrs Udoyen is a civil engineer with over 13 years of experience in the transportation and traffic engineering sector. She has extensive experience in transportation planning, intelligent transportation systems, traffic management , traffic impact studies, traffic safety studies, traffic calming, parking studies traffic modelling, conceptual geometric design, traffic surveys, freight studies, road network planning studies (roads masterplanning and freight network planning), preliminary and detailed design, site supervision and general project administration and coordination . Countries of work experience include South Africa, India, Mozambique, Angola and Kenya.

She is proficient in a range of transport software modelling applications including HDM4, SATURN, PARAMICS, TRACKS, SIDRA, TRAFFIX and HCM2000.

Personal Details

Date of birth: 20 August 1981

Nationality: Mozambican

Residence: Midrand, Johannesburg, South Africa

Professional Qualifications

Education and Training

Year	Institution	Qualification
2004	University of Cape Town	BSc Civil Engineering

Professional Memberships

Status	Organization	Registration Number	Registration Date
Professional Engineer	Engineering Council of South Africa	20150159	2015
Member	South African Institution of Civil Engineering	2011857	2011

Employment record

Period	Employment Organization	Position	Country
September 2014 - to present	Koleko Solutions (Pty) Ltd	Director	Gauteng, South Africa
May 2012 - August 2014	WSP Group Africa (Pty) Ltd	Senior Traffic And Transport Engineer	Gauteng, South Africa
February 2005 - April 2012	ITS Engineers (Pty) Ltd	Traffic And Transport Engineer	Gauteng, South Africa
December 2003 - February 2004	Conseng Ltd	Trainee	Maputo, Mozambique
December 2002 - February 2004	Gammon India (Pty) Ltd	Trainee	New Delhi, India

Selected Relevant Experience

Project Experience

Date	Project	Contract amount (Fee value)	Project role and description	Client
2017-to date	City of Tshwane A Re Yeng (ARY) Systems Planning	(R10,000,000.00)	Lead Systems Planning technical advisor – Manage the systems planning workstream, provide technical support to the systems planning workstream, prepare operational plans, design the overall system, investigate alternatives to optimize the current system, plan for the next phases of the ARY system.	City of Tshwane
2016	City of Tshwane A Re Yeng (ARY) Systems Planning	(R1,000,000.00)	Lead Systems Planning technical advisor – provide technical support to the systems planning workstream, prepare operational plans, design the overall system, investigate alternatives to optimize the current system, plan for the next phases of the ARY system.	City of Tshwane
2015	R555, R579 Road Safety Assessment	(R468,000.00)	Transport engineer - evaluate the road safety risks and propose implementation measures to improve Non-Motorized Transport (NMT) safety, without excessively compromising the mobility function of the routes.	SANRAL
2014	Forest Hill Development Traffic Impact Assessment	(R 90,000)	Traffic Engineer - Assess the impact of the traffic to be generated due to the future expansion of the Forest Hill Shopping Centre. The study considered area wide transport solutions, givens the rapid development of the centurion region.	Billion Group

Date	Project	Contract amount (Fee value)	Project role and description	Client
2015 – to date	City of Tshwane (CoT) Integrated Rapid Public Transport Network (IRPTN) – Parking Strategy	(R 300,000)	Traffic Engineer – Develop parking strategies and management plans for the CoT's rapid public transport network. The study identifies suitable locations for park and rise facilities at the IRPTN trunk stations.	City of Tshwane (CoT)
2015 – to date	City of Tshwane Integrated Rapid Public Transport Network – Non Motorised Transport (NMT)Strategy	(R 400,000)	Project Leader – Develop a NMT integration plan for the CoT IRPTN operational plan. The study proposed strategies to integrate pedestrian walkways and cycle routes with the IRPTN trunk stations (including BRT stations).	City of Tshwane (CoT)
2014 – to date	Shamba-Sonke	R 2 million	Work Package leader - The Shamba-Sonke programme launched in April 2011, is dedicated to road maintenance on secondary roads and rural roads, with particular emphasis on repairing potholes, using labour-intensive methods of construction and maintenance. Some of the tasks on the project include: assist in the monitoring and evaluation of the Shamba-Sonke Road Programme; assist in the oversight of the implementation of Provincial Roads Maintenance Grant (PRMG) and the Rural Roads Asset Management System (RRAMS) Grant. For more info visit: www.koleko.co.za/services/shamba-sonke	National Department of Transport

Date	Project	Contract amount (Fee value)	Project role and description	Client
2015	Linksfield development Comprehensive Public Transport Assessment	(R400,000)	Project Leader – Develop a comprehensive public transport strategy for the proposed Linksfield development which will potentially generate 3500 person trips in terms of public transport share. The comprehensive public transport assessment was done in line with the relevant City of Joburg public transport policies. The final recommendation entailed an integrated approach which included Gautrain, bus rapid transit (BRT), metro bus and mini-bus taxis, and non-motorised transport alternatives.	Century Property
2013 - 2014	Linksfield development traffic modelling, South Africa	(R 800,000)	Traffic Engineer and Project Coordinator – Develop a traffic model using Saturn, calibrate the model, analyse capacity of the intersections; prepared a roads masterplan; the preliminary roads design. Evaluate the road network from a capacity point of view; propose road upgrades and reporting. Furthermore the scope included integrated public transport planning.	Century Property
2012 - 2014	Tiger Brands Browsfield Mayonnaise Factory, South Africa	R 4 million	Civil Engineer and project coordinator – Bulk earth work design and site supervision for additional infrastructure required to accommodate a Mayonnaise production line in an existing Tiger Brands tomato sauce factory in Boksburg. Design and supervise the construction of a new parking area, a new access road, a new storage area, engineering services and relocate and existing weighbridge.	Tiger Brands

Date	Project	Contract amount (Fee value)	Project role and description	Client
2013-2014	Tiger Brands Industrial Factories alteration (Davita site and Isando site), South Africa	R 64,000	Traffic Engineer – Traffic impact assessment as a result of the alterations proposed at the two industrial sites.	Tiger Brands
2014	Riversands Roads Master Planning, South Africa	R 90,000	Traffic Engineer and project coordinator – Development of a roads masterplan for the Johannesburg northern region. This included a road network to accommodate the traffic demand of imminent developments in the area such as the Riversands development and Steyn City.	Century Property
2012 - 2013	Engen Platinum 1 Stop, South Africa	R 26 million	Resident Engineer – Road widening, construction of new off/on ramps from/to the N4 to/from the filling stations, installations of new services (stormwater, sewer, water, and pump and tank), upgrade of existing services, construction of parking areas, manage drawing register, wayleave applications, health and safety management, site inspections and quality control, site instructions, quality control and payment certificate.	Engen Petroleum Ltd
2012-2013	Steyn City Traffic Simulation and Roads Master Planning, South Africa	(R 500,000)	Traffic Engineer – Update of the Steyn City traffic model, evaluate road network, and propose road upgrades.	Steyn City
2014	Riverside View x 27	(R 35,000)	Traffic Engineer – Assessment of the impact of a new self-storage facility.	Urban Dynamics

Date	Project	Contract amount (Fee value)	Project role and description	Client
2013	Riversands development traffic modelling, South Africa	(R 133,000)	Trafiic Engineer - Update of the Steyn City traffic model to include the Riversands development, calibrate the model, analyse capacity of the intersections, evaluate the road network, propose road upgrades and report writing.	Century Property
2013	Chartwell North Estates road closure application	R 48,000	Traffic Engineer: Evaluate the impact of road closures which were proposed to improve security in the estate.	Chartwell North Estates Association
2013	Pemba Port Masterplan Phase I, Mozambique	(R 800,000)	Traffic Engineer – Plan a logistic base in Pemba (Mozambique) for the offshore supply vessels, pipe spooling or dry docking. Identify current transport demand in Pemba (i.e. by air, sea, roads, rail and pipeline) and propose a transport masterplan which catered for the current demand transport in Pemba and those of the new logistic base.	Empresa Nacional de Hidrocarbonetos (ENH)
2013	Cedar Square Church Traffic Impact Study, South Africa	(R 40,000)	Traffic Engineer – Evaluate traffic impact of a new church to be located at Cedar Square in Fourways.	City Life Church
2012	Investec Diepsloot Shopping Centre Parking study for the proposed development, South Africa	(R 35,000)	Traffic Engineer –Motivate the reduction of parking requirement based on historical data of parking utilisation at development of similar nature.	Investec

Date	Project	Contract amount (Fee value)	Project role and description	Client
2013	Tumela Central Shaft Traffic Impact Assessment, South Africa	(R 68,000)	Traffic Engineer – Traffic impact assessment for a new Anglo shaft in Rustenburg. Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, propose mitigating measures and attend public meetings.	Anglo Platinum
2013	Anglo Platinum Waterval Tailings Storage Facilities Traffic Impact Assessment, South Africa	(R 36,000)	Traffic Engineer – Traffic impact assessment for a new Anglo mine in Rustenburg.	Anglo Platinum
2012	Tete Power Plant Traffic Impact Assessment, Mozambique	(R 85,000)	Traffic Engineer – Traffic impact assessment for a new power plant in Moatize, Mozambique.	Parsons Brinckerhoff Africa
2012	East Rand Retail Park Rezoning Application Parking study, South Africa	(R 35,000)	Traffic Engineer –. Motivate the reduction of parking requirement based on historical data of parking utilisation.	East Rand Retail Park
2012	Nairobi Hospital Road Network, Kenya	(R 68,000)	Traffic Engineer – Traffic impact assessment of for the expansion of Nairobi Hospital. Roads planning, Internal circulation and parking	Howard Humphreys (East Africa) Limited – Consulting Engineers
2012	Pomona Shopping Centre X183 Traffic Impact study, South Africa	(R 39,000)	Traffic engineer – Traffic impact study following the four step traffic model. Conceptual road upgrades and cost estimates.	Cross Atlantic Properties 65 (Pty) Ltd
2012	Tlhabane Village parking study, South Africa	(R 25,000)	Traffic Engineer – Parking Study for the proposed development. Motivate the reduction of parking requirement based on historical data of parking utilisation	Retail Africa (Pty) Ltd

Date	Project	Contract amount (Fee value)	Project role and description	Client
2012	City of Johannesburg parking management study, South Africa	(R 240,000)	Project manager - Literature review (local and international) on parking management strategies, identification of parking strategies, parking reduction factors, update the Draft Consolidated Town Planning Scheme (2010), propose guidelines for the implementations of new parking management strategies.	City of Johannesburg
2010	2010 FIFA World Cup Transportation Event Management, Managing the City of Johannesburg (CoJ) Park and Ride, Park and Walk and Bus Rapid Transit (BRT) Stations, South Africa	(R 7 million)	Project Manager - Management of the parking areas, public transport routes (along the BRT lanes),public transport drivers (bus and taxi drivers), implementing crowd control techniques, liaison with Metro Police, SAPS, Disaster Management and other role players, management of volunteers, daily statistics reports, press releases for media purposes (pamphlets, daily report to radio stations such as ticket sales report and routes to be taken) transport arrangements for disabled spectators, transport and crowd management at the pick-up points at the stadium and the after action report writing.	City of Johannesburg

Date	Project	Contract amount (Fee value)	Project role and description	Client
2009 - 2010	2010 FIFA World Cup City of Johannesburg (CoJ) Stadium Precinct Planning, Operational Planning, Traffic modelling and Public Transport Planning, South Africa	(R 1.5 million)	Project Manager - Liaison with various role players (such as COJ Transportation, COJ 2010 Office, Local Organising Committee, National Department of Transport, Metrorail, Bus Rapid Transit (BRT), Metrobus, Taxi association, meter taxi associations, SAPS, Metro Police, Sandton Business association), travel demand models to estimate the number of spectators per game, fleet requirement, ticket sales per match, mode of transport required and frequency of service), route determination, travel surveys, risk assessment, travel estimate costs, transportation management strategies during the event (integration of the available modes of transport: Gautrain, Metrorail, BRT Metrobus, mini-bus taxis and metered taxis), operational and logistical arrangements, report writing.	City of Johannesburg
2009	South African National Roads Agency Western Region Road Safety Management System, South Africa	(R 1 million)	Project Engineer - Develop methodology for collecting road safety data, managing the data system and prioritizing rehabilitation projects (through strategic safety programmes). Assistant Project Manager - Project administration, client liaison and role players such as the routine maintenance consultants, report writing.	South African National Roads Agency

Date	Project	Contract amount (Fee value)	Project role and description	Client
2009	5'oclock Development Master Planning, Road network planning and public transport planning (Rail and Bus Rapid Transit), South Africa	(R 150,000)	Traffic Engineer – Traffic impact assessment, roads masterplanning, conceptual design of an intermodal facility to serve the development, cost estimates, Design of an access interchange (Kruger Avenue /N1 interchange).	M&T Development
2008	Rustenburg 2010 Transportation Operational Plan, Stadium precinct planning, operational planning, traffic modelling and Public Transport Planning, South Africa	(R 800,000)	Project Engineer - Determining routes to be used by various constituent groups, risk assessment, estimate costs, estimate public transport demand in 2010, implementation of transportation management strategies to support the existing road network, operational and logistical arrangements, meetings with the local municipalities and report writing.	Rustenburg Local Municipality
2007 - 2008	Park and Ride Service leading up to FIFA 2010 World Cup Event, South Africa	(R 500,000)	Project Engineer – Operational and logistical arrangements implement and monitor the park and ride sites, meeting with the client, and report writing, costing, public transport planning, contract documentation (between the City and the owner of the transport venue), strategic integration of the Rea Vaya system, the rail system and the park and ride/park and walk system.	City of Johannesburg

Date	Project	Contract amount (Fee value)	Project role and description	Client
2006 - 2007	Intelligent Transportation System along the N1 Ben Schoeman, M1, N3, N12, N17 and M2 Freeways in Gauteng, South Africa	(R 55 million)	Resident Engineer - Site supervision on the civil works, traffic accommodation, inspections.	South African National Roads Agency
2005 - 2006	Midrand Traffic Modelling, South Africa	(R 180,000)	Traffic Modeller - Setting up the Tracks model, calibrate the model, analyse intersections, evaluate road network, and propose road upgrades.	City of Johannesburg
2006	Travel Demand Management around the Braamfointein and the Sunninghill areas in Johannesburg, South Africa	(R 1 million)	Project Engineer - Operational and logistical arrangements, implement and monitor the travel demand strategy, implement and monitor the ride-smart programme, meeting with the client, report writing.	Department of Transport and City of Johannesburg
2005	N1Traffic modelling study on the N1 from Lynnwood Road interchange in the north up to Rigel Avenue in the south, and adjacent intersections, South Africa	(R 250,000)	Traffic Modeller - Setting up the Paramics model, calibrate the model, analyse capacity of the intersections, evaluate the different road network, propose road upgrades and report writing.	City of Tshwane Metropolitan Municipality

Date	Project	Contract amount (Fee value)	Project role and description	Client
2005	K109 Olievenhoutbosh Traffic Modelling, South Africa	(R 150,000)	Traffic Modeller - Setting up the Paramics model, calibrate the model, analyse capacity of the intersections, evaluate the road network, propose road upgrades and report writing.	City of Tshwane Metropolitan Municipality
2005	Maugaug Traffic Modelling for the Central University of Technology security problems and President Brand Street pedestrian crossing problems, South Africa	(R 130,000)	Traffic Modeller - Setting up the Tracks model, calibrating the model, analysing the capacity of the intersections, evaluating the road network, proposing road upgrades where necessary and report writing.	Mangaung Local Municipality
2005	N4 Roadside Traffic survey for toll traffic modelling project, South Africa	(R 1 .5 million)	Assistant Engineer - Organize the traffic counts, liaise with local traffic police department, traffic survey supervision, analyse survey results and report writing.	TRAC

Date	Project	Contract amount (Fee value)	Project role and description	Client
2010	Project Mafutha Transport Impact Assessment, Feasibility of establishing a large scale mining and Coal-to-Liquids industrial complex with supporting infrastructure in the Lephalale area of the Limpopo Province, South Africa	(R 850,000)	Assistant Engineer - Revision of existing transport planning in the area (ITP, SDP, NLTA) capacity and level of services on the affected routes and intersections, determining delays and safety investigation at access points and road intersections, road safety investigation, investigating possible extension of the existing rail line to serve the proposed development; assessment of public transport operations (routes, capacity, user need, existing facilities, intermodal facilities)	Sasol
2011	Updating of the Freight Databank in alignment in order to estimate and assess the future demands of freight on the Gauteng transport system, South Africa	(R 1.1 million)	Project manager - Collect information, improve current data collection methodologies and reporting tools, develop data storage system, determine future modal distribution of inter and intra-provincial freight movements and any significant modal, provincial and industry trends as well as any imbalance of directional freight flows.	Gauteng Department of Roads and Transport
2011	Maputo traffic Management Centre, Mozambique	(R 120,000)	Project Engineer: Preparation of terms of reference and the supporting tender documentation for the Maputo traffic Management Centre (Mozambique).	Maputo Municipality
2004	Construction of a Flyover in New Delhi, India	(R 30 million)	Engineer in training Vacation work - Quality control tests, geometric control of short and long line bed (calculations) and sieve analyses test control	New Delhi Transport Department

Awards and Publications

1999	Participation and Achievement in Olympia Mathematics and Science, ColegioKitabu (Mozambique)
2004	Best Undergraduate Thesis, Civil Engineering Department, University of Cape Town
2004	Best Undergraduate Final Group Project, Civil Engineering Department, University of Cape Town
2011	2010 FIFA World Cup™, Lessons Learnt, Presented at the South African Annual Transport Conference

Languages

Languages	**Speak**	**Read**	**Write**
English	Excellent	Excellent	Excellent
Portuguese	Excellent	Excellent	Excellent
Spanish	Fair	Fair	Fair

UNIVERSITY OF CAPE TOWN

we certify that

Ivandra Leonor Carlos Juisse

was admitted to the degree of

Bachelor of Science in Engineering
in Civil Engineering

on 6 December 2004

SUID-AFRIKAANSE POLISIEDIENS
STASIE KOMMISSARIS
2004 -12- 08
STATION COMMISSIONER
MOWBRAY
SOUTH AFRICAN POLICE SERVICE

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Datum/Date ..... Handtekening/Signature ..... Rang/Rank .....

Vice-Chancellor

Hugh Amoore
Registrar

Engineering Council of South Africa

This is to certify that ***Ivandra Leonor Carlos Juisse***

is registered as *Professional Engineer*

in terms of the Engineering Profession Act, 2000
(Act No. 46 of 2000)

Date *4 May 2015*

Registration Number *20150159*

President

Chief Executive Officer

Engineering Council of South Africa
ECSA

The South African Institution of Civil Engineering

This certifies that

Ivandra L C Juisse

is duly elected as

Associate Member

Member no: 2011857

of

The South African
Institution of Civil Engineering

on

6 June 2011

Issued under the seal of the Institution
Under resolution of the Council

President

Chief Executive Officer

Claire Birungi

Transportation and Traffic Engineer

Email: claireb@koleko.co.za

Cell: +27 784366154

Career Summary

Ms Birungi is a civil engineer with four years' experience in the design, planning and management in the road transport sector. The areas of experience include: transport planning, public transport infrastructure design, non-motorised transport, transport modelling, transport surveys using technology and traffic engineering studies. Countries of work experience include South Africa, Uganda and China.

She is proficient in several traffic engineering and transportation planning software packages including SIDRA, TRAFFIX, AutoCAD, ArcGIS, Omnitrans, Quandstone Paramics, Biogeme, and Commuter.

Personal details

Nationality: Ugandan

Residence: Johannesburg, South Africa

Professional Qualifications

Education and Training

Year	Institution	Qualification
2016	University of Cape Town	MSc. Civil (Transport Engineering and Planning)
2014	University of Cape Town	BSc. Civil Engineering

Professional Memberships

Status	Organisation	Registration Number	Registration Date
Candidate Engineer	Engineering Council of South Africa	201650383	2016
Associate Member	South African Institution of Civil Engineering	201300719	2013

Employment record

Period	Employment Organization	Position	Country
October, 2017 – To date	Sustainable Low Carbon Transport (SLoCaT)	Research assistant	Shanghai, China
January 2016 - To date	Koleko Solutions Pty Ltd	Transport and Traffic Engineer	Johannesburg, South Africa
March 2016 – June 2017	Health Bridge - Canada	Liveable city consultant	Kampala, Uganda
July 2015 – September 2016	University of Cape Town	Research Assistant	Cape Town, South Africa
November 2012 – February 2013	Uganda National Roads Authority	Trainee	Kampala Uganda
June 2011 – August 2011	Roko construction Ltd	Trainee	Kampala, Uganda

Selected Relevant Experience

Project Experience

Date	Project	Contract amount (Fee value)	Project Role and Description	Client
2017	Design Build Operate & Management (DBOM) of the Freeway Management System, South Africa	(ZAR 200,000)	Transportation Engineer - Design, Build, Operate and maintain the freeways in Gauteng Province. Investigate various alternatives to reduce congestion and increase safety on the freeways in Gauteng Province. This included accident hotspot analysis, lane use restrictions for trucks, geometric upgrades to improve safety, pedestrian bridges and barriers to reduce accidents involving pedestrians.	Teti Traffic/SANRAL
2017	Provincial Road P321 Traffic Study and Network Analysis	(ZAR 80,000)	Traffic Engineer - Traffic impact assessment and Network Analysis for upgrading the P321 located in Greytown Kwazulu-Natal Province. Site visit, traffic data analysis, Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, and propose requirements for the road geometric upgrade.	VNA Consulting Engineers

Date	Project	Contract amount (Fee value)	Project Role and Description	Client
2017	Provincial Road P749 Traffic Study and Network Analysis	(ZAR 90,000)	Traffic Engineer - Traffic impact assessment and Network Analysis for upgrading the P321 located in Umzimkhulu Municipality in Kwazulu-Natal Province. Site visit, traffic data analysis, Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, and propose requirements for the road geometric upgrade.	VNA Consulting Engineers
2017	City of Tshwane (CoT) integrated rapid public transport network (IRTPN) operational plan: Parking strategy	(ZAR 120,000)	Transport Engineer - Reviewing, restructuring and updating of the report.	City of Tshwane, South Africa
2017	Road Infrastructure planning Manual	(ZAR 400,000)	Transport Planner - Review of the planning manual. Literature review on planning processes involved in transportation project deliver cycle as stipulated by the SIPDM.	KwaZulu Natal Department of Transport, South Africa
2017	Shangoni Gate – Kruger National Park Traffic statement	(ZAR 35,000)	Traffic Engineer – Traffic impact statement for an additional gate to allow traffic into the Kruger National Park. Assessment of diverted traffic from the existing Punda Maria and Phalaborwa gates. The study entailed quantifying the traffic impact, determining the impact significance, and propose mitigating measures.	Envirolution Consulting
2017	Materials Recovery Facility Traffic study	(ZAR 70,000)	Traffic Engineer - Traffic impact assessment for waste materials recovery facility located South of Johannesburg. Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, propose mitigating measures and meeting with JRA for project and report approval.	Stafford MRF (Pty) Ltd
2017	K57 Traffic Study	(ZAR 80,000)	Traffic Engineer - Traffic impact assessment for the proposed K-Route K57. Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, and propose the required road upgrades and mitigating measures.	Zimile consulting Engineers
2017	Eloff Coal Mine Traffic Impact Assessment	(ZAR 80,000)	Traffic Engineer - Traffic impact assessment for a new Anglo shaft in Mpumalanga Province. Identification of possible traffic impact, quantify the traffic impact, determine the impact significance, propose mitigating measures and attend public meetings	GCS Water and Environmental Consultants

Date	Project	Contract amount (Fee value)	Project Role and Description	Client
2016-2017	Walkability in Kampala slums, Uganda	(USD 5000 - ZAR 70,000)	Project Leader - Liveable city consultant and Project Coordinator – Develop a mobile phone survey, meet with consultants in International slum dwellers association, conduct the survey, data analysis in ArcGIS, Reporting and writing an article on the project.	Health Bridge, Canada

Awards, Achievements and Publications

2017	Facilitating Transportation Visibility at the United Nations Framework Convention on Climate Change (UNFCCC) at COP23 in Bonn, Germany.
2017	SATC conference paper: Case study investigation of unscheduled feeder and scheduled trunk relationship in Cape Town
2017	Speaker and Presenter at the i-Transport UATP ITS South Africa conference
2016	Assistant facilitator at Indaba Mobility conference: #COCREATE and Rethinking mobility in Cape Town
2016	Participant at Mobilize Summit: ITDP-VREF conference in Yichang, China
2015	Most outstanding postgraduate faculty student leader, University of Cape Town
2015	Volvo Research and Education Foundations scholarship, University of Cape Town
2015	Member of the Centre for Transport Studies Advisory Board, University of Cape Town
2008	Hard work and consistency award: Nabisunsa Girls' School

Language proficiency

Languages	Speak	Read	Write
English	Excellent	Excellent	Excellent
French	Fair	Fair	Fair

References

1. A/Prof. Mark Zuidgeest
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   EBE
   University of Cape Town
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   mark.zuidgeest@uct.ac.za

2. Mr. Robbie Mutyaba
   Transport Engineer,
   World Bank
   Georgia
   Tel: + 1 202 817 5667
   rmutyaba@worldbank.org

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad

We certify that

Claire Birungi

was admitted to the degree of

Bachelor of Science in Engineering in Civil Engineering

on 14 December 2015

Vice-Chancellor

Registrar

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad

We certify that

Claire Birungi

was admitted to the degree of

Master of Science in Engineering
specialising in Civil Engineering

on 14 July 2017

Vice-Chancellor

UNIVERSITY OF CAPE TOWN MDCCCXCIX

Royston Pillay

Registrar

Engineering Council of South Africa

This is to certify that *Claire Birungi*

is registered as *Candidate Engineer*

in terms of the Engineering Profession Act, 2000
(Act No. 46 of 2000)

Date *19 April 2016*

Registration Number *201650383*

President

Chief Executive Officer

Engineering Council of South Africa
ECSA

THE SOUTH AFRICAN INSTITUTION OF CIVIL ENGINEERING

Est 1903

This certifies that

Claire Birungi

is duly elected as

Associate Member

Membership Number: 201300719

of

The South African Institution of Civil Engineering

on

23 June 2017

Issued under the seal of the Institution
Under resolution of the Council

President
Sundran Naicker PrEng

Chief Executive Officer
Manglin Pillay PrEng

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