Traffix Group

Traffic Engineering Assessment

Proposed Quarry Expansion

60 Valley Road & 150 Quarry Road, Langwarrin

Prepared for
Heidelberg Materials

June 2025

G34433R-01B

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Document Control

Our Reference: G34433R-01B

Issue No.	Type	Date	Prepared By	Approved By
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B	Final	23/06/2025	J. Mitropoulos & M. O'Shea	M. O'Shea

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1. Introduction

Traffix Group has been engaged by Heidelberg Materials to undertake a traffic engineering assessment for a proposed quarry expansion at 60 Valley Road & 150 Quarry Road, Langwarrin.

2. Proposal

The application seeks to expand sand extraction operations that have previously occurred within 150 Quarry Road, Langwarrin into the site at 60 Valley Road, Langwarrin. The processing and distribution of the extracted sand resources will continue to occur via the site at 150 Quarry Road.

Operating Hours

- Operating hours of the quarry include:
- Monday to Friday – 7:00am to 6:00pm.
- Saturday – 7:00am to 7:00pm.
- Sunday and Public Holidays – No Activity.

Staff and Visitor Demands

The expanded quarry operations will require a total of 10 staff during peak operation, representing an increase of 4 compared to the existing conditions. Staff would consist of operational staff undertaking quarrying activities in addition to administration activities.

The number of visitors to the site is minimal with no more than 1-2 visitors occurring at any one time.

All staff and visitor access will occur through the existing light vehicle crossover from Quarry Road (Central Crossover).

Site Access

Vehicle access to the site (includes existing Quarry Road site and expanded Valley Road site) for all heavy vehicle, staff and visitors is to be provided through the existing vehicle crossovers to Quarry Road. No changes to the vehicle crossover are proposed as part of the application.

A summary of the existing crossovers onto Quarry Road and operation as it relates to the proposed use is provided as follows:

- Southern Crossover – Quarry Heavy Vehicle Access
  - Provides for all entry and exit movements associated with heavy vehicles accessing the quarry operations.
  - Provides for exit movements (right-out) associated with land remediation operations.
  - 9m clear opening at gate.
  - 20m clear width at edge of splays to Quarry Road.

- Central Crossover – Light Vehicle Access
  - Provides for all entry and exit movements associated with light vehicles accessing the quarry operations.
  - 4m clear opening at gate (single lane two-way driveway).
  - 16m clear width at edge of splays to Quarry Road.
- Northern Crossover – Heavy Vehicle and Light Vehicle Access
  - Provides for all entry movements associated with light and heavy vehicles accessing the land remediation activities.
  - Provides for left-out only movements. Right-out movements directed towards the southern heavy vehicle crossover.
  - Site manager of land remediation advised during site visit that removal of right-out movements has occurred as an operational decision to ensure that conflicts between entering and exiting vehicles can be better managed.
  - It was evident during the site inspection that trucks turning left-out of the site at this location are mounting the inside corner of the crossover.
  - 7m clear opening at gate.
  - 16m clear width at edge of splays to Quarry Road, splay for left-in larger compared to left-out splay.

Aerial photographs identifying the existing vehicle access locations from Quarry Road is provided at Figure 1 to Figure 3.

Figure 1: 150 Quarry Road – Vehicle Access Locations

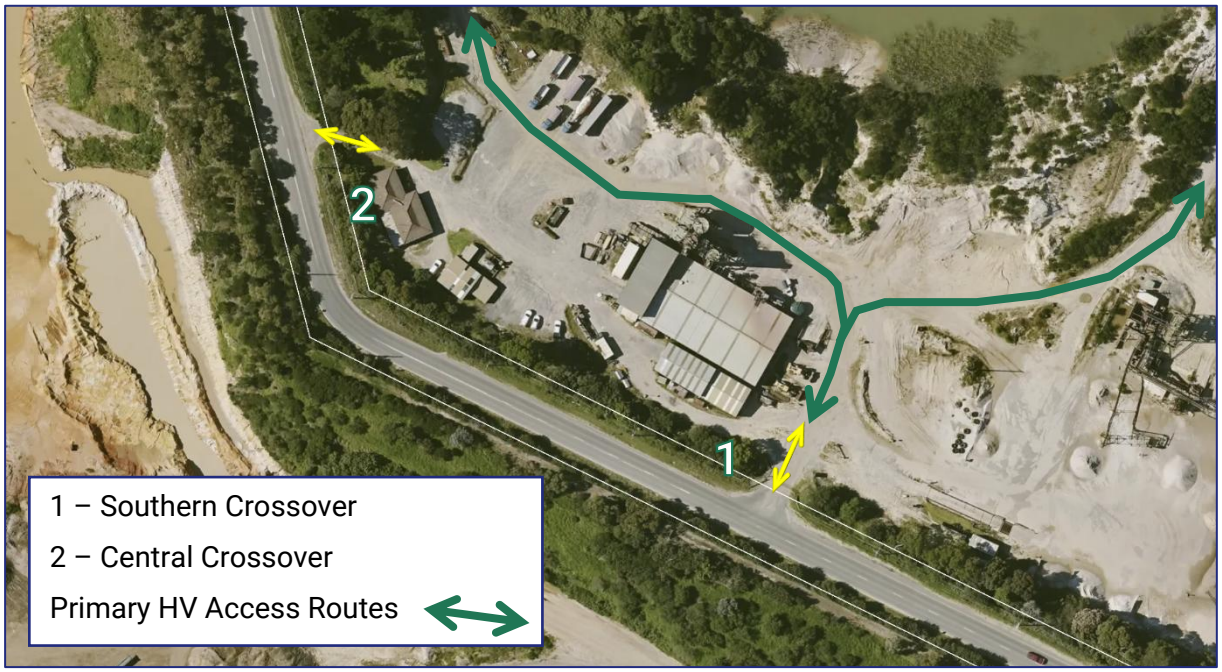


Figure 2: Central Crossover and Southern Crossover – Quarry Access

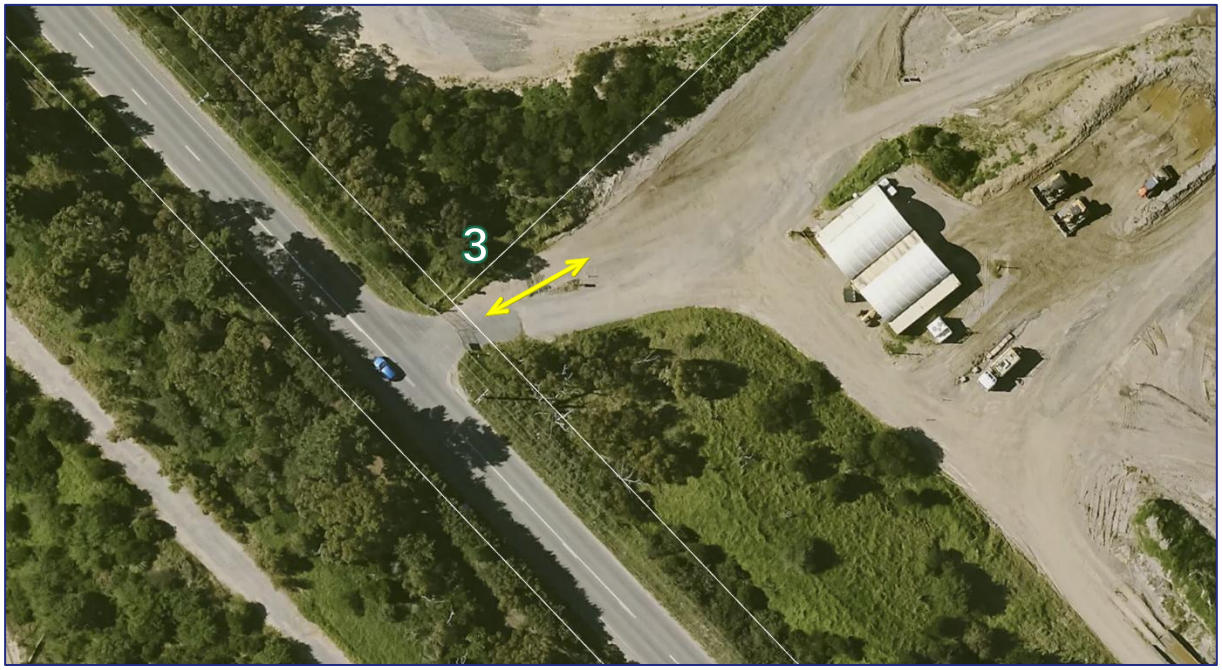


Figure 3: Northern Crossover – Site Remediation Access

Photographs of each vehicle access point from Quarry Road are provided in the following figures.

Figure 4: Quarry Road - Southern Heavy Vehicle Access – Quarry Access

Figure 5: Quarry Road - Northern Vehicle Access – Remediation Access

Valley Road Crossovers

Two existing vehicle crossovers from the site to Valley Road are available.

No access to the eastern crossover will occur in association with the existing or ongoing quarry operations.

The western crossover may be used to providing access to the rear boundary of the site. The western crossover would only be used by small maintenance vehicles or emergency vehicle access only. No amendments to this crossover are proposed as part of the development.

A photograph that identifies the western crossover is provided in the figure below.

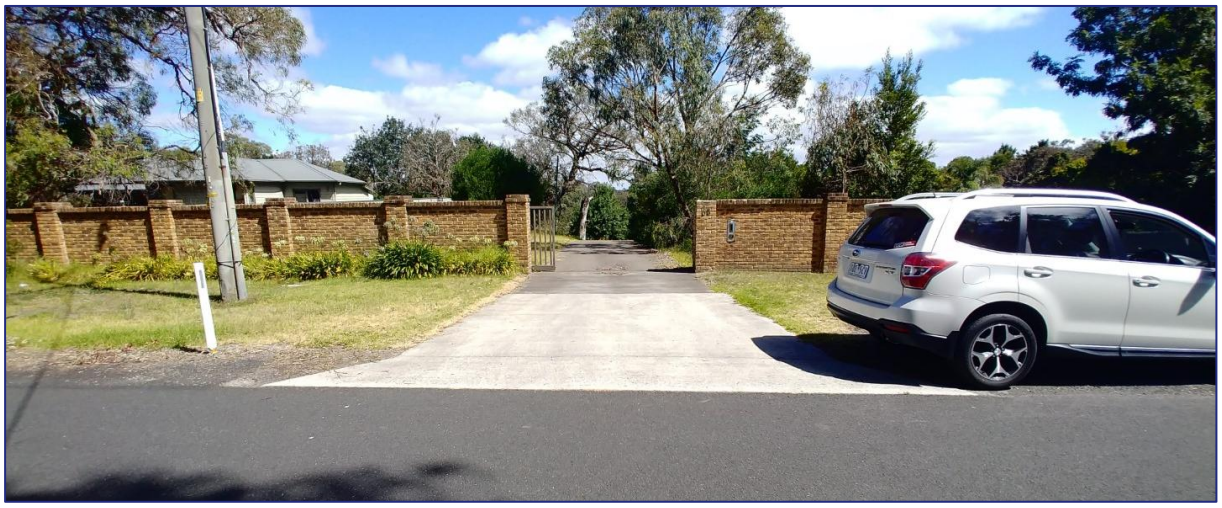


Figure 6: Valley Road - Western Vehicle Access – Maintenance/Emergency Access

Internal Vehicle Access

Internal access will be available for the transfer of quarried materials from the Valley Road Site to the Quarry Road existing quarry without the use of the public road network.

The internal access roads will provide circulation for suitable service vehicles (i.e. dump trucks etc) and excavation equipment.

This arrangement is standard practice for quarrying activities. The existing Work Authority provides the relevant controls around the internal vehicle access network.

Traffic Generation – Quarry

Advice from the applicant is that the level of traffic generated from the site under the proposed conditions will be similar to that generated during 2018 when sand extraction was most recently undertaken from the existing quarry.

During the 2018 period the site generated truck traffic associated with three separate operations, including:

- Clean fill import (site remediation),
- Sand drying, and
- Sand extraction.

While the sand drying operations and fill import activities are presently undertaken from the site no sand extraction currently occurs. The proposed quarry operation from 60 Valley Road will enable the extraction activities (and associated truck movements) to recommence.

A detailed analysis of the previous traffic generation profile is provided within report.

Traffic Generation – Remediation

The existing quarry site is currently undergoing remediation works that involve the delivery of clean fill. These operations will continue noting that they apply to parts of the site at 150 Quarry Road where sand deposits have been exhausted.

This activity on the site is managed and operated by a separate entity and will not be impacted by the expanded sand extraction operations.

Car Parking

Car parking for staff and visitors will be accommodated around the office and machinery buildings in the southern part of the site. Some staff may on occasions park near the quarrying activity to be in close access to excavation equipment.

To formally identify the car parking opportunities near the office and machinery buildings Traffic Group have prepared car parking concept plans based on a current aerial photograph. This plan is attached at Appendix A and identifies no less than 15 car parking spaces in these areas.

3. Existing Conditions

3.1. Subject Site

The existing sand extraction and processing site is located at 150 Quarry Road, Langwarrin and operated by Heidelberg Materials. The proposal is to expand the operation to the adjacent property at 60 Valley Road, Langwarrin.

The sand extraction component at the site ceased operation in 2018 as the on-site resource was exhausted. Accordingly the current activities involve sand drying and processing. Sand is currently imported from external sites for this purpose.

The following tables below summarises the key characteristics of each of the sites that form part of the proposed operations.

Table 1: 150 Quarry Road, Langwarrin - Site Description

Subject Site	Notes
Address	150 Quarry Road, Langwarrin
Area	46.3ha (approx.)
Frontages	830m (approx.) to Quarry Road
Activity Centre	Site not located within a specific Activity Centre
Zoning	Special Use Zone - Schedule 2 (SUZ2)
Current use of site	Sand Extraction and Processing Site
Operating Hours	Above Ground Operations: • Monday – Friday: 7:00 am to 6:00 pm • Saturday: 7:00 am to 7:00 pm

Subject Site	Notes
	• Sunday and Public Holidays: Closed Source: WORK PLAN SPECIFIC CONDITIONS Work Authority WA13, dated 10th March 2022
Car parking arrangements	Informal parking opportunities are available within hardstand areas towards the south of the site.
Loading Arrangements	Accommodated on-site as required within various hard stand areas adjacent to site office buildings.
Vehicle access	Northern Crossover: • Serves heavy and light vehicles associated with site remediation activities. • Right-out movements not permitted. Central Crossover: • Serves light/passenger vehicles associated with quarry activities. Southern Crossover: • Serves heavy vehicles associated with sand extraction processing and material distribution operations. • Provides for right-out movements associated with land remediation activities.
On-street parking along site's frontage	No on-street parking opportunities along the site's frontage to Quarry Road.

Table 2: 60 Valley Road, Langwarrin - Site Description

Subject Site	Notes
Address	60 Valley Road, Langwarrin
Area	7.9ha (approx.)
Frontages	55m (approx.) to Valley Road
Activity Centre	Site not located within a specific Activity Centre
Zoning	Rural Conservation Zone - Schedule 2 (RCZ2)
Current use of site	Dwelling and various outbuildings

Subject Site	Notes
Operating Hours	N/A
Car parking arrangements	Car parking provided for existing dwelling
Loading Arrangements	No formal on-site loading bay
Vehicle access	3.8m wide crossover towards eastern boundary (access to existing dwelling) 4.5m wide crossover towards western boundary (access to rear areas of the site)
On-street parking along site's frontage	No on-street parking opportunities along the site's frontage to Valley Road

A locality plan, aerial photograph and land use zoning map are provided at Figure 7 to Figure 9, respectively.

The subject site abuts other similar quarry uses, while residential uses are located to the north of the site and along Valley Road.

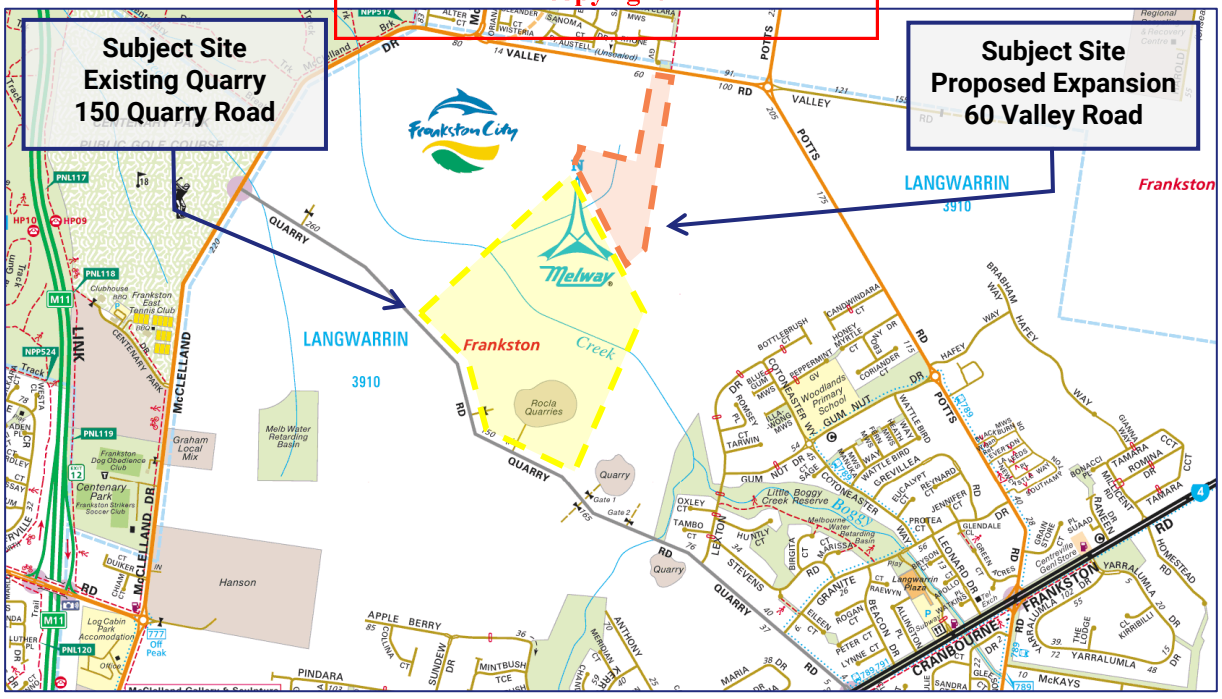


Figure 7: Locality Plan (Source: Melways)

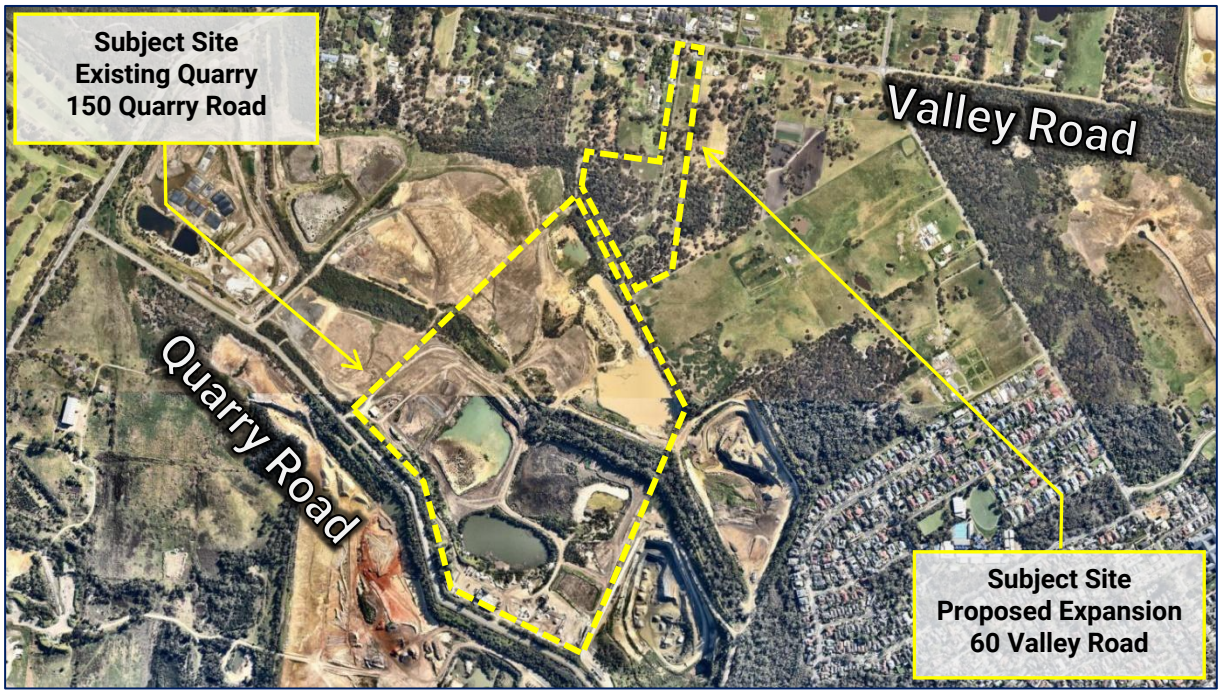


Figure 8: Aerial Photograph (Source: Nearmap)

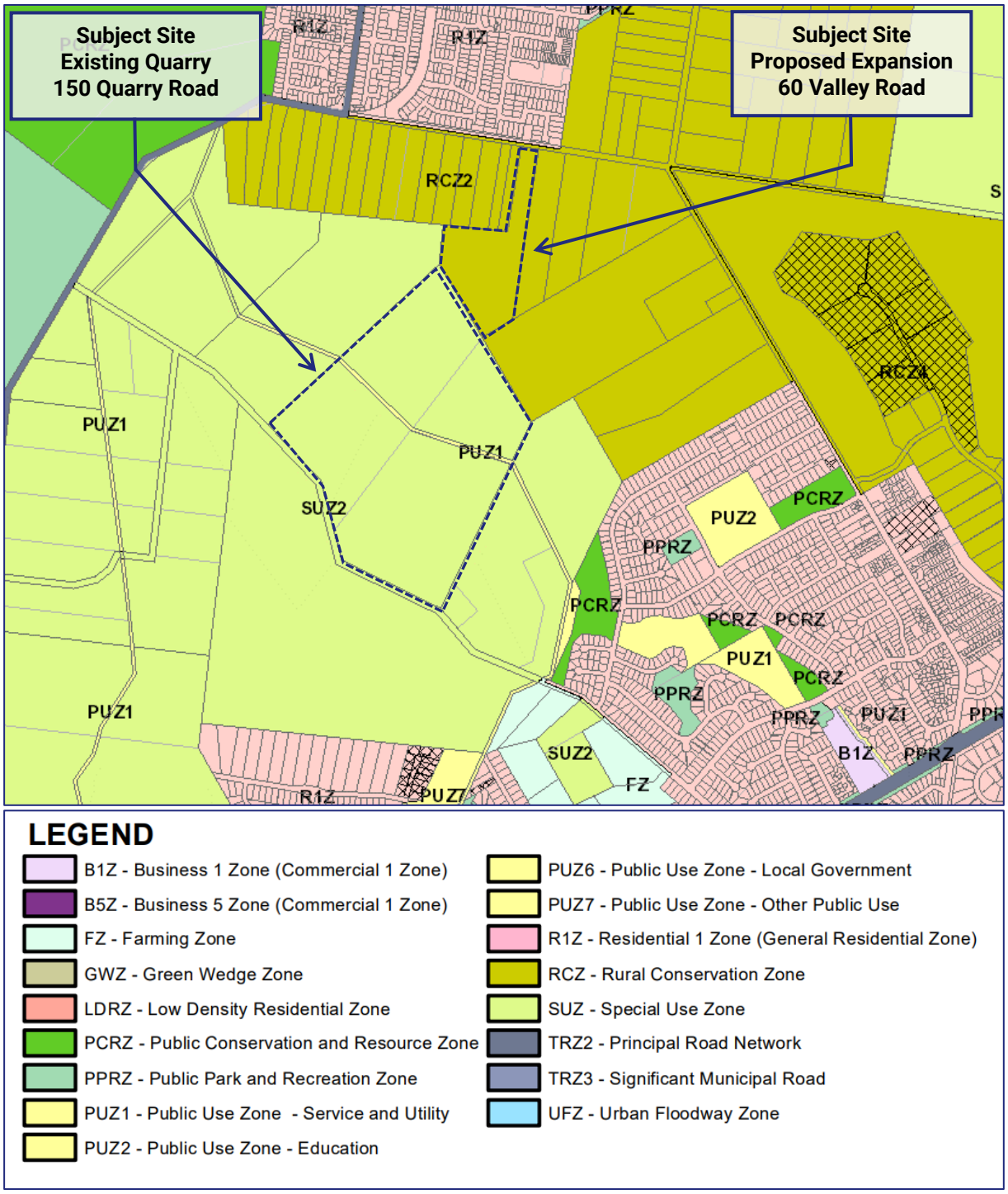


Figure 9: Land Use Zoning Map (Source: Vicplan)

3.2. Existing Planning Permit and Work Authority – 150 Quarry Road

Planning Permit 005 was issued on 8 May 2000 for the Hanson sand extraction operation at 150-190 Quarry Road Langwarrin. This permit allows for the land to be used and developed for extractive industry generally in accordance with Work Authority 13.

Conditions within the Work Authority 13 associated with traffic engineering matters are summarised as follows:

4 Internal Roads

4.1 Internal roads must be sited as approved or directed by an inspector after consultation with the relevant section of the Department of Natural Resources and Environment in the case of Crown land, and/or the Responsible Authority in the case of private land.

4.2 Any such road may be used:

(a) by officers of, or persons authorised by any of the relevant sections of the Department of Natural Resources and Environment or employees or persons engaged in fire control:

(b) by the landowners or their agents where the Work Authority convers private land.

4.3 The Wark Authority holder must ensure that all internal roads are properly formed, drained, surface treated and maintained to the satisfaction of an Inspector.

11 Dust Emissions

11.1 Dust control measures must be in place to minimise dust generation so that detriment is not caused to surrounding areas, residents and persons in and around the quarry.

11.2 Dust resulting from all operations including extraction, loading, transport and stockpiling must be controlled by the use of appropriate water sprays, dust extraction or dust proof enclosures. Spray and extraction systems are to be maintained in operable condition at all times.

21 Operation of Sand Drying Plant

21.1 The sand drying plan and associated activities can operate for 24 hours from Monday to Saturday inclusive.

21.2 The number of trucks to be despatched from the site between the hours of 10:00pm and 6:00am is restricted to six (6) and all trucks must access and leave the quarry via McClelland Drive only.

3.3. Nearby Commercial Uses

There are multiple sites in the nearby area that include similar land uses that generate some level of heavy vehicle movements over the nearby road network. This includes other active quarry sites and land remediation operations.

A summary of these land uses is provided in the following figure.

The traffic generation from these uses was captured within the traffic surveys of the wider road network undertaken by Traffix Group, as detailed at Section 4.4.3 of this report.

Figure 10: Nearby Quarry and Land Fill Uses

Nearby Similar Land Uses

Site 1 – 260-280 Quarry Road, Burdett's Quarry

Quarry products (soil, rock aggregates) and Fill Disposal

Site 2 – 230 Quarry Road, Quarry Road Rehabilitation

Quarry products (soil, rock aggregates) and Fill Disposal

Site 3 – 130 Quarry Road, Monk Resource Management

Quarry products (soil, rock aggregates) and Fill Disposal

Site 4 – 165 Quarry Road, Langwarrin Quarries

Quarry products (soil, sand, rock aggregates)

3.4. Historical Site Operations

3.4.1. Traffic Generation – Quarry Operations

A review of the historical truck movements generated from the quarrying activity has been undertaken based on data provided by Heidelberg Materials.

We have been advised by the quarry operator that the most relevant period of data that relates to both Sand Drying and Bagging and Quarrying Activity is 2018 calendar year.

The quarry extraction activity ceased towards the end of 2018 and as such there was a significant reduction in the total truck traffic from the site. The material that continued to be transferred from the site at the completion of the quarry extraction related to course material that is filtered out of the sand drying plant. After 2018 raw material was imported from external sites at Lang Lang and Yannathan prior to being filtered out and being distributed from the Langwarrin site.

Since 2018 the number of truck movements has been consistent as the volume of material imported and processed at the sand drying plant has been relatively consistent.

Analysis of the available data is provided as follows.

Stantec Assessment

The Stantec Engineering Assessment that accompanied a previous planning application to Council (Application No. 754/2022) and provided some analysis of 10 months traffic data (Quarry Operation Jan-Oct 2018, Site Remediation July 2021-April 2022). In summary, the Stantec analysis suggested that:

- Quarry Operations
  - 1,350 trucks per month
  - 60 trucks per day Mon-Fri
  - 30 trucks per day Sat
  - 5-6 trucks per hour peak volume
- Remediation Operations
  - 4,000 trucks per month
  - 180 trucks per day Mon-Fri
  - 21 trucks per hour peak volume

The above analysis is based on the number of trucks and the actual number of movements is double noting that trucks typically generate 2 movements for every site visit associated with entry and exit (i.e. 4,000 trucks per month = 8,000 trucks movements per month).

Traffix Group Data Review

We have undertaken a detailed review of the historical traffic impacts from the quarrying activity, in particular a review of hourly and daily variation in traffic impacts. The site operator provided truck data for the period between January 2016-April 2022.

Table 3 identifies the average, 85th percentile and maximum daily trucks accessing the site for each year of available data. As expected, the maximum truck movements occurred during 2017 and 2018 with these periods coinciding with the peak sand extraction activities.

The data also identifies that there is commonly variation in the daily volumes with some days generating more than double the average truck volumes.

Table 3: Daily Truck Generation – Quarry Operations (2016-2022)

Year	Daily Values (Trucks) - Mon-Sat		
	Average	85th Percentile	Max.
2016	7	11	18
2017	35	60	124
2018	43	70	142
2019	10	14	84
2020	9	14	28
2021	9	13	22
2022	8	11	18

The 2017 and 2018 data are most representative of the impacts that will occur as a result of the proposed sand extraction expansion. Further analysis of the 2017 and 2018 data which separates the Weekday and Saturday averages is provided in the following table.

Table 4: Daily Truck Generation – Quarry Operations (2017-2018)

Year	Weekday Daily Values (Trucks)			Saturday Daily Values (Trucks)		
	Average	85th Percentile	Max.	Average	85th Percentile	Max.
2017	39	64	124	11	16	45
2018	48	72	142	12	18	31

The daily trucks count during the 2017 and 2018 calendar years are detailed in the following figures. The figures demonstrate the few occasions when the total number of trucks exceed the 85th percentile.

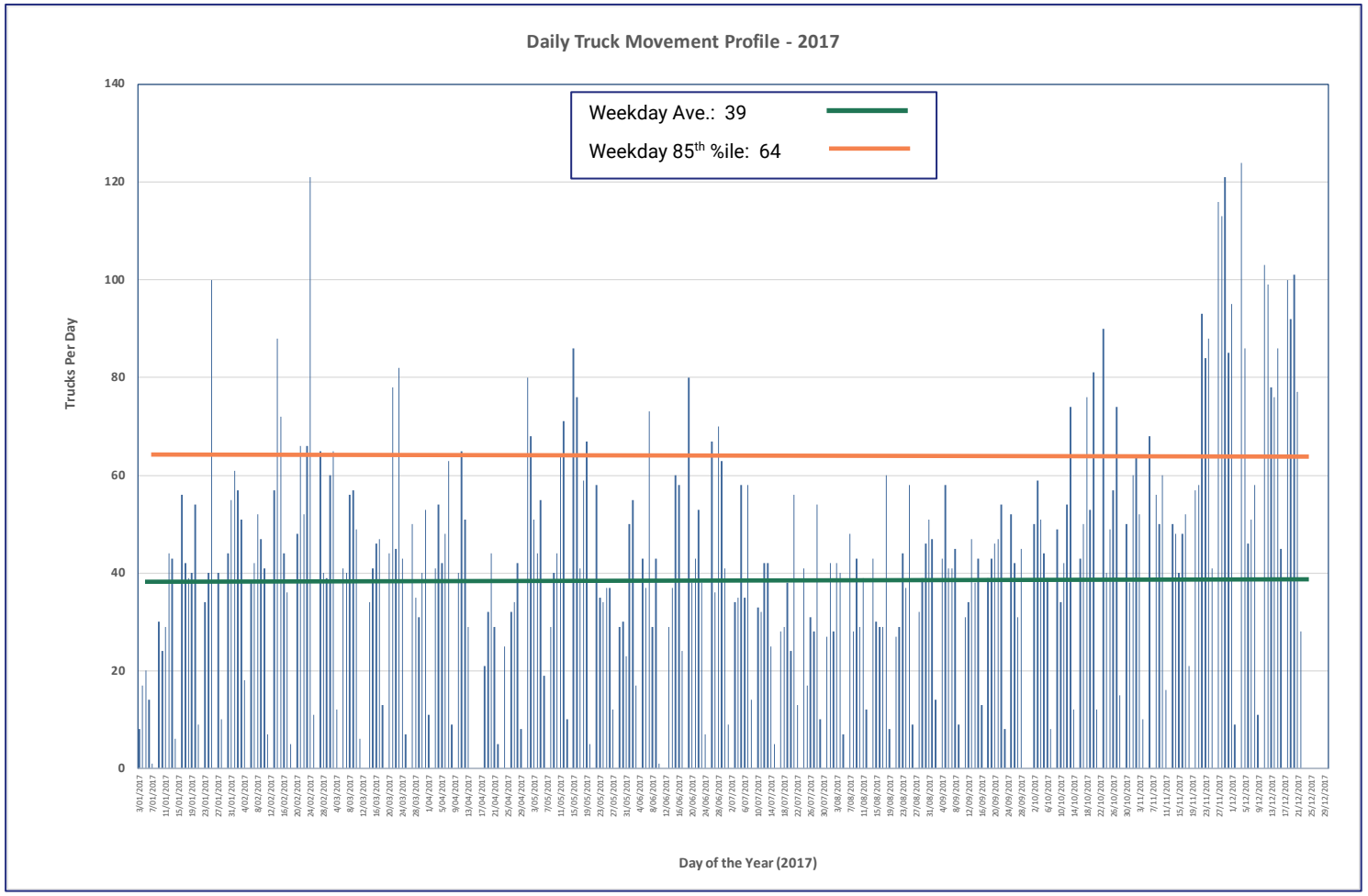


Figure 11: Quarry Daily Truck Movements – 2017

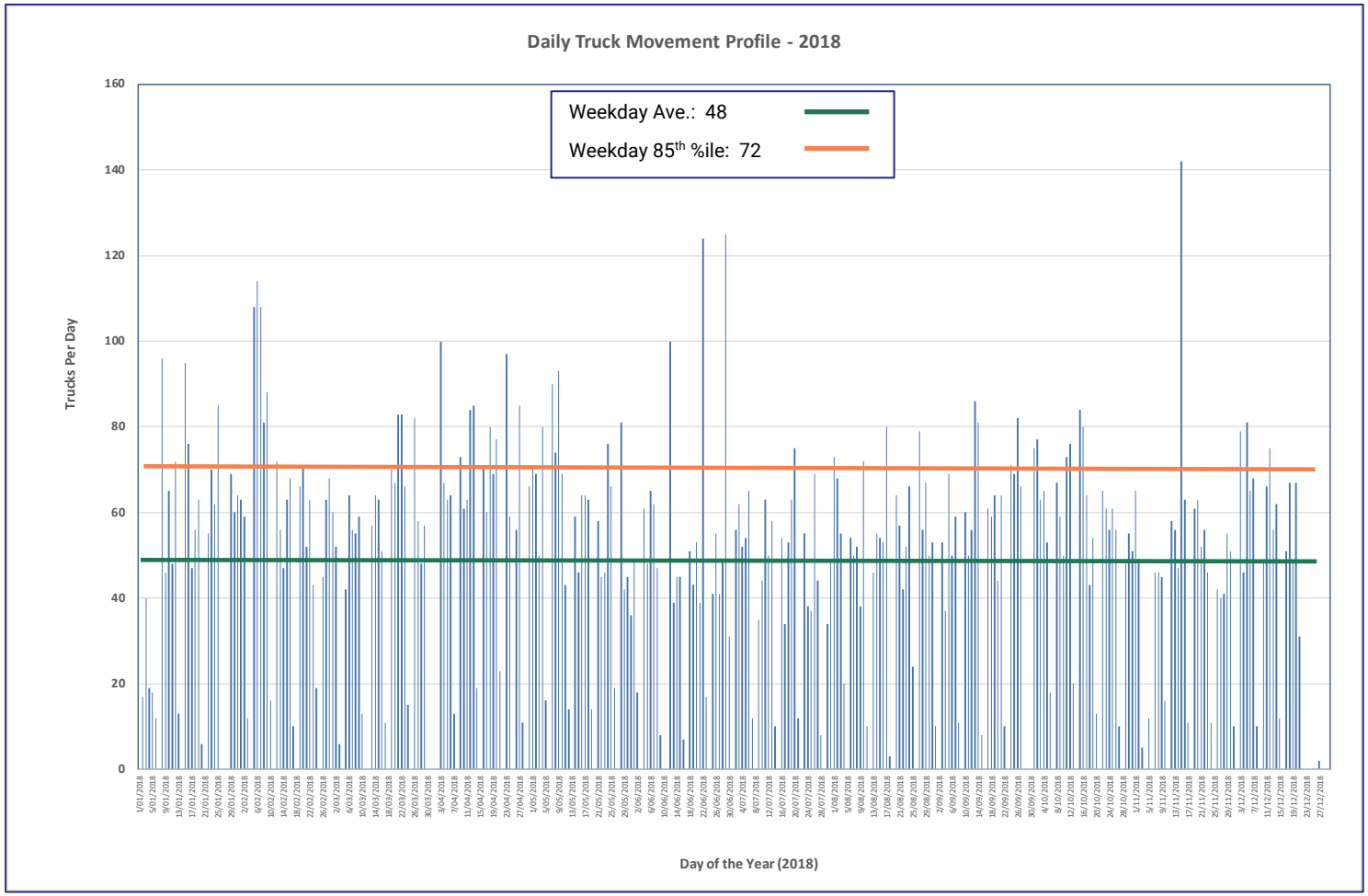


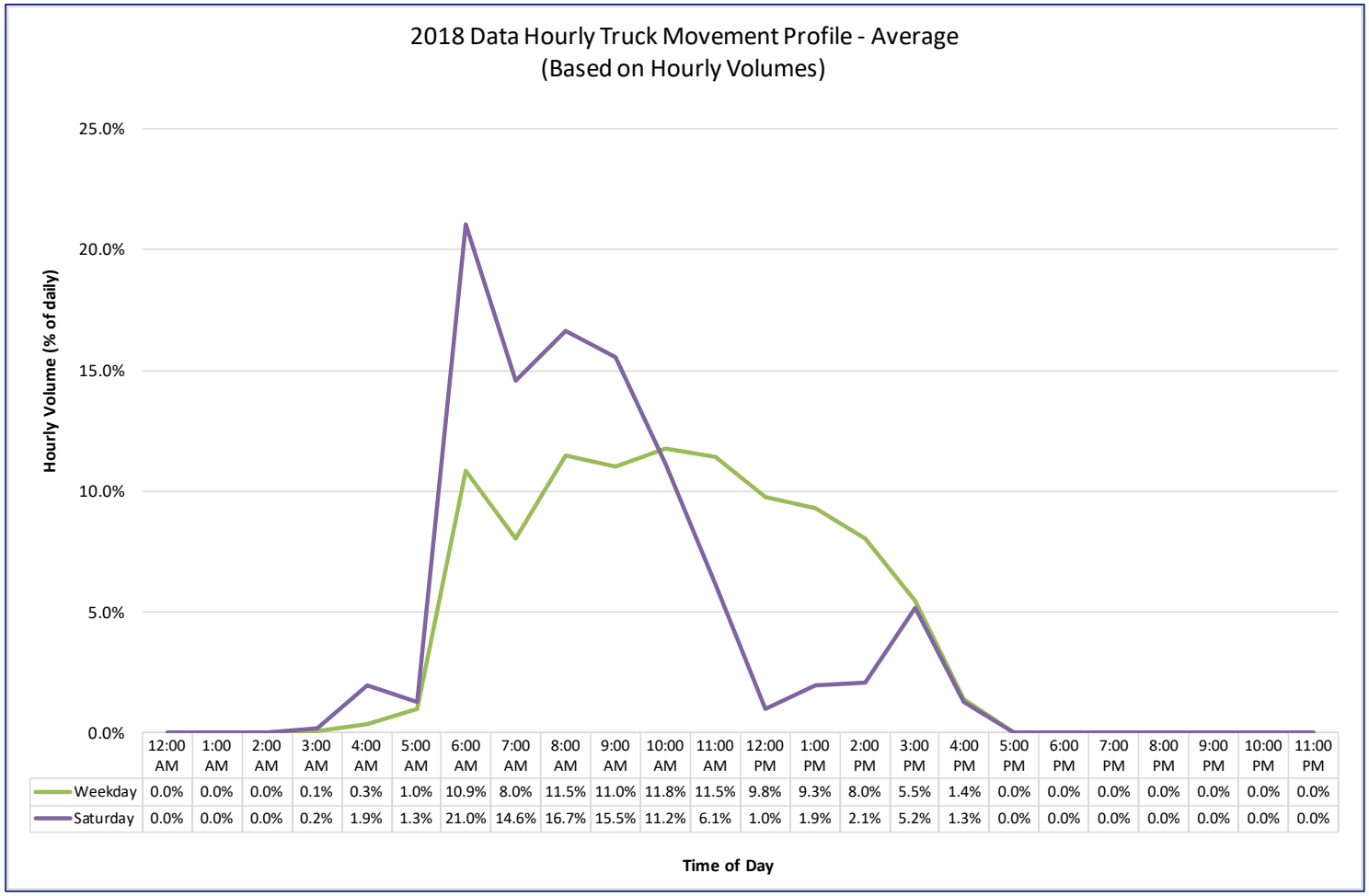
Figure 12: Quarry Daily Truck Movements – 2018

As the 2018 data is a representation of the peak, we have conservatively adopted this profile for further analysis and determining the likely traffic impacts of the proposed quarrying operations.

Further analysis of the 2018 data associated with the monthly, weekly and daily profile over Weekdays and Saturdays is provided as follows:

- Monthly Data
  - Average of 1,300 trucks per month
  - Maximum of 1,497 trucks per month
  - 85th Percentile of 1,468 trucks per month
- Weekly Data
  - Average of 300 trucks per week
  - Maximum of 515 trucks per week
  - 85th Percentile of 350 trucks per week
- Weekday Daily Data
  - Average of 48 trucks per day
  - Maximum of 142 trucks per day
  - 85th Percentile of 72 trucks per day
  - On average up to 12% of daily traffic can occur within any 1-hour period (considers all weekday data over year) – Peak movements typically occurred within the 6am-1pm window.
- Saturday Data
  - Average of 12 trucks per day
  - Maximum of 31 trucks per day
  - 85th Percentile of 18 trucks per day
  - On average up to 21% of daily traffic can occur within any 1-hour period (considers all Saturday data over year) – Peak movements typically occurred within the 6am-10am window.

A figure that identifies the weekday and Saturday hourly traffic generation profile based on the 2018 is provided in Figure 13 (hourly traffic as percentage of daily traffic).



	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Weekday	0.0%	0.0%	0.0%	0.1%	0.3%	1.0%	10.9%	8.0%	11.5%	11.0%	11.8%	11.5%	9.8%	9.3%	8.0%	5.5%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Saturday	0.0%	0.0%	0.0%	0.2%	1.9%	1.3%	21.0%	14.6%	16.7%	15.5%	11.2%	6.1%	1.0%	1.9%	2.1%	5.2%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure 13: Average Daily Traffic Generation Profile – 2018

3.4.2. Traffic Generation – Land Remediation Operations

To understand the traffic generation from the site remediation activities, we have undertaken a review of a full year of truck delivery data for the 2023 calendar year. The truck data was provided by the site remediation operator.

The key results of the data identified:

- Monthly Data
  - Average of 3,844 trucks per month
  - Maximum of 5,155 trucks per month
  - 85th Percentile of 4,936 trucks per month
- Weekly Data
  - Average of 887 trucks per week
  - Maximum of 1,446 trucks per week
  - 85th Percentile of 1,195 trucks per week
- Weekday Daily Data
  - Average of 180 trucks per day
  - Maximum of 391 trucks per day
  - 85th Percentile of 270 trucks per day
  - On average up to 14% of daily traffic can occur within any 1 hour period (considers all weekday data over year). Peak movements typically occurred between 8am-3pm.
- Saturday Data
  - Average of 46 trucks per day
  - Maximum of 205 trucks per day
  - 85th Percentile of 93 trucks per day
  - On average up to 18% of daily traffic can occur within any 1-hour period (considers all Saturday data over year). Peak movements typically occurred between 8am-1pm.

Figures that identify the monthly and weekly and daily truck movements from the land remediation activity is provided in the following figures.

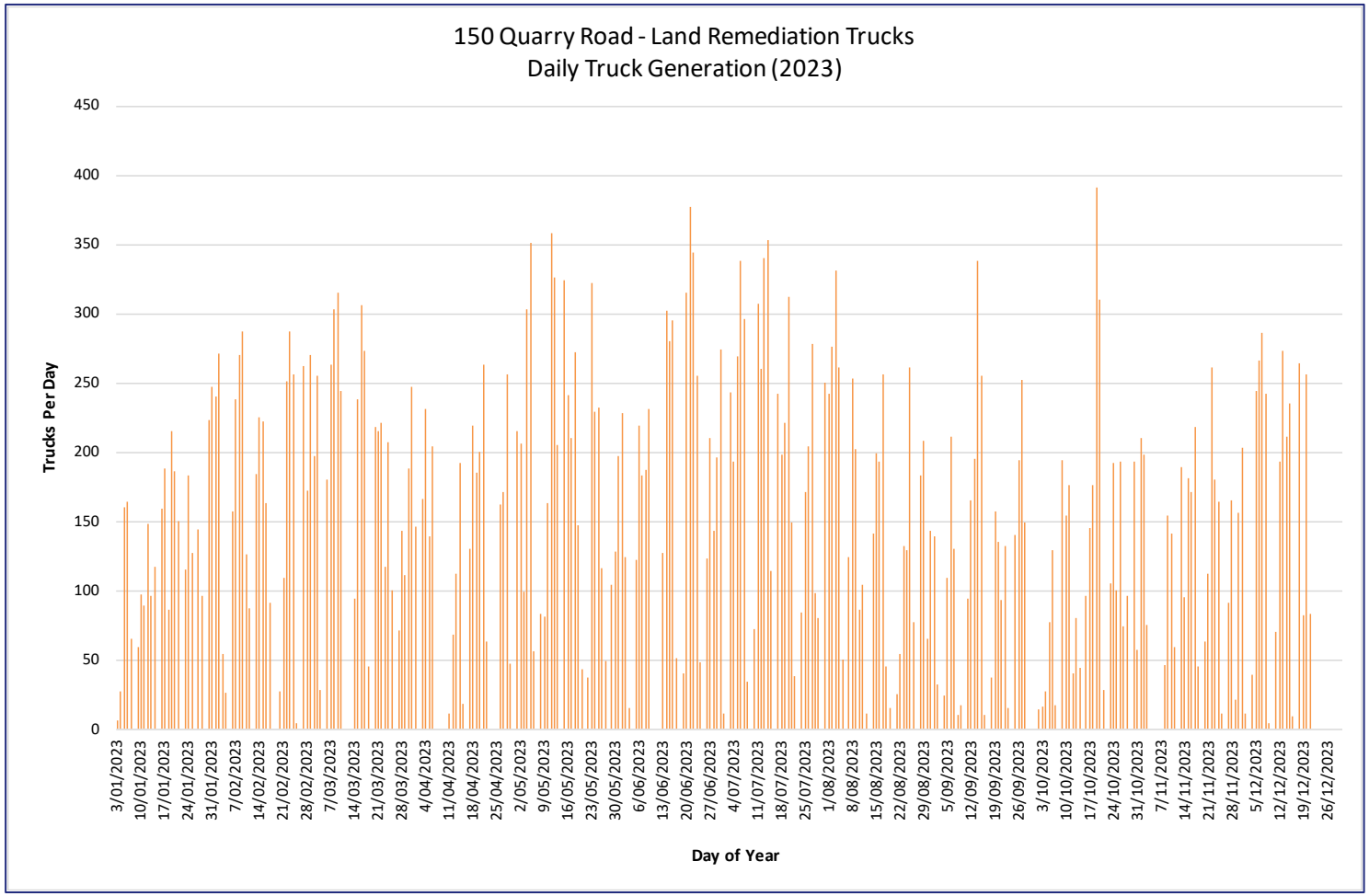


Figure 14: Land Remediation – Daily Truck Profile (2023)

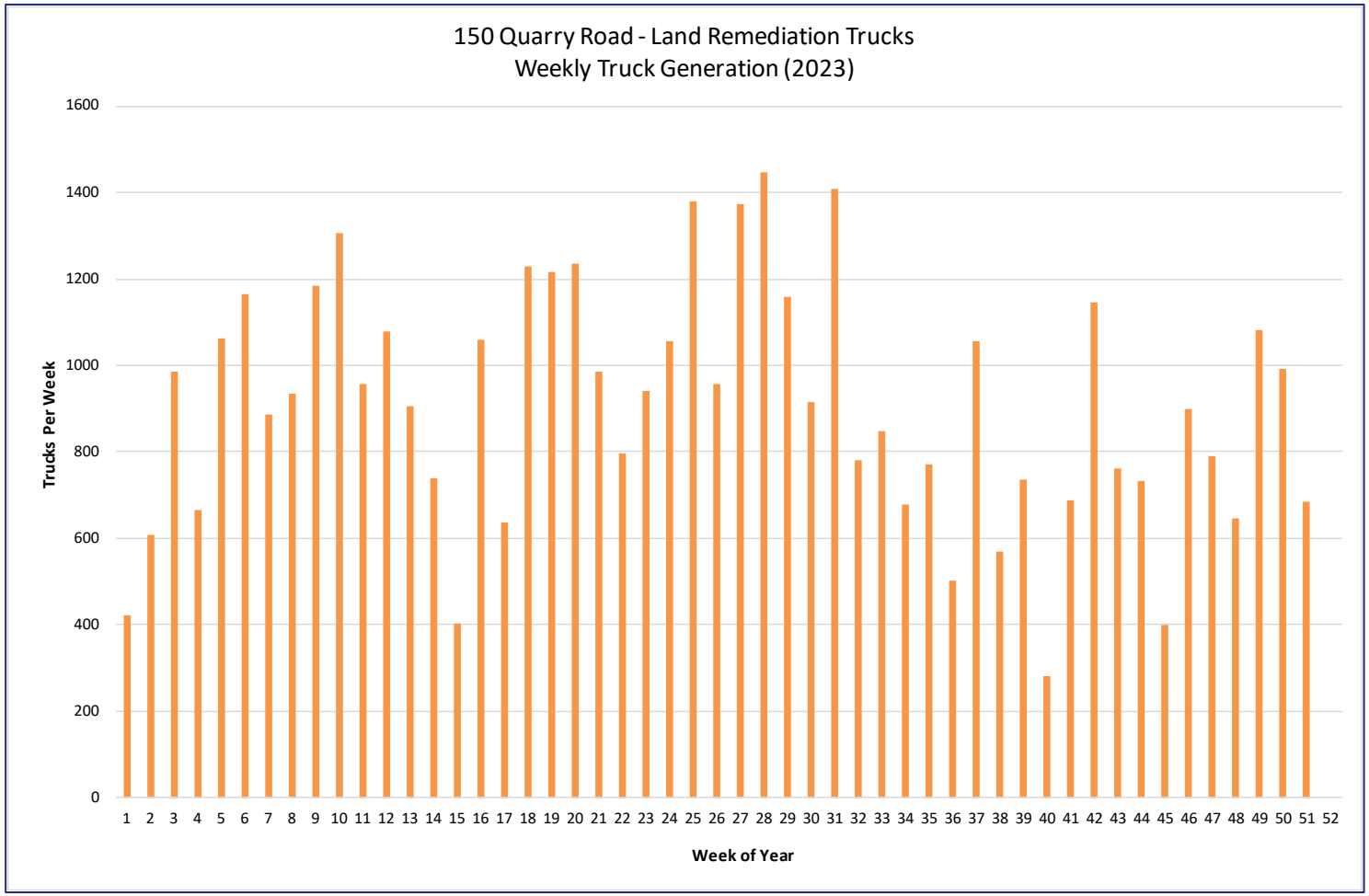


Figure 15: Land Remediation – Weekly Truck Profile (2023)

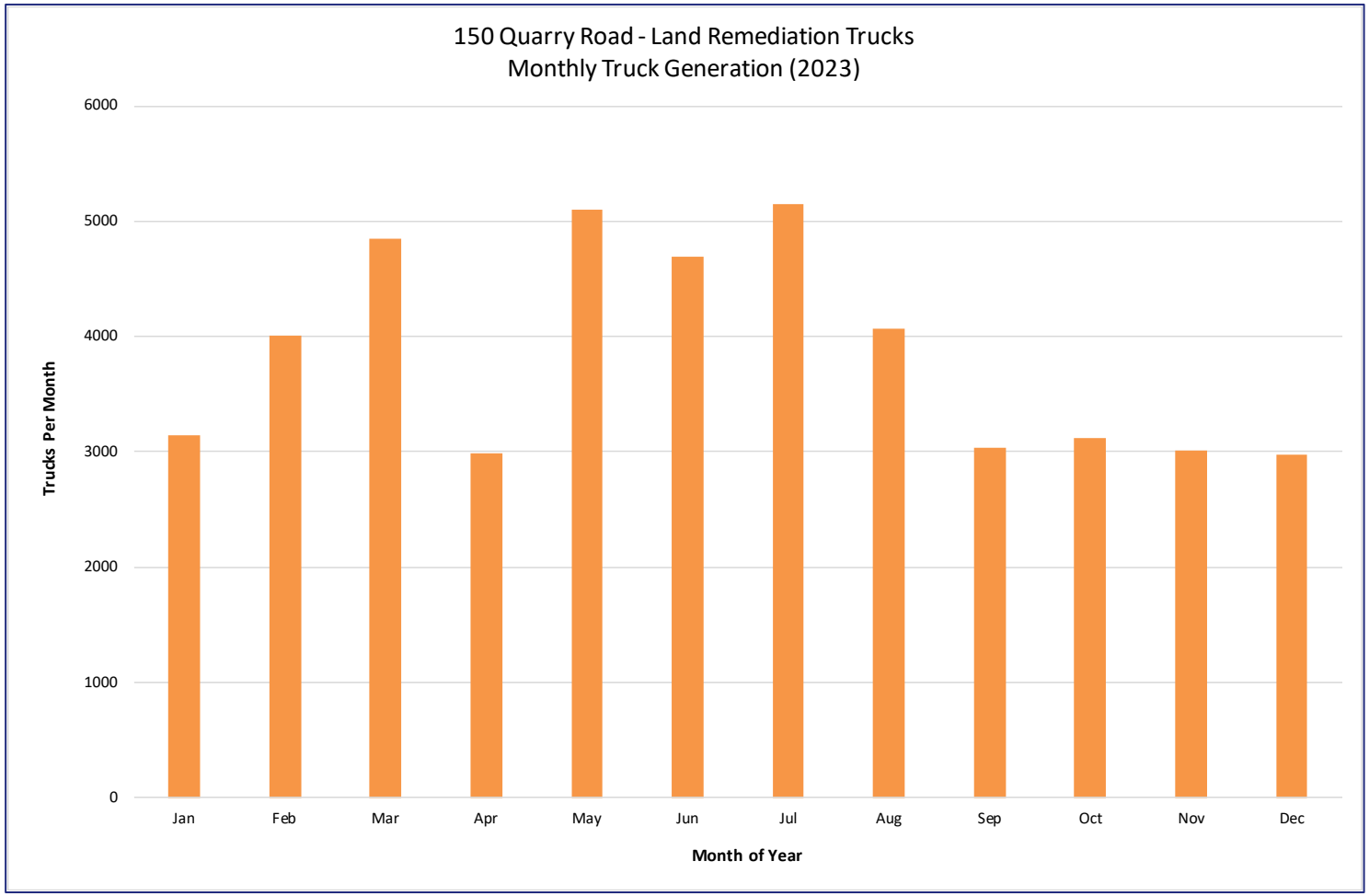


Figure 16: Land Remediation – Monthly Truck Profile (2023)

3.5. Road Network

The subject site directly abuts Quarry Road and Valley Road.

A summary of the local road network is provided in the table below.

Photographs of the surrounding road network are presented following the table.

Table 5: Local Road Network

Road Name	Agency	Classif-ication[2]	Transport Zone	Configuration	Speed Limit	Parking
Valley Road	Council	Local Access Road	No	5m wide (sealed) undivided carriageway accommodating a single traffic lane in each direction. Traffic islands on either side taper roadway creating one-way sections at regular intervals. No pedestrian footpaths	50km/h	No kerbside parking
Quarry Road	Council	Collector Road	No	7m wide undivided carriageway accommodating a single traffic lane in each direction. 1.2m shoulder along north side No pedestrian footpaths	60km/h	No kerbside parking
McClelland Drive	Council	Major Road	TRZ2	Undivided carriageway accommodating a single traffic lane in each direction. Two-way shared path along the east side of McClelland Drive north of Quarry Road which continues along the west side of McClelland Drive south of Quarry Road.	80km/h	No kerbside parking

Road Name	Agency	Classif-ication[2]	Transport Zone	Configuration	Speed Limit	Parking
Cranbourne Frankston Road	DTP	Arterial Road	TRZ2	Two through lanes in each direction separated by landscaped median. On-road bicycle lanes on both sides	80km/h	No kerbside parking

Notes:

1. As classified in Frankston City Council's Public Road Register (dated 13th December, 2022).

Figure 17: Quarry Road – view southeast

Figure 18: Quarry Road – view northwest (towards bend south of Central Crossover)

Figure 19: Quarry Road – view northwest (towards McClelland Road)

Figure 20: Quarry Road – view southeast (from McClelland Road)

Figure 21: Quarry Road – view southeast (near Lexton Drive)

Figure 22: Quarry Road – view northwest (from Lexton Drive)

Figure 23: Valley Road – view east

Figure 24: Valley Road – view west

Figure 25: McClelland Drive – view north

Figure 26: McClelland Drive – view south

Road Hierarchy

A review of the nearby road hierarchy as per Frankston City Council's Register of Public Roads (dated 28th September, 2021) has been undertaken for those roads that provide part of the primary access routes to the site.

A figure that identifies the road classification for the nearby road network is provided at Figure 28.

The definition of local roads as defined within the Frankston City Council Road Management Plan (2022) - Version 3.0 is detailed as per the following extract.

Road Hierarchy Classification	Desired Function/ Description
Major Roads	Act as through traffic routes. Connect to the VicRoads arterial road network. Complement the VicRoads arterial road network by efficiently and safely channelling traffic through the municipality. Carry traffic between major commercial, industrial and residential areas. High to moderate use by heavy vehicles. Bus routes may be provided on these roads.
Collector Roads	Concentrate locally generated traffic to an outlet. Provide safe and efficient connection to commercial and residential areas from Major Roads, or directly from the VicRoads arterial network. Provide direct access to the local road network. Not intended to act as a through traffic routes. Carry local traffic to shops, schools, commercial districts, hospitals, sporting and other local facilities. May provide access to abutting properties. Moderate to low use by heavy vehicles. Bus routes may be provided on these roads.
Industrial Roads	Provide access to local light industries concentrated in small areas within the municipality. Abutting properties are primarily industrial. High to moderate use by heavy vehicles. Bus routes may be provided on these roads.
Local Access Roads	Provide safe access to abutting properties (primarily residential). Low speed environment Bus routes may be provided on these roads.

Figure 27: Road Hierarchy Classification – Frankston City Council Road Management Plan

The nearby road network provides opportunities for traffic associated with the development site to disperse to the arterial road network using the higher order roads (Collector Roads and Major Road) with no reliance on local access roads.

The Collector Road classification nominates 'low to moderate use by heavy vehicles' Quarry Road provides access to multiple land uses that generate high heavy vehicle traffic and as such its current classification may not be entirely appropriate in this area.

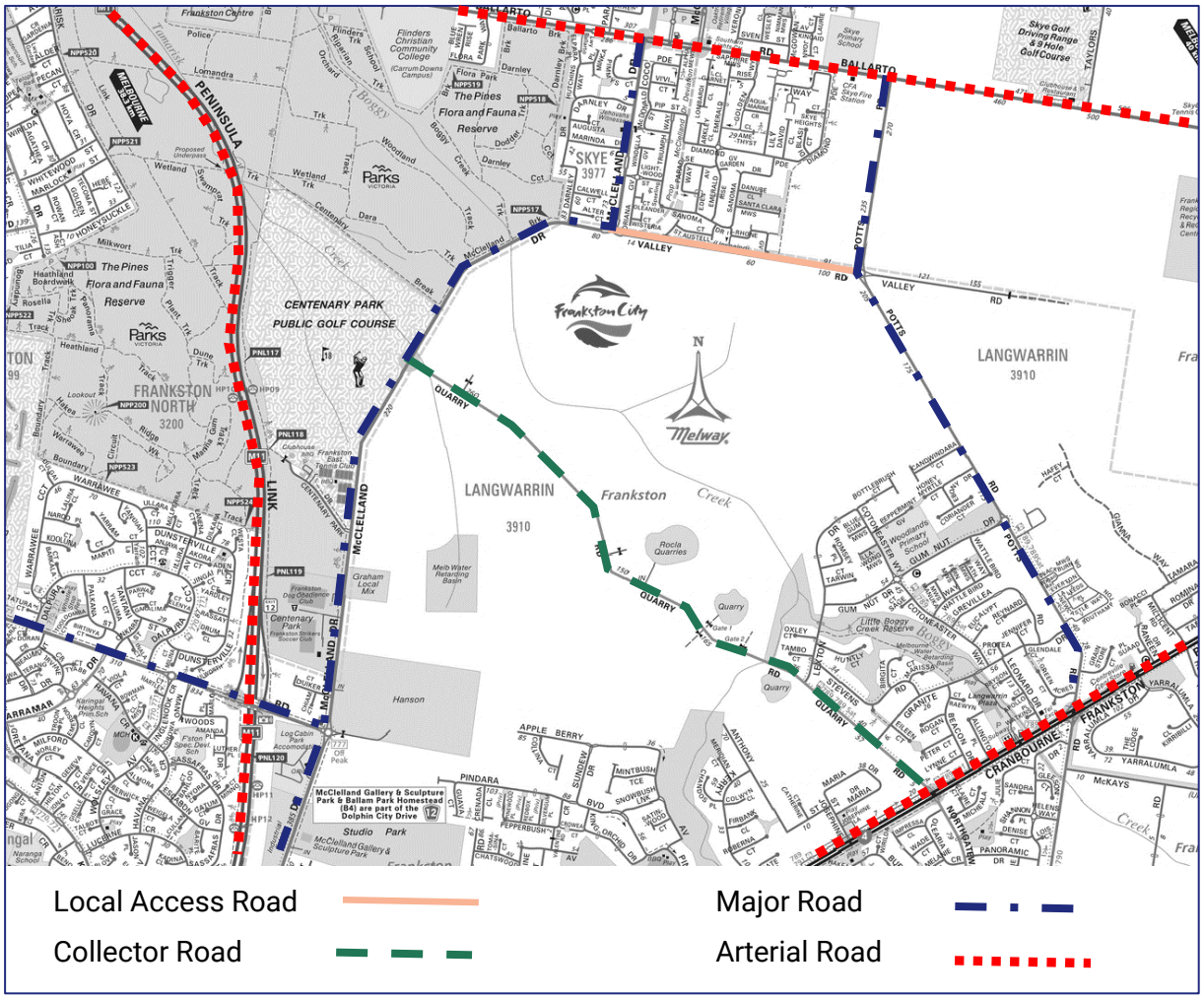


Figure 28: Nearby Road Hierarchy

3.6. Existing Traffic Conditions

3.6.1. Nearby Intersection Traffic Surveys

To ascertain the traffic conditions at the eastern and western end of Quarry Road, turning movement count traffic surveys were completed over a 12 hour period on Thursday 15th February, 2023 between 6:30am-6:30pm.

The surveys recorded all vehicle movements at the signalised intersections of:

- Quarry Road and Cranbourne Road, and
- Quarry Road and McClelland Drive.

The peak hour results from each location are provided in the following figures.

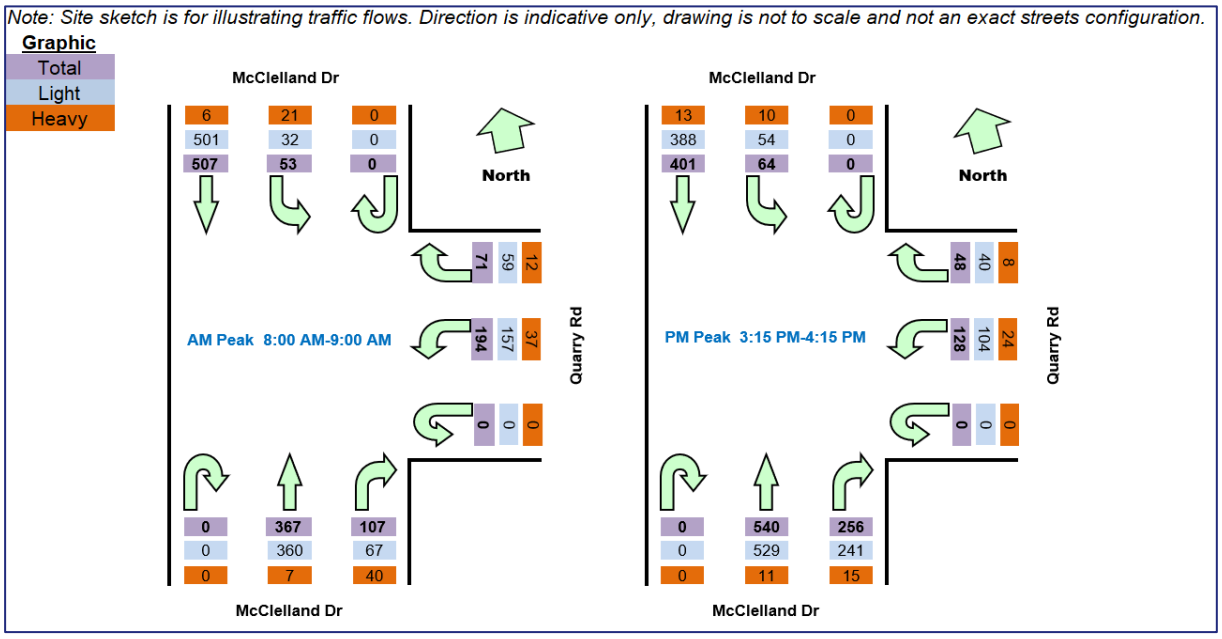


Figure 29: Peak Hour Traffic Conditions – Intersection Quarry Road/McClelland Drive

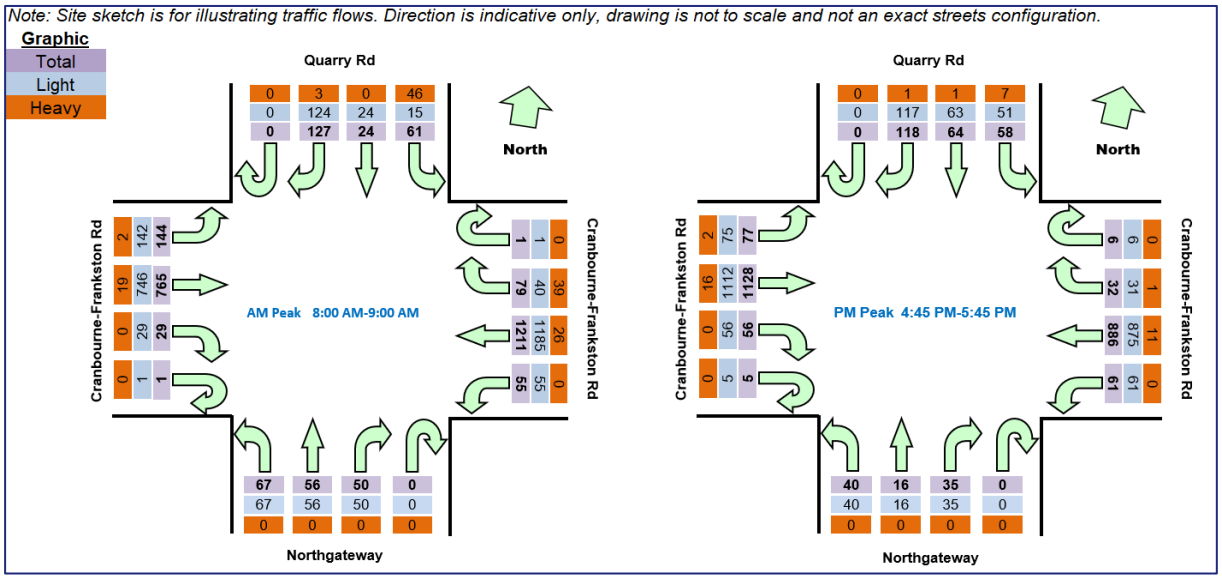


Figure 30: Peak Hour Traffic Conditions – Intersection Quarry Road/McClelland Drive

3.6.2. Site Access Surveys

To ascertain the traffic profile generated by the site, traffic surveys were completed over a 12-hour period on Thursday 15th February, 2023 between 6:30am-6:30pm. The surveys recorded all vehicle movements in and out of the site via the following access points:

- Northern Crossover – Remediation Vehicle Access (Remediation),
- Central Crossover – Light Vehicle Access (Quarry), and
- Southern Crossover – Heavy Vehicle Access (Quarry and Right-out from Remediation).

The surveys survey results are summarised in Table 6.

Table 6: Subject Site – Key Traffic Generation Data

Access Location	12 hour Volumes (veh movements)			Peak Hour Traffic (veh/hour)		
	Total	Entry	Exit	Total	Entry	Exit
Northern Crossover	586	378	208	88 (9:30-10:30am)	54	34
Central Crossover	27	11	16	9 (4:30-5:30pm)	2	7
Southern Crossover	195	11	184	29 (12-1pm)	1	28

When considering the breakdown between heavy and light vehicles the surveys identified the following vehicle class distribution at each access point:

- Northern Access – 98.5% HV, 1.5% LV
- Central Access – 0% HV, 100% LV
- Southern Access – 98.6% HV, 1.4% LV

Most of the traffic generated from the site is associated with heavy vehicles with negligible light vehicles occurring through the northern and southern crossover. All traffic through the central crossover was associated with light vehicles only.

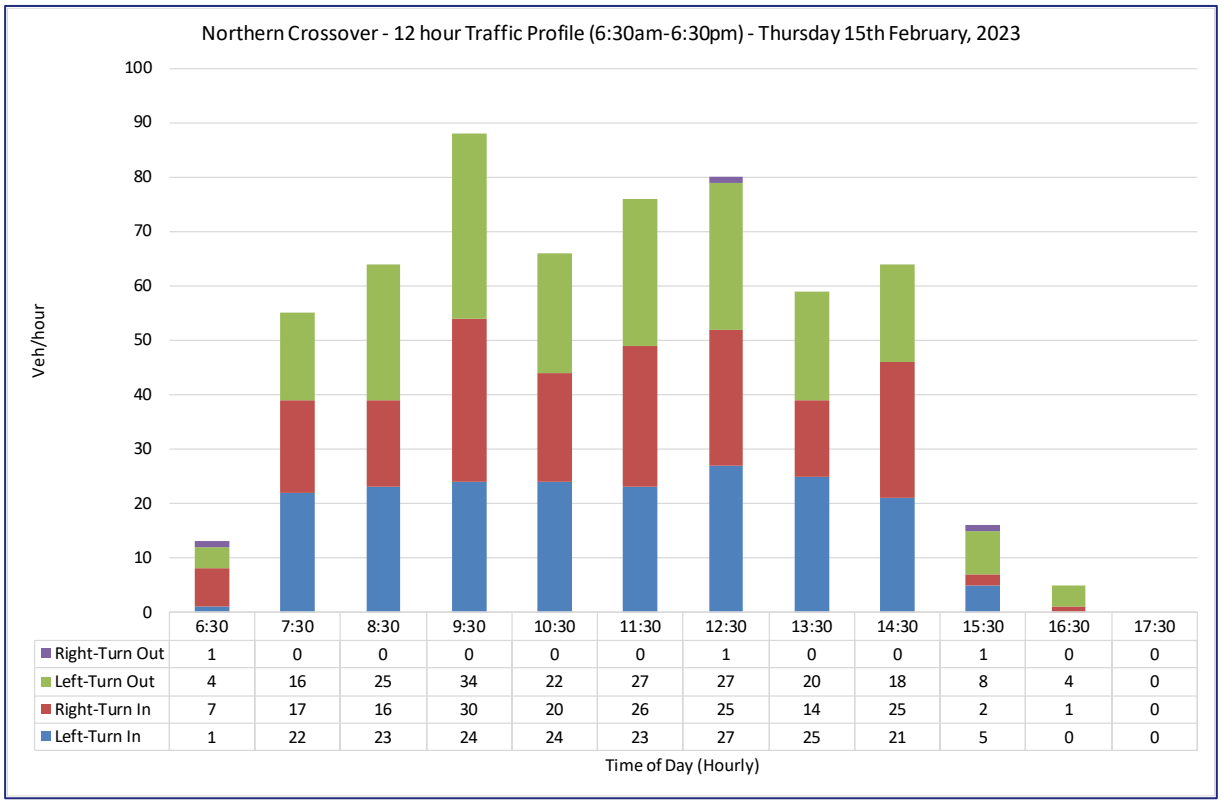
When reviewing the southern crossover (i.e. the Quarry access) there was a significant variation in the entry and exit vehicle movements. This occurs as the operation of the site remediation activity directs those trucks exiting towards the west (i.e. right-out movements) to do so via the southern crossover.

On this basis we have adopted that the quarry operations impact from the southern crossover were limited to 25 vehicle movements only. This allows for the recorded 11 entry movements and adopts 14 exit movements from the 184 exit movements overall. The balance of 170 exit movements are assumed to be associated with the land remediation works.

Based on the above, the traffic generation from the existing activities at the site is summarised as:

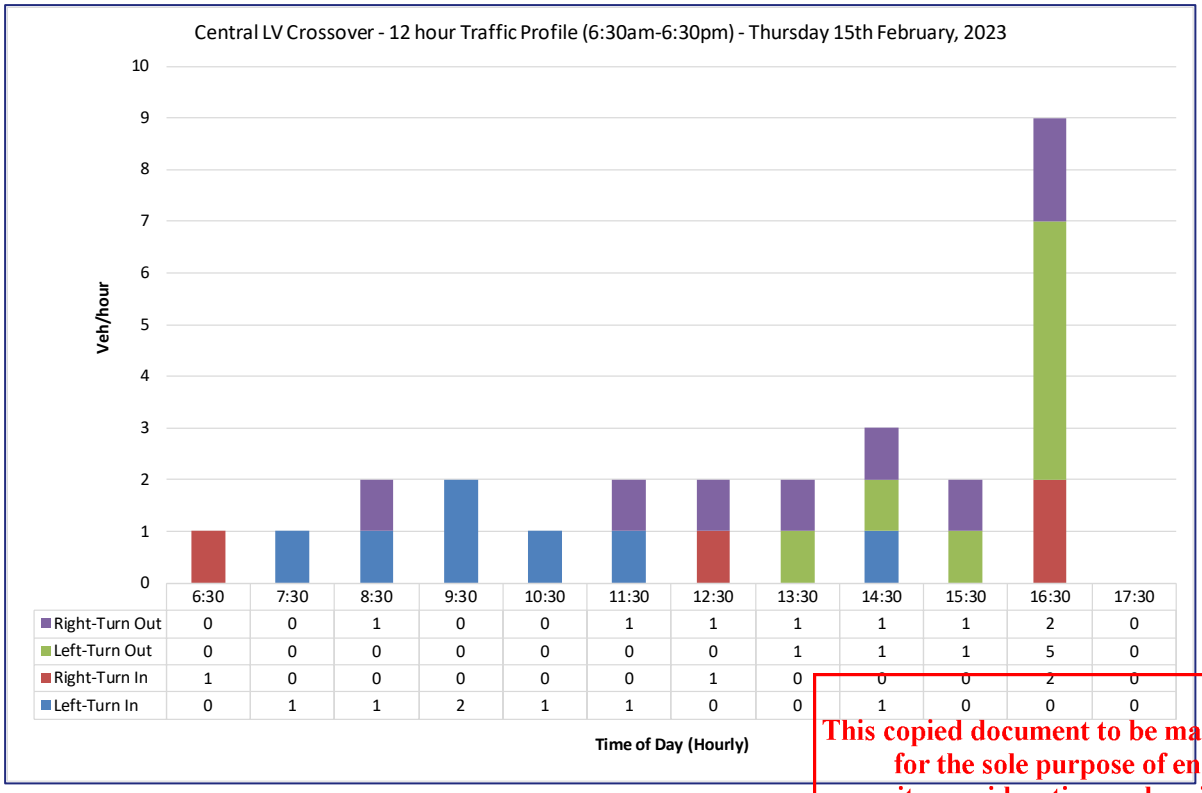
- Land Remediation – 756 vehicle movements per day (12 hour), including:
  - 586 vehicle movements from northern access, and
  - 170 vehicle movements from southern access.
- Quarry Activity – 54 vehicle movements per day (12 hour), including:
  - 27 vehicle movements from central access (light vehicles), and
  - 25 vehicle movements from southern access (heavy vehicles).

A hourly profile of each turning movement to and from the site for each day is provided in the following graphs.



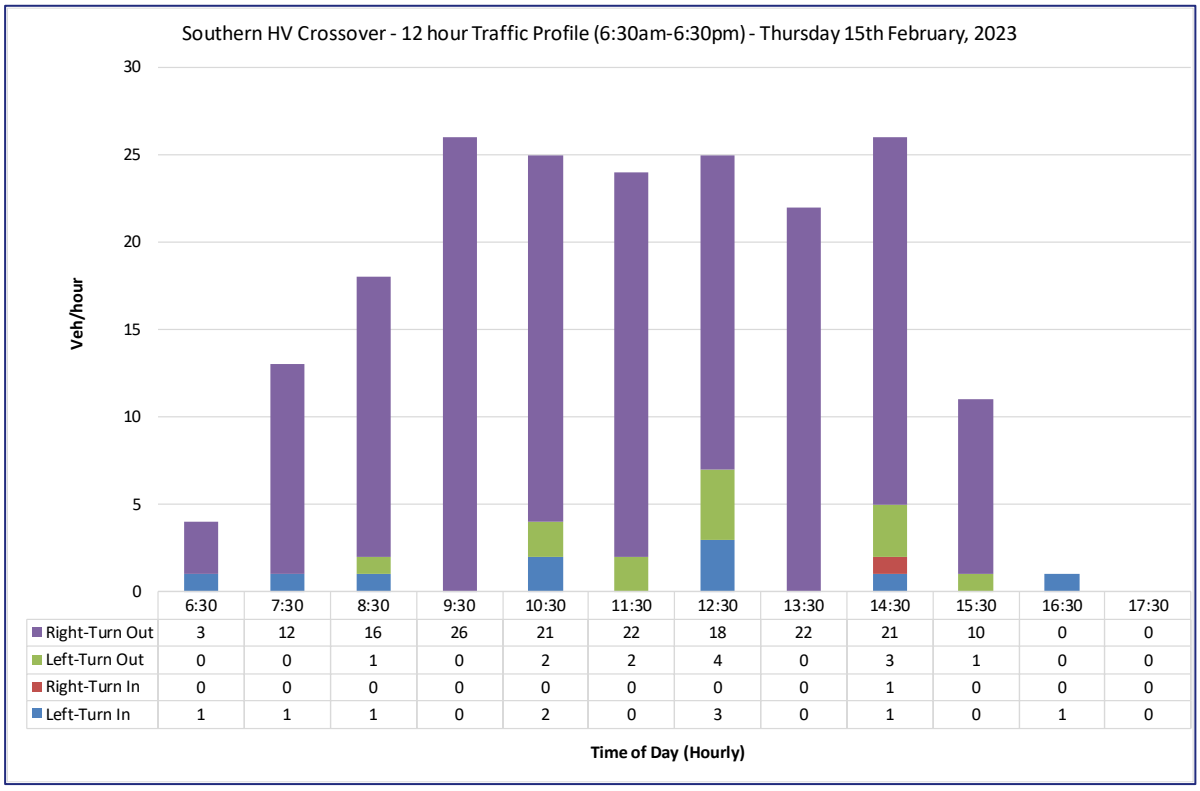
	6:30	7:30	8:30	9:30	10:30	11:30	12:30	13:30	14:30	15:30	16:30	17:30
Right-Turn Out	1	0	0	0	0	0	1	0	0	1	0	0
Left-Turn Out	4	16	25	34	22	27	27	20	18	8	4	0
Right-Turn In	7	17	16	30	20	26	25	14	25	2	1	0
Left-Turn In	1	22	23	24	24	23	27	25	21	5	0	0

Figure 31: Northern Crossover 12Hr Weekday Traffic Profile – Thurs 15th February, 2024



	6:30	7:30	8:30	9:30	10:30	11:30	12:30	13:30	14:30	15:30	16:30	17:30
Right-Turn Out	0	0	1	0	0	1	1	1	1	1	2	0
Left-Turn Out	0	0	0	0	0	0	0	1	1	1	5	0
Right-Turn In	1	0	0	0	0	0	1	0	0	0	2	0
Left-Turn In	0	1	1	2	1	1	0	0	1	0	0	0

Figure 32: Central Crossover 12Hr Weekday Traffic Profile – Thurs 15th February, 2024



	6:30	7:30	8:30	9:30	10:30	11:30	12:30	13:30	14:30	15:30	16:30	17:30
Right-Turn Out	3	12	16	26	21	22	18	22	21	10	0	0
Left-Turn Out	0	0	1	0	2	2	4	0	3	1	0	0
Right-Turn In	0	0	0	0	0	0	0	0	1	0	0	0
Left-Turn In	1	1	1	0	2	0	3	0	1	0	1	0

Figure 33: Southern Crossover 12Hr Weekday Traffic Profile – Thurs 15th February, 2024

When considering the directional split of the existing traffic, the surveys identified:

- Land Remediation (Northern Crossover and Southern Crossover)
  - Entry traffic evenly distributed between the east and western approaches along Quarry Road.
  - Exit traffic assumed to follow a similar pattern.
  - This distribution is expected noting that the trucks associated with the delivery of fill would arrive from variable locations.
- Quarry Activities (Southern Crossover – HV)
  - Entry traffic bias towards the west with 90% of the entry movements originating from the west (left-in).
  - This distribution is expected noting that the trucks associated with the delivery and export of sand products would more likely utilise the more direct connection to Peninsula Link to the west.
- Quarry Activities (Central Crossover – LV)
  - Entry traffic biased towards arrival from the west.
  - Exit traffic evenly split between east and west.

3.6.3. Road Network Surveys

Automatic tube counts were undertaken for those roads that form part of the primary access routes to the site. These counts were completed for 7 days beginning on Wednesday 14th February, 2024. These surveys were within the school term and not affected by public holidays.

The locations of the tube counts are set out in Figure 34.

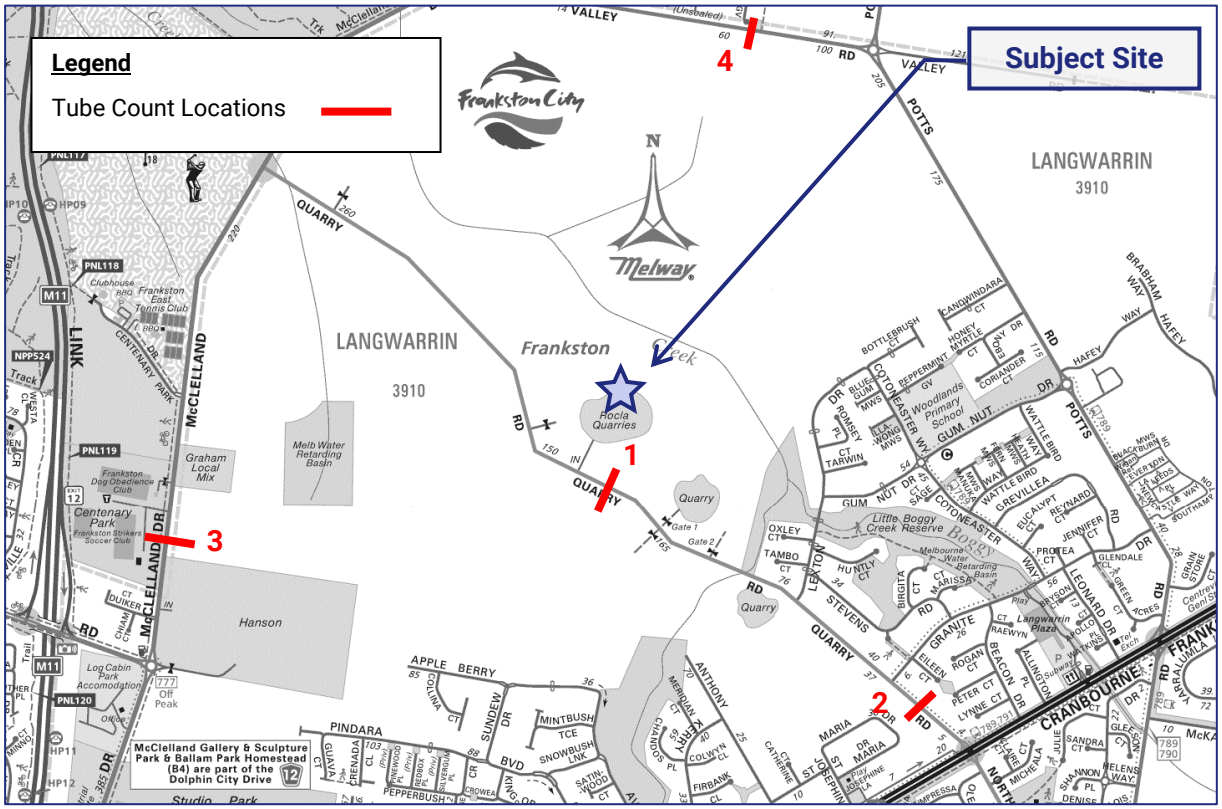


Figure 34: Tube Count Locations (Source: Melways)

A summary of the results is presented below at Table 7.

Table 7: Tube Count Traffic Results

Characteristic	Values		
Quarry Road – East of Southern HV Crossover (Location 1)			
	Eastbound	**Westbound**	**Total**
24hr Weekday Ave. Volume	1,737 vpd	1,593 vpd	**3,330 vpd**
24hr Sat Ave. Volume	902 vpd	897 vpd	**1,799 vpd**
85th Percentile Speed	69.4 km/h	69.8 km/h	**69.6 km/h**
Commercial Vehicles %	21.8%	21.8%	**21.8% (726 vpd)**

Characteristic	Values		
Quarry Road – Outside #16 Quarry Road (Location 2)			
	Eastbound	**Westbound**	**Total**
24hr Weekday Ave. Volume	2,227 vpd	1,927 vpd	**4,154 vpd**
24hr Sat Volume	1,442 vpd	1,167 vpd	**2,609 vpd**
85th Percentile Speed	49.9 km/h	50.9 km/h	**50.4 km/h**
Commercial Vehicles %	22.3%	23.0%	**22.6% (938 vpd)**
McClelland Drive – North of Skye Road (Location 3)			
	Northbound	**Southbound**	**Total**
24hr Weekday Ave. Volume	6,251 vpd	6,222 vpd	**12,473 vpd**
24hr Sat Volume	5,158 vpd	5,229 vpd	**10,387 vpd**
85th Percentile Speed	77.4 km/h	74.6 km/h	**76.0 km/h**
Commercial Vehicles %	7.8%	7.2%	**7.5% (935 vpd)**
Valley Road – Outside of #34 Valley Road (Location 4)			
	Westbound	**Eastbound**	**Total**
24hr Weekday Ave. Volume	1,602 vpd	1,750 vpd	**3,352 vpd**
24hr Sat Volume	897 vpd	902 vpd	**1,799 vpd**
85th Percentile Speed	69.8 km/h	69.4 km/h	**69.6 km/h**
Commercial Vehicles %	21.7%	21.6%	**21.7% (727 vpd)**

Vehicle Classification

Further analysis of the classification of vehicle types across the nearby road network is provided in Figure 36 to Figure 41. The figures separate the two-way hourly movements into the types of vehicles recorded. We have undertaken analysis of Location 1-3 only as these are the roads that will form part of the access route to the proposed quarry operations (i.e. no truck access proposed to Valley Road).

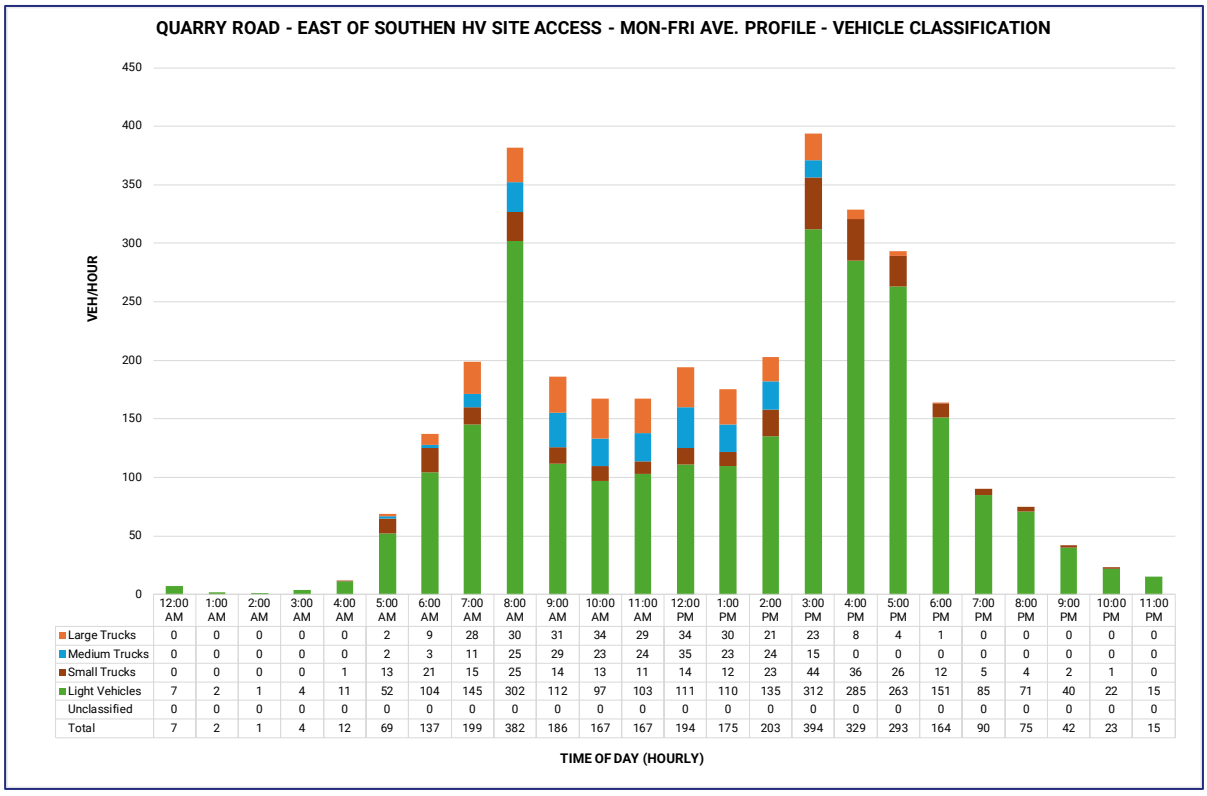
To group vehicle classification, guidance has been taken from the relevant AustRoads guidelines. A figure that identifies the different vehicle types and how they have been grouped within the recorded survey data is provided below.

Trucks operating from the quarrying activities on the site would typically fall within the Medium and Heavy Truck classifications (i.e. minimum 3 and 4 axle trucks).

Axles	Groups	Description	Class		Parameters	Dominant Vehicle	Aggregate
2	1 or 2	Short - Sedan, Wagon, 4WD, Utility, Light Van	SV	1	d(1)>=1.7m, d(1)<=3.2m & axles=2		1 (Light)
3, 4 or 5	3	Short Towing - Trailer, Caravan, Boat, etc.	SVT	2	groups=3, d(1)>=2.1m, d(1)<=3.2m, d(2)>=2.1m & axles=3,4,5		
2	2	Two axle truck or Bus	TB2	3	d(1)>3.2m & axles=2		2 (Medium)
3	2	Three axle truck or Bus	TB3	4	axles=3 & groups=2		
>3	2	Four axle truck	T4	5	axles>3 & groups=2		
3	3	Three axle articulated vehicle or Rigid vehicle and trailer	ART3	6	d(1)>3.2m, axles=3 & groups=3		3 (Heavy)
4	>2	Four axle articulated vehicle or Rigid vehicle and trailer	ART4	7	d(2)<2.1m or d(1)<2.1m or d(1)>3.2m axles = 4 & groups>2		
5	>2	Five axle articulated vehicle or Rigid vehicle and trailer	ART5	8	d(2)<2.1m or d(1)<2.1m or d(1)>3.2m axles=5 & groups>2		
>=6	>2	Six (or more) axle articulated vehicle or Rigid vehicle and trailer	ART6	9	axles=6 & groups>2 or axles>6 & groups=3		
>6	4	B-Double B-Double or Heavy truck and trailer	BD	10	groups=4 & axles>6		
>6	5 or 6	Double road train or Heavy truck and two trailers	DRT	11	groups=5 or 6 & axles>6		
>6	>6	Triple road train or Heavy truck and three trailers	TRT	12	groups>6 & axles>6		

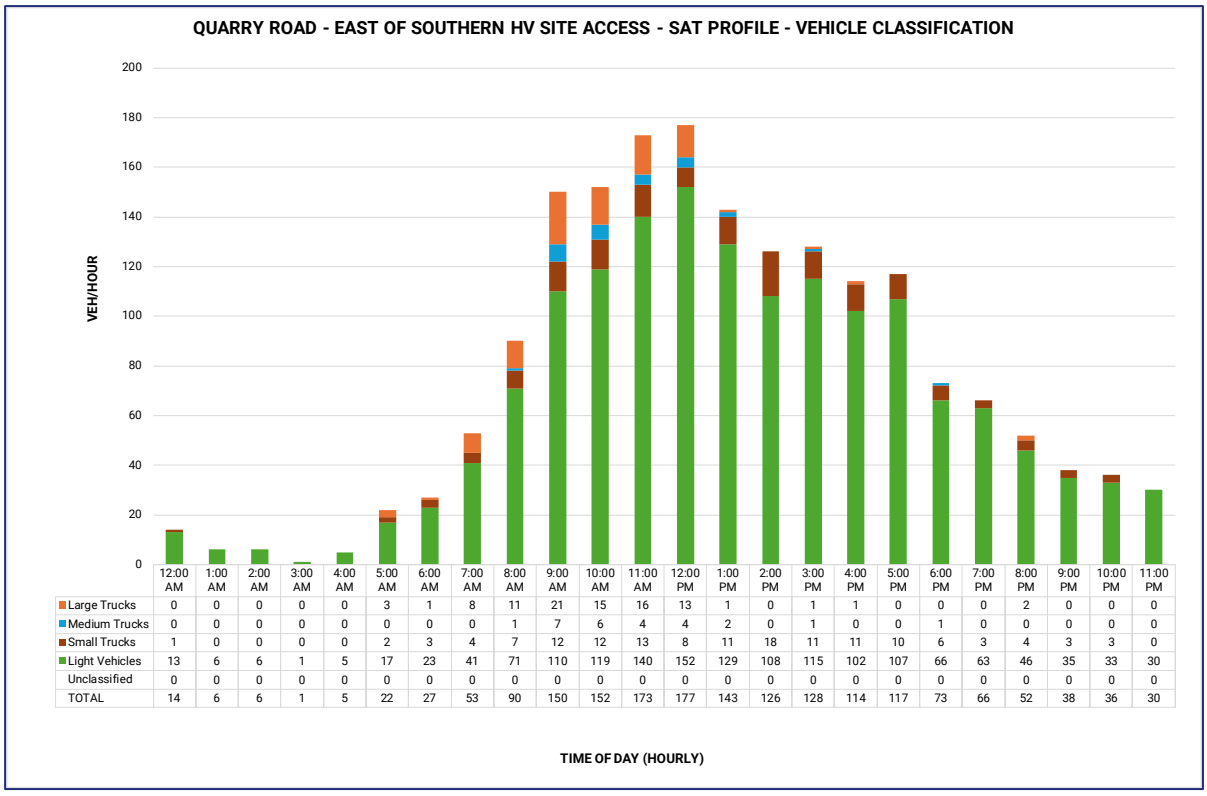
Light Vehicles (Class 1-2)
Medium Trucks (Class 4-5)
Small Trucks (Class 3)
Large Trucks (Class 6-12)

Figure 35: Vehicle Classification Diagram (Source: AustRoads)



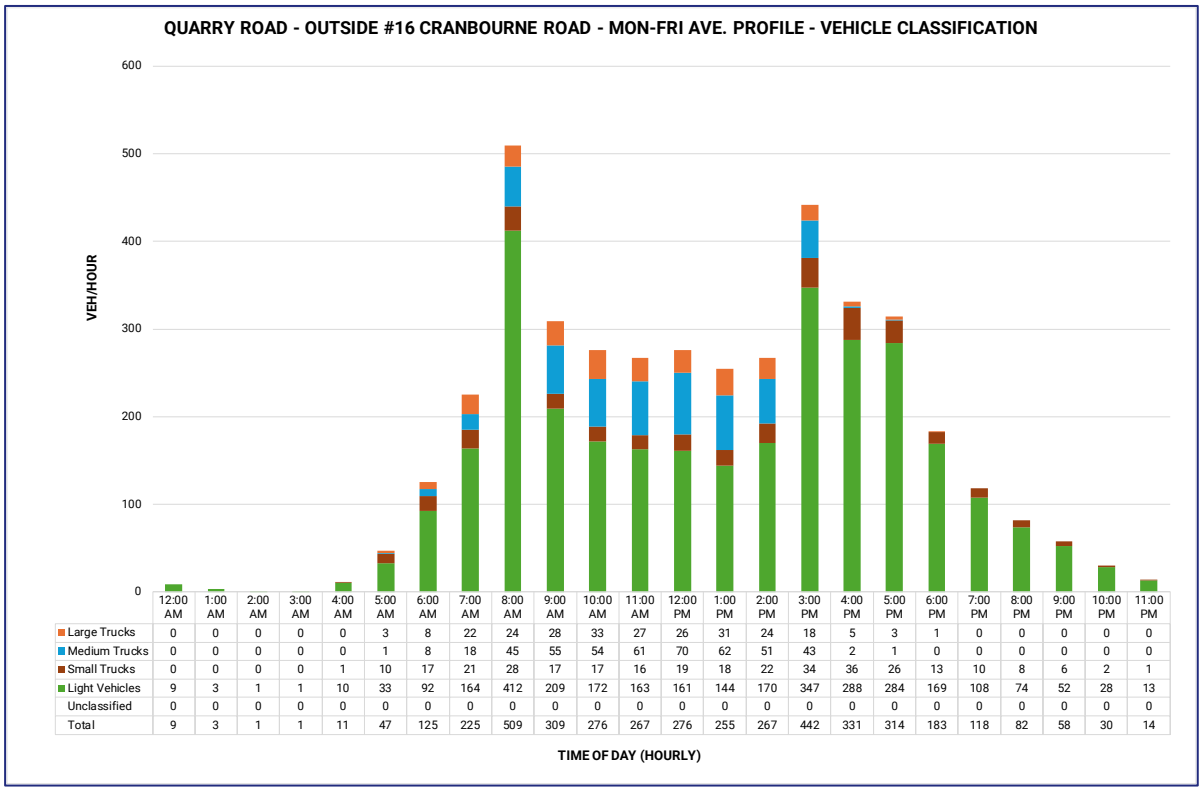
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Large Trucks	0	0	0	0	0	2	9	28	30	31	34	29	34	30	21	23	8	4	1	0	0	0	0	0
Medium Trucks	0	0	0	0	0	2	3	11	25	29	23	24	35	23	24	15	0	0	0	0	0	0	0	0
Small Trucks	0	0	0	0	1	13	21	15	25	14	13	11	14	12	23	44	36	26	12	5	4	2	1	0
Light Vehicles	7	2	1	4	11	52	104	145	302	112	97	103	111	110	135	312	285	263	151	85	71	40	22	15
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	7	2	1	4	12	69	137	199	382	186	167	167	194	175	203	394	329	293	164	90	75	42	23	15

Figure 36: Vehicle Classification – Quarry Road east of Southern Crossover – Mon-Fri



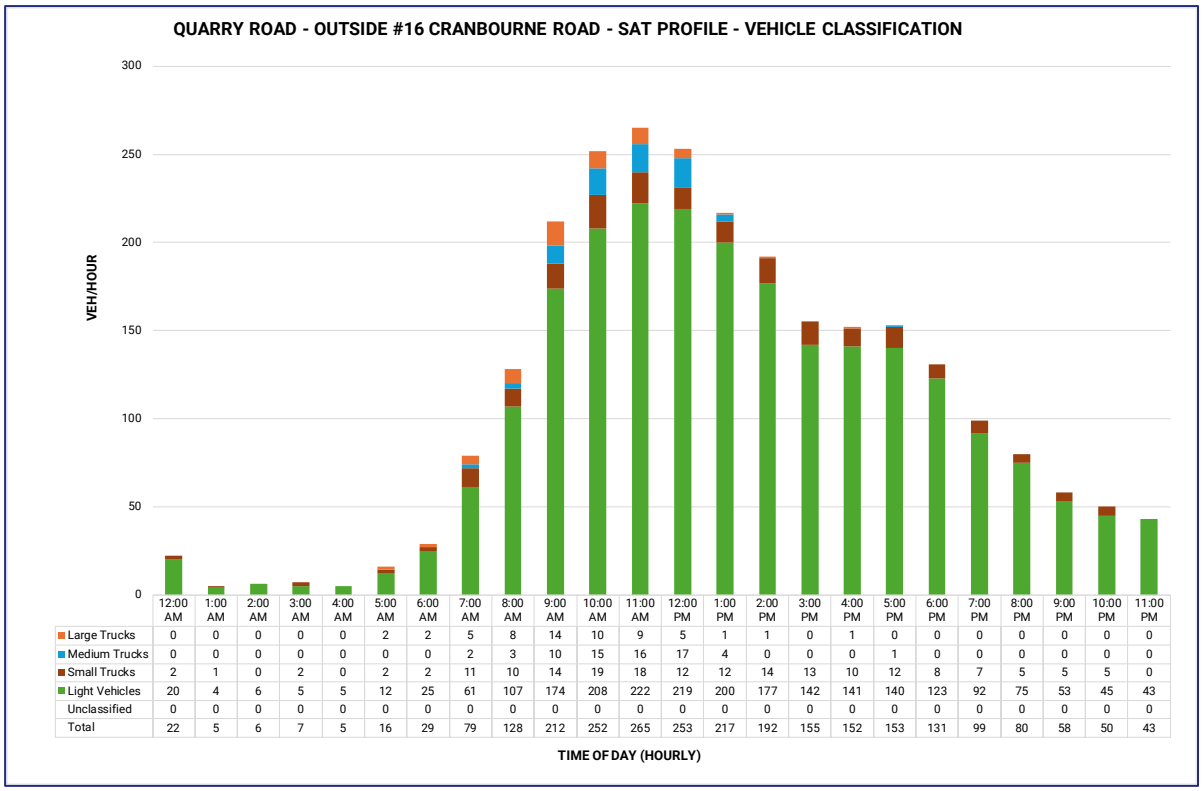
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Large Trucks	0	0	0	0	0	3	1	8	11	21	15	16	13	1	0	1	1	0	0	0	2	0	0	0
Medium Trucks	0	0	0	0	0	0	0	0	1	7	6	4	4	2	0	1	0	0	1	0	0	0	0	0
Small Trucks	1	0	0	0	0	2	3	4	7	12	12	13	8	11	18	11	11	10	6	3	4	3	3	0
Light Vehicles	13	6	6	1	5	17	23	41	71	110	119	140	152	129	108	115	102	107	66	63	46	35	33	30
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	14	6	6	1	5	22	27	53	90	150	152	173	177	143	126	128	114	117	73	66	52	38	36	30

Figure 37: Vehicle Classification – Quarry Road east of Southern Crossover – Sat



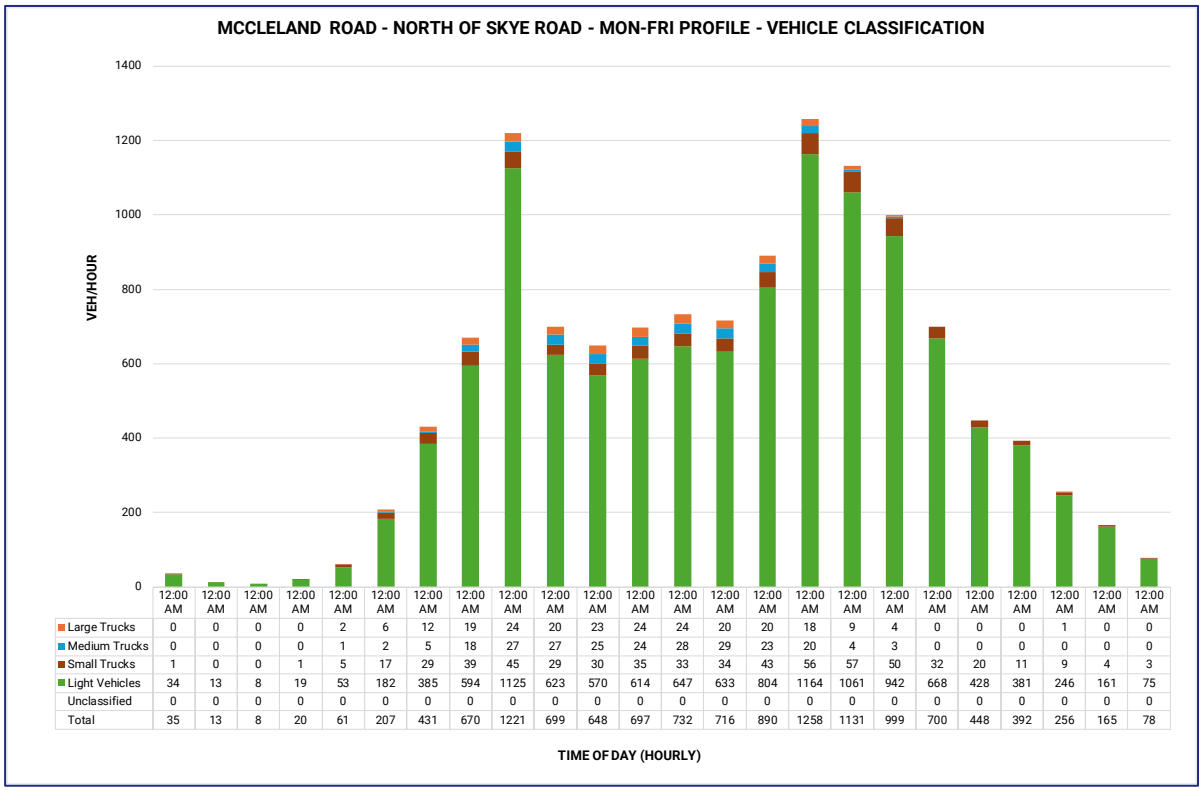
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Large Trucks	0	0	0	0	0	3	8	22	24	28	33	27	26	31	24	18	5	3	1	0	0	0	0	0
Medium Trucks	0	0	0	0	0	1	8	18	45	55	54	61	70	62	51	43	2	1	0	0	0	0	0	0
Small Trucks	0	0	0	0	1	10	17	21	28	17	17	16	19	18	22	34	36	26	13	10	8	6	2	1
Light Vehicles	9	3	1	1	10	33	92	164	412	209	172	163	161	144	170	347	288	284	169	108	74	52	28	13
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	3	1	1	11	47	125	225	509	309	276	267	276	255	267	442	331	314	183	118	82	58	30	14

Figure 38: Vehicle Classification – Quarry Road (Outside #16 Quarry Road) – Mon-Fri



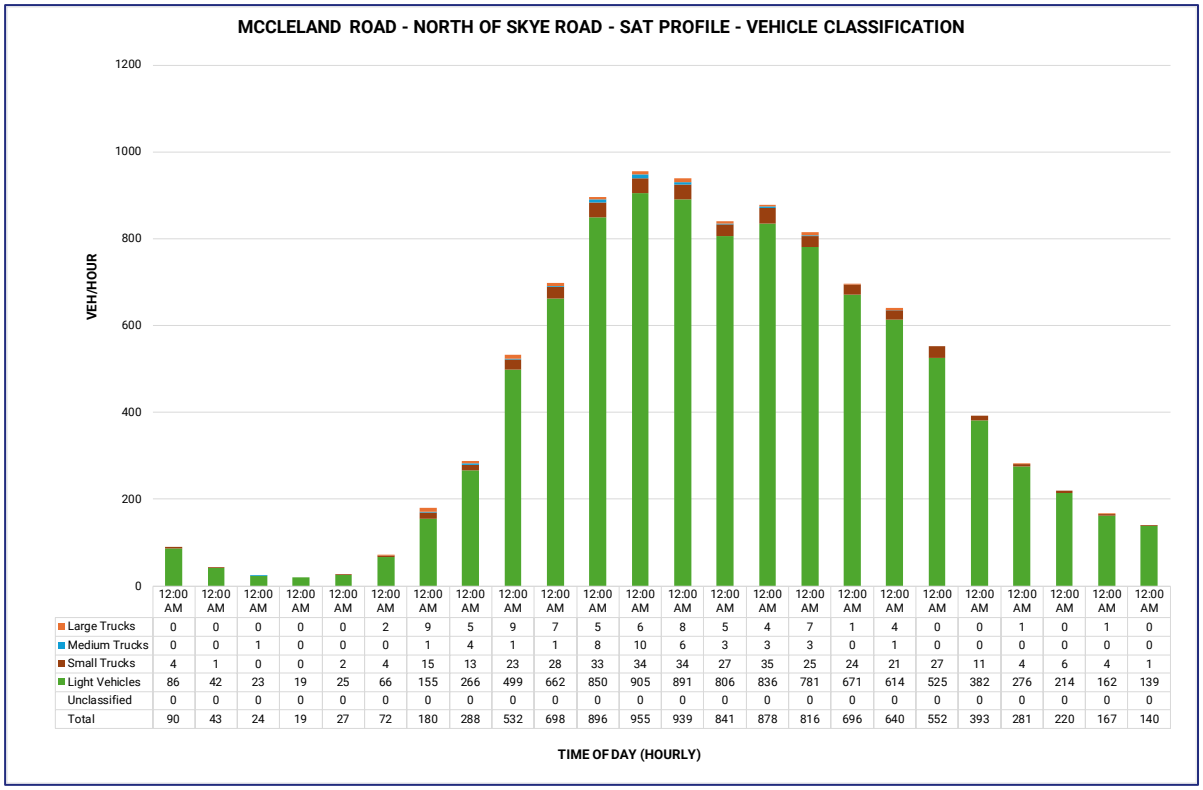
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Large Trucks	0	0	0	0	0	2	2	5	8	14	10	9	5	1	1	0	1	0	0	0	0	0	0	0
Medium Trucks	0	0	0	0	0	0	0	2	3	10	15	16	17	4	0	0	0	1	0	0	0	0	0	0
Small Trucks	2	1	0	2	0	2	2	11	10	14	19	18	12	12	14	13	10	12	8	7	5	5	5	0
Light Vehicles	20	4	6	5	5	12	25	61	107	174	208	222	219	200	177	142	141	140	123	92	75	53	45	43
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	22	5	6	7	5	16	29	79	128	212	252	265	253	217	192	155	152	153	131	99	80	58	50	43

Figure 39: Vehicle Classification – Quarry Road (Outside #16 Quarry Road) – Sat



	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM
Large Trucks	0	0	0	0	2	6	12	19	24	20	23	24	24	20	20	18	9	4	0	0	0	1	0	0
Medium Trucks	0	0	0	0	1	2	5	18	27	27	25	24	28	29	23	20	4	3	0	0	0	0	0	0
Small Trucks	1	0	0	1	5	17	29	39	45	29	30	35	33	34	43	56	57	50	32	20	11	9	4	3
Light Vehicles	34	13	8	19	53	182	385	594	1125	623	570	614	647	633	804	1164	1061	942	668	428	381	246	161	75
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	35	13	8	20	61	207	431	670	1221	699	648	697	732	716	890	1258	1131	999	700	448	392	256	165	78

Figure 40: Vehicle Classification – McClelland Drive north of Skye Road – Mon-Fri



	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM	12:00 AM
Large Trucks	0	0	0	0	0	2	9	5	9	7	5	6	8	5	4	7	1	4	0	0	1	0	1	0
Medium Trucks	0	0	1	0	0	0	1	4	1	1	8	10	6	3	3	3	0	1	0	0	0	0	0	0
Small Trucks	4	1	0	0	2	4	15	13	23	28	33	34	34	27	35	25	24	21	27	11	4	6	4	1
Light Vehicles	86	42	23	19	25	66	155	266	499	662	850	905	891	806	836	781	671	614	525	382	276	214	162	139
Unclassified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	90	43	24	19	27	72	180	288	532	698	896	955	939	841	878	816	696	640	552	393	281	220	167	140

Figure 41: Vehicle Classification – McClelland Drive north of Skye Road – Sat

3.6.4. Road Safety Review

We have undertaken a review of the road safety record for the road network surrounding the subject site. The table below details the locations of casualty crashes recorded over the 5-year period (30th June, 2018 and 31st July , 2023).

The crash investigation area is shown in the figure below.

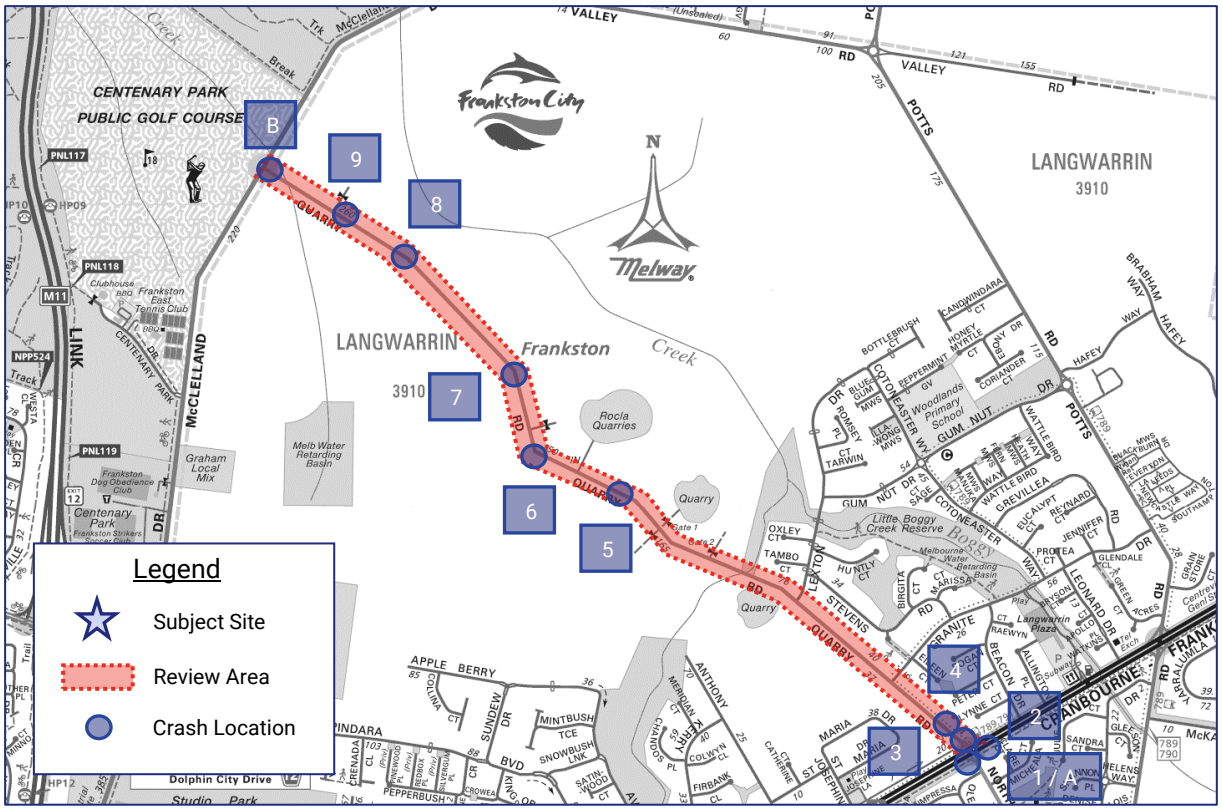


Figure 42: Crash History Investigation Area

Table 8: Casualty crash history

No.	Location	Date	Time	Severity	Type (DCA Code)	Type of Accident
1	Cranbourne-Frankston Road at Northgateway	Friday 17/02/2023	13:00	OI	121 (LCV)	Right through. Westbound light commercial vehicle turning right collided with a south-eastbound vehicle.
		Thursday 17/06/2021	9:47	OI	110	Cross traffic (intersections only). South-eastbound vehicle

No.	Location	Date	Time	Severity	Type (DCA Code)	Type of Accident
						collided with a south-westbound vehicle.
2	Cranbourne-Frankston Road 7m northeast of Northgateway	Friday 12/06/2020	15:30	OI	130	Rear end (vehicles in same lane) involving two south-westbound vehicles.
3	Cranbourne-Frankston Road at Northgateway	Thursday 21/11/2019	14:30	OI	130	Rear end (vehicles in same lane) involving four north-eastbound vehicles.
		Saturday 25/02/2023	11:15	SI	113	Right near (intersections only). North-eastbound vehicle collided with south-eastbound vehicle turning right.
		Saturday 22/05/2021	7:35	SI	113	Right near (intersections only). Southbound vehicle collided with north-eastbound vehicle turning right.
4	Quarry Road 43m northwest of Northgateway	Thursday 29/08/2019	8:30	OI	147	Vehicle strikes another vehicle while emerging from driveway. Collision involving south-eastbound and south-westbound vehicles.
5	Quarry Road 686m northwest of Lexton Drive	Tuesday 3/05/2022	8:00	OI	145 (HRV)	Reversing in stream of traffic. North-westbound HRV collided with reversing vehicle.
6	Quarry Road 933m northwest of Lexton Drive	Sunday 6/03/2022	19:00	SI	184 (M)	Out of control on carriageway (on bend) involving south-eastbound motorcycle.
7	Quarry Road 1052m southeast of McClelland Drive	Sunday 5/07/2020	15:25	OI	180	Off carriageway on right bend involving south-eastbound vehicle.

No.	Location	Date	Time	Severity	Type (DCA Code)	Type of Accident
8	Quarry Road 527m southeast of McClelland Drive	Monday 27/09/2021	17:10	SI	173	Right off carriageway into object/parked vehicle involving north-westbound vehicle.
9	Quarry Road 186m southeast of McClelland Drive	Tuesday 13/08/2019	15:30	OI	140	U turn involving a north-westbound and south-eastbound vehicle.

LEGEND:
OI: Other Injury SI: Serious Injury F: Fatality
(B): Bicyclist (M): Motorcyclist (P): Pedestrian
(C): Bus/Coach (RT): Rigid Truck (ST): Semi-trailer
(LCV): Light Commercial Vehicle (Rigid) <=4.5 Tonnes GVM
(HRV): Heavy Vehicles (Rigid) >4.5 Tonnes

A total of 12 casualty crashes were recorded within the review area. Based on the size of the review area the number of crashes is not unusual.

The crashes above do not exhibit a discernible crash pattern and were distributed across various locations, with the number of crashes not unusual in the context of a sub-arterial road (i.e. higher incidence of crashes due to higher exposure).

No crashes were recorded at the intersection between Quarry Road and McClelland Drive during the review period or at the intersections between the site access and Quarry Road.

Based on the above, the casualty crashes do not highlight any road safety concerns that would preclude the proposed expansion.

2017-2018 Review

It is acknowledged that the period in which the peak activity from the quarrying activity was during 2017-2018. A review of the crashes within the study area during this period is provided in the following table.

A total of 2 casualty crashes were recorded within the review area between 2017 and 2018. Based on the size of the review area the number of crashes is not unusual nor representative of a specific traffic safety issue.

Table 9: Casualty crash history (2017-2018)

No.	Location	Date	Time	Severity	Type (DCA Code)	Type of Accident
A	Cranbourne-Frankston Road at Northgateway	Wednesday 27/09/2017	12:30	OI	140	U turn involving a south-westbound and north-eastbound vehicle.
B	McClelland Drive at Quarry Road	Tuesday 2/05/2017	22:30	OI	174 (M)	Out of control on carriageway (on straight) involving a north-eastbound motorcycle.

Car Parking Conditions

No Stopping restrictions apply on both sides of Quarry Road and Valley Road in the vicinity of the subject site.

The car parking demands from the development site are fully contained within the site boundaries as required and there is no reliance on off-site car parking.

3.7. Alternative Transport Modes

3.7.1. Public Transport

There is limited public transport services in close proximity to the site. The nearest services operate along Frankston-Cranbourne Road to the east however, pedestrian connections to these services are not readily available.

4. Planning Background

Application No. 754/2022 was previously submitted to Frankston City Council which received a Refusal to Grant a Permit (dated 3rd October, 2023). While this application was withdrawn by the applicant the Council position is relevant noting that the current application through the Development Facilitation Program is effectively unchanged.

The grounds of refusal specified by Council did not directly relate to traffic engineering matters. Further consideration of traffic engineering matters was provided by Council Officer's within the Delegate Report (dated 3rd October 2023). The relevant commentary is reproduced as follows.

> *It is not clear from the submitted documents what amount of on-site car parking provision is to be provided, other than noting that the number of employees is not proposed to increase beyond the number that were on-site prior to the end of 2018 and that there is adequate space on-site in the vicinity of the office to accommodate the car parking demand generated by the development.*
>
> *Therefore, clarification is sought regarding the proposed number of employees and number of on-site parking spaces to be provided to determine if this will be to the satisfaction of FCC.*
>
> *The use of the existing access of Quarry Rd is deemed acceptable, noting that the Valley Rd site entry will be for the use of light vehicles and emergency use only.*
>
> *Clause 52.06 does not specify a parking rate for Extractive Industry; therefore, parking provision is to the satisfaction of Council.*
>
> *The Traffic Report prepared by the applicant states that the number of employees on site is not proposed to increase beyond the number onsite prior to the end of 2018. The report states there is adequate space on-site in the vicinity of the office to accommodate parking demands for the proposal.*
>
> *The report does not identify how many employees were on site at that time. The report does not identify how many spaces are provided on 150 Quarry Road. The plans provided with the application do not show the location, number, or dimensions of the parking spaces.*
>
> *This information must be provided for Council's Traffic Engineers to consider if the parking provision is to the satisfaction of Council.*
>
> *The Traffic Report prepared by the applicant states that all access to 60 Valley Road is proposed to occur via the existing quarry at 150 Quarry Road using the existing internal haul roads. The existing crossovers to Valley Road will be maintained for emergency vehicle and light vehicle access only. Trucks associated with the sand extraction are proposed to use the existing access points on Quarry Road.*
>
> *The Traffic Report prepared by the applicant states that all the proposed operations at 60 Valley Road are expected to generate similar volumes of truck traffic to that which was generated at 150 Quarry Road up until the end of 2018.*
>
> *If permission was to be granted, a condition would have been included restricting the existing crossovers on Valley Road to emergency vehicle and light vehicle access only.*

As detailed, Council Traffic Engineers did not raised any concerns regarding the traffic impacts from the development or vehicle access arrangements. Some concerns associated with the demonstration of adequate car parking areas were raised.

To address the adequacy of the on-site car parking a car parking concept plan has been prepared and is attached at Appendix A.

Department of Transport Referral

The Department of Transport considered Application No. 754/2022 and identified no objection or any specific permit condition requirements (Correspondence dated 16th November, 2022).

5. Traffic Engineering Assessment

5.1. Car Parking Requirements

The proposed development falls under the land-use category of 'extractive industry' under Clause 73.03 of the Planning Scheme. A definition of the land use is provided as follows:

> *Land used for the extraction or removal of stone from land for commercial use, or to use the stone for building, construction, road or manufacturing works.*
>
> *It includes:*
>
> - *the rehabilitation of the land; and*
> - *the treatment of stone (such as crushing and processing) or the manufacture of bricks, tiles, pottery, or cement or asphalt products on, or adjacent to, the land from which the stone is extracted or removed.*

The Planning Scheme sets out the parking requirements for new developments under Clause 52.06. The purpose of Clause 52.06 is:

- *To ensure that car parking is provided in accordance with the Municipal Planning Strategy and the Planning Policy Framework.*
- *To ensure the provision of an appropriate number of car parking spaces having regard to the demand likely to be generated, the activities on the land and the nature of the locality.*
- *To support sustainable transport alternatives to the motor car.*
- *To promote the efficient use of car parking spaces through the consolidation of car parking facilities.*
- *To ensure that car parking does not adversely affect the amenity of the locality.*
- *To ensure that the design and location of car parking is of a high standard, creates a safe environment for users and enables easy and efficient use.*

The statutory parking requirements are set out at Clause 52.06-5 of the Planning Scheme.

There is no specific car parking rate for the proposed land use under Clause 52.06-5. In this regard Clause 52.06-6 sets out that:

> *Where a use of land is not specified in Table 1 or where a car parking requirement is not specified for the use in another provision of the planning scheme or in a schedule to the Parking Overlay, before a new use commences or the floor area or site area of an existing use is increased, car parking spaces must be provided to the satisfaction of the responsible authority. This does not apply to the use of land for a temporary portable land sales office located on the land for sale.*

An assessment of the car parking demands for the proposed development is provided as follows.

5.1.1. Car Parking Demand Assessment

Clause 52.06-7 allows for the statutory car parking requirement to be reduced (including to zero). An application to reduce (including reduce to zero) the number of car spaces required under Clause 52.06-5 or in a schedule to the Parking Overlay must be accompanied by a Car Parking Demand Assessment.

Clause 52.06-7 sets out that a Car Parking Demand Assessment must have regard to the following key factors:

- *The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use.*
- *The variation of car parking demand likely to be generated by the proposed use over time.*
- *The short-stay and long-stay car parking demand likely to be generated by the proposed use.*
- *The availability of public transport in the locality of the land.*
- *The convenience of pedestrian and cyclist access to the land.*
- *The provision of bicycle parking and end of trip facilities for cyclists in the locality of the land.*
- *The anticipated car ownership rates of likely or proposed visitors to or proposed occupants (residents or employees) of the land.*
- *Any empirical assessment or case study.*

Planning Practice Note 22 (August, 2023) specifies that the provisions for reducing the car parking requirement draw a distinction between the assessment of likely demand for car parking spaces (the Car Parking Demand Assessment), and whether it is appropriate to allow the supply of fewer spaces than assessed by the Car Parking Demand Assessment. These are two separate considerations, one technical while the other is more strategic. Different factors are taken into account in each consideration.

Accordingly, the applicant must satisfy the responsible authority that the provision of car parking is appropriate on the basis of a two-step process, which has regard to:

- *Likely demand for car parking spaces.*
- *Whether it is appropriate to allow fewer spaces to be provided than the number likely to be generated by the site.*

An assessment of the expected car parking demand is provided as follows.

Car Parking Demand Assessment

For this land use a first principles assessment is appropriate noting that car parking demands will largely be associated with the anticipated level of staff.

Advice from the quarry has confirmed that post development a total of 10 staff maximum would be anticipated in association with the quarry activities (allows for 6 staff maximum under the current conditions and 4 additional staff under the expansion). Allowing all staff to drive would equate to a maximum demand for 10 car spaces.

Visitors to the site are minimal with an estimate that no more than 2 separate visitors would be required on-site at any time. Allowing for each visitor to drive would equate to a demand for 2 car spaces.

There are ample hardstand areas available across the site to accommodate the anticipated car parking demand of 12 car spaces. This includes 10 car spaces within hardstand areas to the south-east the office buildings and 5 car spaces within a designated car parking area to the north of the office building.

Photographs of these areas are provided in the following figures.

A formal plan that identifies how the car parking could be accommodated within these areas with dimensions that accord with the relevant design standards is provided at Appendix A.

Overall, car parking demands for the proposed use will be accommodated on-site within car parking areas available near the site offices located on 150 Quarry Road.

There will also be occasions where staff park their vehicles within hardstand areas near the actual sand extraction works zones (parking areas not formalised) in order to park as close as possible to excavation machinery. This would further reduce the demand for car parking around the site offices and this activity would be managed by site operator as required.

Figure 43: Car Parking north of Office

Figure 44: Car Parking South of Office - Area 1

Figure 45: Car Parking South of Office - Area 2

5.2. Car Parking Layout

It was raised within the Planning Officer report that formal plans that identified the on-site car parking opportunities were not provided as part of the development application.

Car parking demands from the development will be accommodated within those existing hardstand areas adjacent to the site offices located on 150 Quarry Road.

To formally identify the number of car parking spaces that can be accommodated within these areas Traffix Group prepared car parking concept plan as attached at Appendix A. The plan identifies three car parking areas in close proximity to the site offices that will accommodate a total of 15 car parking spaces, including:

- Car parking South of Office – Area 1 – 8 car parking spaces,
- Car parking South of Office – Area 2 – 2 car parking spaces, and
- Car parking North of Office – Area 3 – 5 car parking spaces

The dimensions of car parking spaces will include minimum car space dimensions of 4.9m long and 2.6m wide with clear access aisle of 6.4m. This arrangement accords with the requirements of Clause 52.06-9.

The car parking areas are typically flat with no major grades occurring.

If required, the car parking spaces could be delineated using pavement spikes/markers rather than line marking.

Vehicle access to the car parking will be provided via a single width driveway that connects to Quarry Road via the Central LV crossover. Based on the low level of light vehicle traffic the retention of this vehicle access route is acceptable.

The use of crushed rock for the car parking areas and vehicle access is satisfactory and there is no requirement for these areas to be formalised through bitumen or concrete.

Overall, the available car parking areas will accommodate the required number of car parking spaces and that car spaces will accord with the spatial dimensions set out at Clause 52.06-9 of the Planning Scheme.

5.3. Sight Distance Review

5.3.1. Heavy Vehicle Access Locations

Sight distance requirements associated with access driveways are provided at Figure 3.3 of AS2890.2-2018 (Australian Standard Part 2: Off-Street Commercial Vehicle Facilities). Based on this figure a site distance of 83-133m is required for a 60km/h frontage road (based on 5-8 sec gap).

For the southern heavy vehicle crossover that will serve the quarry trucks the sight distance requirements are satisfied with greater than 140m available in both directions. This

arrangement ensures that suitable sight distance is available for larger vehicles to select appropriate gaps in the through traffic.

Figures that identify the satisfaction of the minimum sight distance requirements for the heavy vehicle accessway and sight distance photos are provided as follows.

Figure 46: Quarry Southern Crossover – Site Distance Compliance

Figure 47: Quarry Southern Crossover – Site Distance Southeast

Figure 48: Quarry Southern Crossover – Site Distance Northwest

5.3.2. Light Vehicle Access Location

The existing central light vehicle crossover does not include compliant sight distance towards the south-east with only 65m achieved in this direction. Sight distance to the north west is compliant with greater than 140m available.

A figure and photographs of the available site distance is provided as follows.

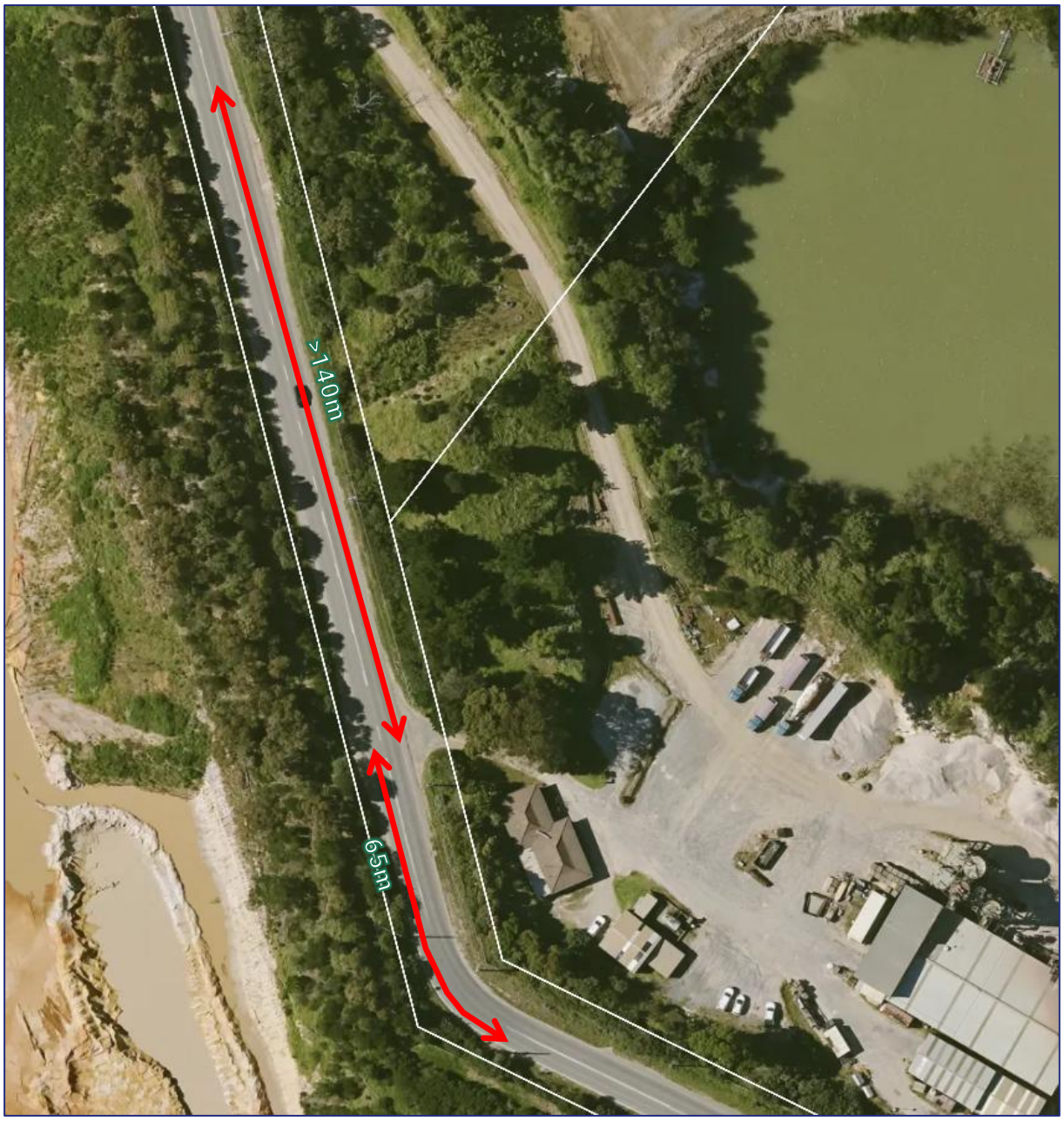


Figure 49: Quarry Light Vehicle Access – Site Distance Compliance

Figure 50: Quarry Light Vehicle Access – Site Distance South-East

Figure 51: Quarry Light Vehicle Access – Site Distance North-West

Further to the Australian Standards, recommended sight distance criteria is set out at Section 3 of *Austroads Guide To Road Design Part 4A: Unsignalised and Signalised Intersections*. While this guideline applies to new road design (i.e. not private property access), desirably, sight distance at property accesses should comply with the recommendations set out in Austroads.

Under Section 3.2 of the Austroads guidelines the types of sight distance that must be provided in the design of all intersections include:

- approach sight distance (ASD)
- safe intersection sight distance (SISD)
- minimum gap sight distance (MGSD)

Each of these types of sight distances will be assessed in the following sections.

Approach Sight Distance (ASD)

The approach sight distance (ASD) applies to the level of sight distance that must be available on the minor road approach to an intersection. In this case, it applies to the vehicle access on the approach to Quarry Road.

ASD should be measured from the drivers eye height (1.1m above the road surface) to a height of 0.0m, representing line marking at the intersection (i.e. give-way or stop line marking). The following figure details the application of ASD.

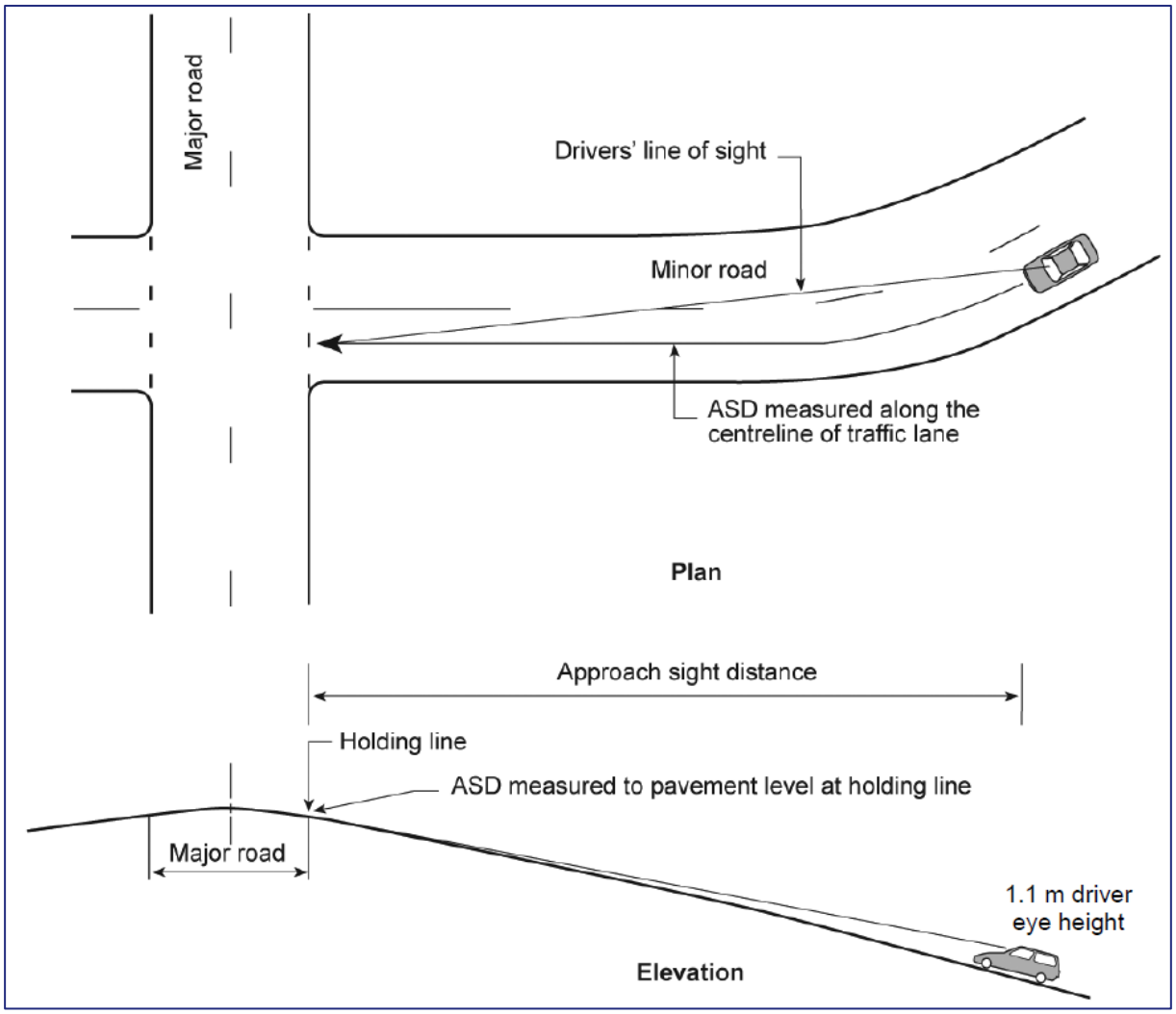


Figure 52: Application of Approach Sight Distance (ASD) (Source: Guide to Road Design Part 4A: Unsignalised and Signalised Intersections – Figure 3.1)

In relation to property access, Austroads states the following in relation to obtaining ASD:

> *ASD will need to be provided only if adequate perception of the access is not provided through other means.*

In this case, the intersection between the internal driveway and Quarry Road is entirely visible to departing drivers and adequate perception of the access is provided.

Safe Intersection Sight Distance (SISD)

Safe intersection sight distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection. SISD is the measurement between two points to provide inter-visibility between drivers and vehicles on the major road and minor road approaches.

The SISD provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation (e.g. in the worst case,

stalling across the traffic lanes), and to decelerate to a stop before reaching the collision point.

It is measured from a driver eye height of 1.1 m above the road to points 1.25 m above the road, which represents drivers seeing the upper part of cars. It assumes that the driver on the minor road is situated at a minimum distance of 7.0 m (minimum of 5.0 m) from the conflict point on the major road (5m, minimum 3m, from the edge line). The following figures illustrate the longitudinal section for the two cases representing inter-visibility; one for drivers on the major road and the second for a driver waiting in the minor road for an opportunity to enter the major road.

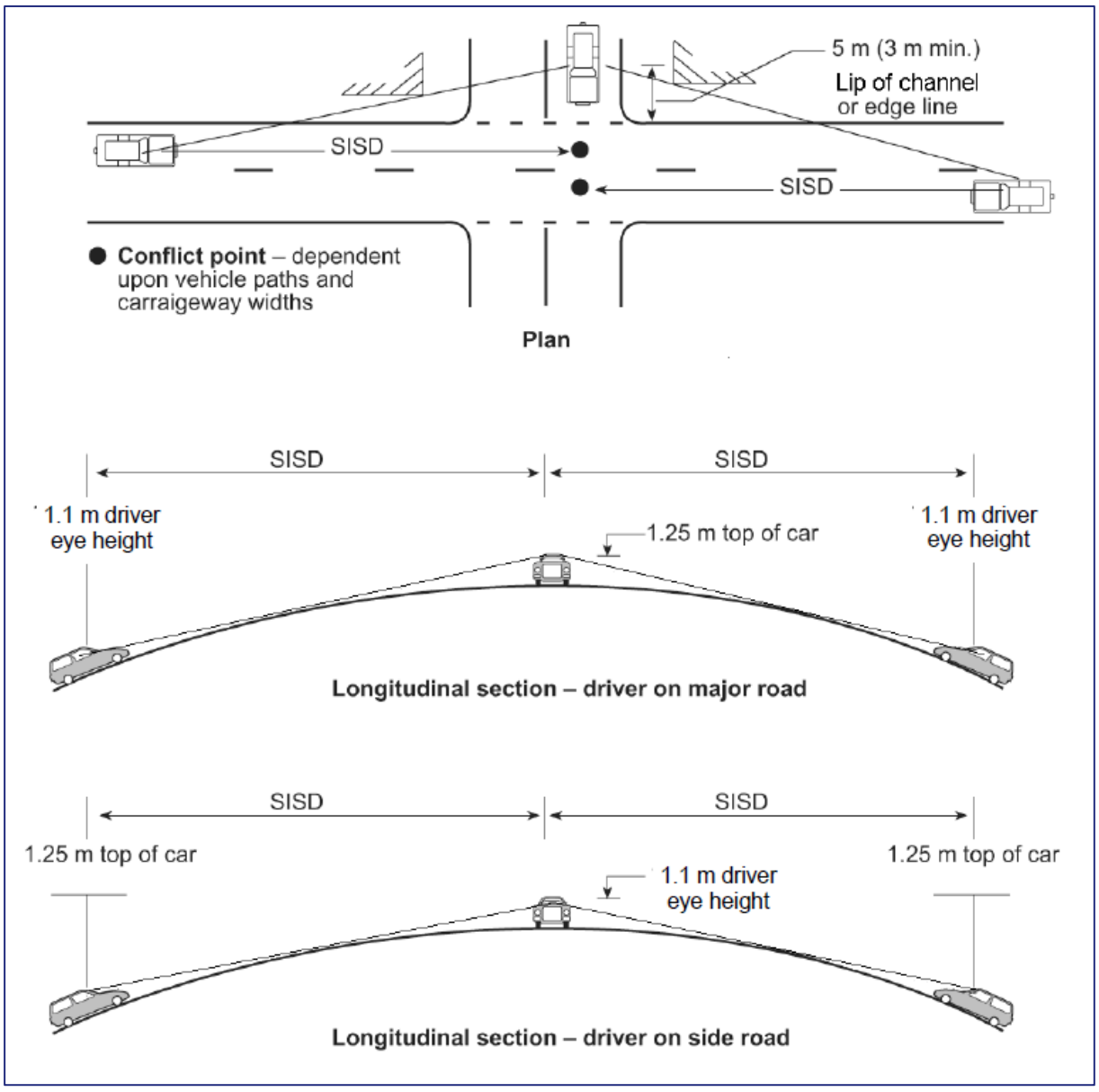


Figure 53: Application of Safe Intersection Sight Distance (SISD) (Source: Guide to Road Design Part 4A: Unsignalised and Signalised Intersections – Figure 3.2)

The SISD model should also be applied to:

- drivers waiting on the major road **to turn right into the minor road, ensuring that there is adequate sight distance to oncoming vehicles for the case of stalling across the traffic lanes, and**
- **drivers approaching the intersection along the major road ensuring that there is sufficient distance to view a vehicle propped waiting to turn right. This only applies when there is no right turn lane provided.**

These situations are depicted in the following Figure.

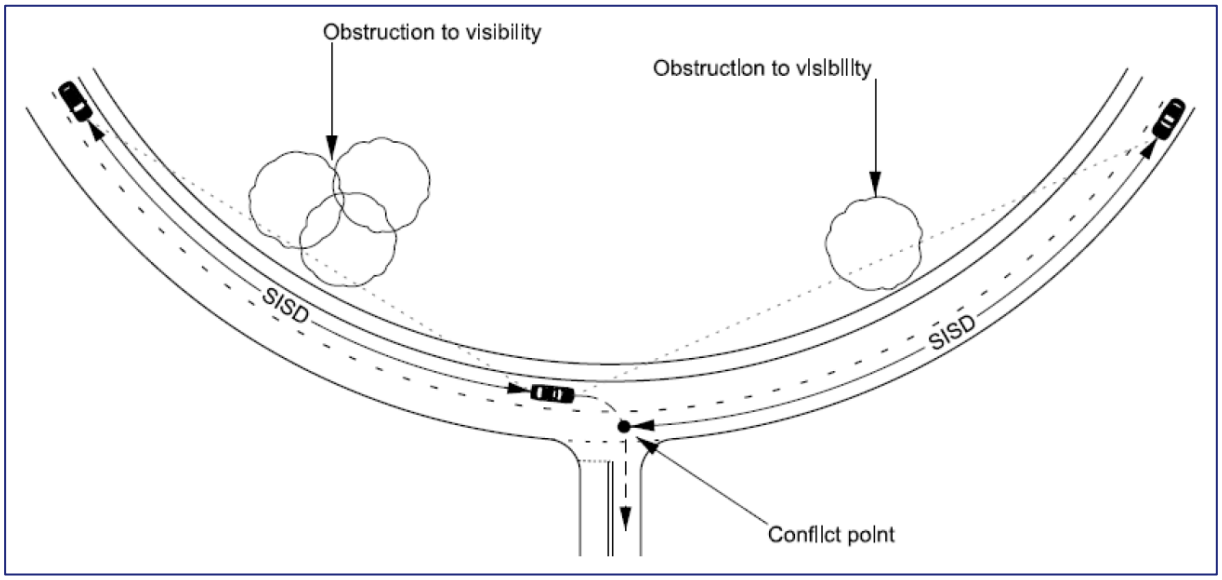


Figure 54: Application of Safe Intersection Sight Distance (SISD) (Source: Guide to Road Design Part 4A: Unsignalised and Signalised Intersections – Figure 3.2)

In this location Quarry Road has a speed limit of 60km/h. As a result of the sharp bend located to the south-east of the access vehicles approaching from this direction are required to travel at a lower speed. There is advisory speed limit of 40km/h provided on the approach to the intersection and a review of the internal radii of the north-west lanes identifies an inside curve radius of 31.5m for this movements confirming a design speed of 40km/h for the corner.

5.3.3. Extended Design Domain (EDD)

The SISD criteria set out above often cannot be obtained at accesses in constrained situations, including on roadways with tighter horizontal and vertical alignments, or where there is significant roadside vegetation.

In these situations, minimum sight distances should comply with SISD using values given under the extended design domain (EDD) criteria for intersections.

The values adopted under the EDD are values outside of the normal design domain (NDD) that through research and/or operating experience, particular road agencies have found to provide a suitable solution in constrained situations.

In the case of SISD under the EDD, the 'observation time' is permitted to be reduced based on the major road configuration and traffic volumes.

Based on the type of intersection in this case, the observation time can be reduced to 1.5 seconds because the intersection satisfies the following criteria:

> *T-intersections on single carriageway roads (two-lane, two-way roads and one-way roads) that have a traffic volume < 4000 veh/d*

The relevant SISD requirements as set out within the EDD are presented in the table below.

Table 10: Minimum EDD Safe Intersection Sight Distance (SISD) Assessment

Situation	Austroads Guide to Road Design Part 4A (Appendix A – EDD) Table A 9 Norm-Day SISD Observation Time 1.5 seconds R_T	Measurement	Satisfactory?
Minor Road Approach (Site Access)			
View to the NW from site access	89m (60km/h)	>140m	Yes
View to the SE from site access	89m (60km/h) 70m (50km/h) 53m (40km/H	65m	Compliant for 40km/h only
Major Road Approach (Waiting to turn into site access)			
View to NW while propped to turn right	89m (60km/h)	>140m	Yes
View on approach to intersection to see propped vehicle	89m (60km/h) 70m (50km/h) 53m (40km/H	72m	Compliant for 40km/h & 50km/h

While the site distance towards the south-west does not comply for a speed limit of 60km/h, the sight distance available at the proposed accessway is acceptable on the basis that:

- Right-turning traffic movements into the accessway are low with no greater than 2 movements in any hour with a total of 4 vehicle movements recorded across the entire 12 hour survey period,
- Right-out movements from the crossover onto Quarry Road are low with no greater than 2 movements in any hour with a total of 8 vehicle movements recorded across the entire 12 hour survey period,
- Increases to each of the above movements will be minimal with the proposed development only resulting in an increase of 4 staff at any time overall,

- Traffic approaching from the south-east will be traveling at speeds lower than 60km/h through the bend to the south by virtue of the constrained curve in the road alignment and design speed, in this regard the available sight distance is compliant for a reduced speed of 40km/h and
- The crossover represents the retention of an existing condition which has existed without issue for an extended period.

To increase the awareness of this access to drivers approaching from the south-east it is suggested that a 'Concealed Driveway' sign (AS Sign Code: W5-55-1) shall be placed facing north-west bound traffic prior to the existing vehicle crossover. A distance sign (AS Sign Code: W8-5) should also be included with this signage to provide additional indication of the driveway location.

The installation of this sign could be included as a condition of permit with the exact location and installation being undertaken by the applicant to the satisfaction of Council.

5.4. Traffic Impacts

As previously detailed, at Section 3.6.1 the existing quarry was observed to generate the following 12 hour traffic impacts:

- Quarry Activity – 54 vehicle movements per day, including:
  - 27 vehicle movements from central access (light vehicles), and
  - 25 vehicle movements from southern access (heavy vehicles).

Impacts from the site remediation activities are excluded from the above figures noting that this activity is separate to the proposed quarry expansions and unimpacted by the proposed development.

An assessment of the anticipated traffic impacts from the proposed quarry operations is detailed as follows.

5.4.1. Light Vehicle Impacts

The increase in staff is minimal with only 4 additional staff above existing conditions. Staff would typically generate 2 vehicle movements per day with an entry or exit movement associated with staff arrival or departure.

There is negligible variation anticipated in associated with traffic impacts external visitors to the site.

Based on the above, the following increase in light vehicle traffic is anticipated:

- 8 vehicle movements per day, and
- 4 vehicle movements per hour.

This level of passenger vehicle traffic will have negligible impacts on the operation of Quarry Road and the wider road network. These movements will occur via the Central Crossover to Quarry Road.

5.4.2. Truck Impacts

To assess the post development truck impacts on the nearby road network we have considered:

- 2018 truck generation data, allowing for entry and exit movements (i.e. each recorded truck will generate 2 movements), and
- subtracted the existing truck movements associated with the quarry operations as recorded during the 12 hours surveys of the southern quarry access.

The 2018 truck data represented the calendar year of peak average activity between the available data review from 2016-2022. Table 11 identifies the assessed impacts to the average, 85th percentile and maximum impact scenarios.

Table 11: Truck Generation – Quarry Operations

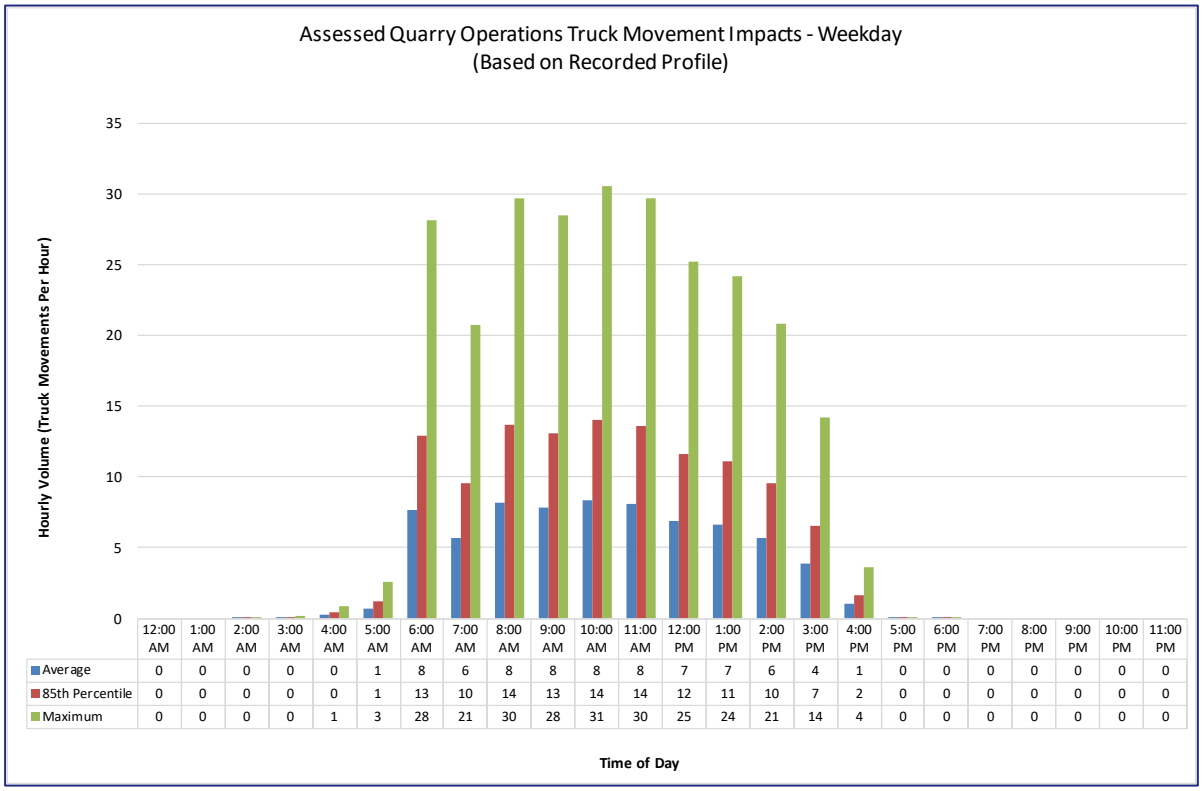
Year	Weekday Daily Values			Saturday Daily Values		
	Average	85th %ile	Max.	Average	85th %ile	Max.
2018 Profile (trucks)	48	72	142	12	18	31
Truck movements per day (1)	*96*	*144*	*284*	*24*	*36*	*62*
Less Existing Truck Movements (MPD) (2)	25	25	25	6	6	6
Net Truck Impacts (MPD)	**71**	**119**	**259**	**18**	**30**	**56**

Note 1: Each recorded truck has been assessed as generating 2 movements associated with entry and exit from the site.
Note 2: For the purpose of discounting the existing truck movements recorded during the surveys we have subtracted the truck movements associated with the quarry operations. For the Saturday impacts we have applied a factor of 25% to recorded weekday volumes in line with the typical profile recorded during 2018.

Figures that identify the hourly profile of truck movement impacts over a typical weekday and Saturday are provided in the following figures. The figures identify maximum hourly truck traffic impacts of:

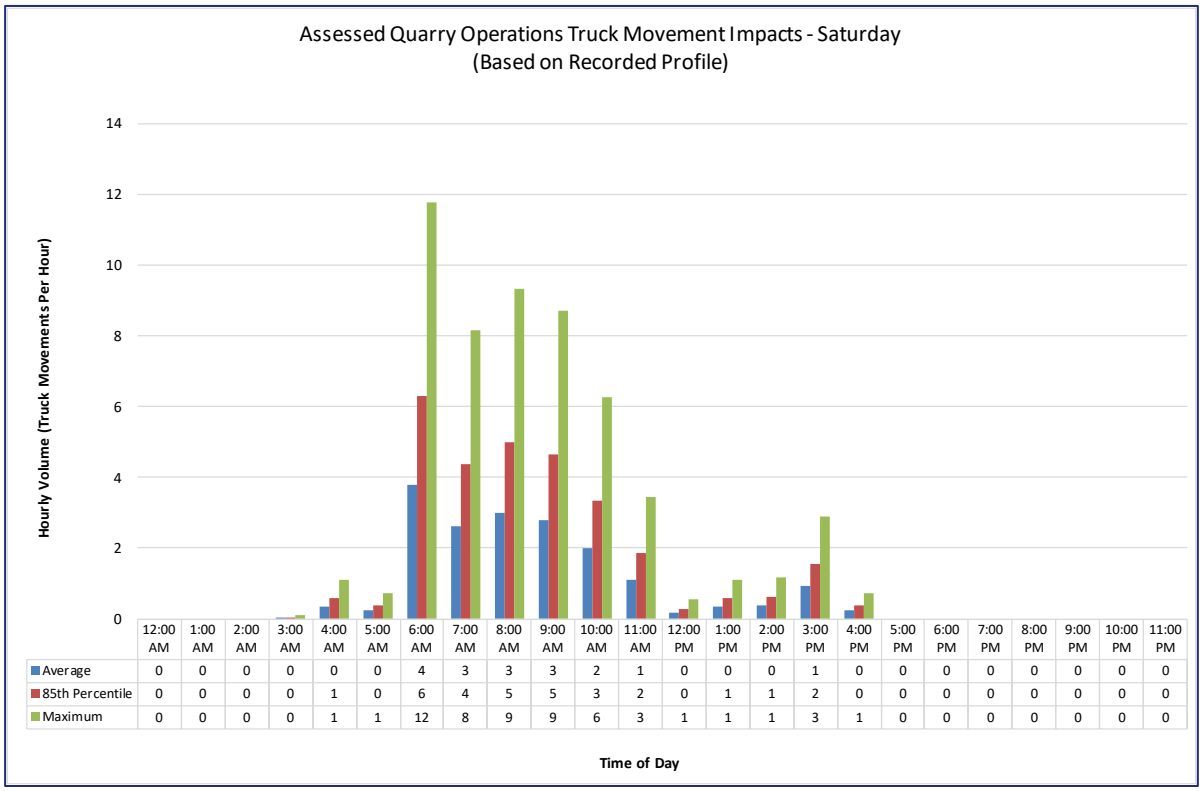
- Weekday
  - Average – 8 truck movements per hour
  - 85th Percentile – 14 truck movements per hour
  - Maximum – 31 truck movements per hour
- Saturday
  - Average – 4 truck movements per hour

- 85th Percentile – 6 truck movements per hour
- Maximum – 12 truck movements per hour



	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Average	0	0	0	0	0	1	8	6	8	8	8	8	7	7	6	4	1	0	0	0	0	0	0	0
85th Percentile	0	0	0	0	0	1	13	10	14	13	14	14	12	11	10	7	2	0	0	0	0	0	0	0
Maximum	0	0	0	0	1	3	28	21	30	28	31	30	25	24	21	14	4	0	0	0	0	0	0	0

Figure 55: Assessed Weekday Truck Movement Impacts



	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
Average	0	0	0	0	0	0	4	3	3	3	2	1	0	0	0	1	0	0	0	0	0	0	0	0
85th Percentile	0	0	0	0	1	0	6	4	5	5	3	2	0	1	1	2	0	0	0	0	0	0	0	0
Maximum	0	0	0	0	1	1	12	8	9	9	6	3	1	1	1	3	1	0	0	0	0	0	0	0

Figure 56: Assessed Saturday Truck Movement Impacts

5.4.3. Traffic Impact Discussion

The distribution of the truck traffic from the sand extraction operations is anticipated to occur primarily towards the west. This is a result of the road network to the west providing the most direct connection to Peninsula Link which connects to the greater metropolitan Melbourne area (via East Link).

This differs from the remediation activity which attract fill deliveries from various locations depending on project demand and as such was observed to typically generate movements evenly split between the east and the west.

Considering the above, we have adopted 75% of the sand extraction truck traffic as occurring to and from the west (McClelland Drive) and 25% to and from the east (Cranbourne Road). The peak hour impacts will be evenly split between entry and exit movements.

Figures that identify the traffic impacts at the site access and wider road network from the proposed quarrying activity are provided in the following figure.

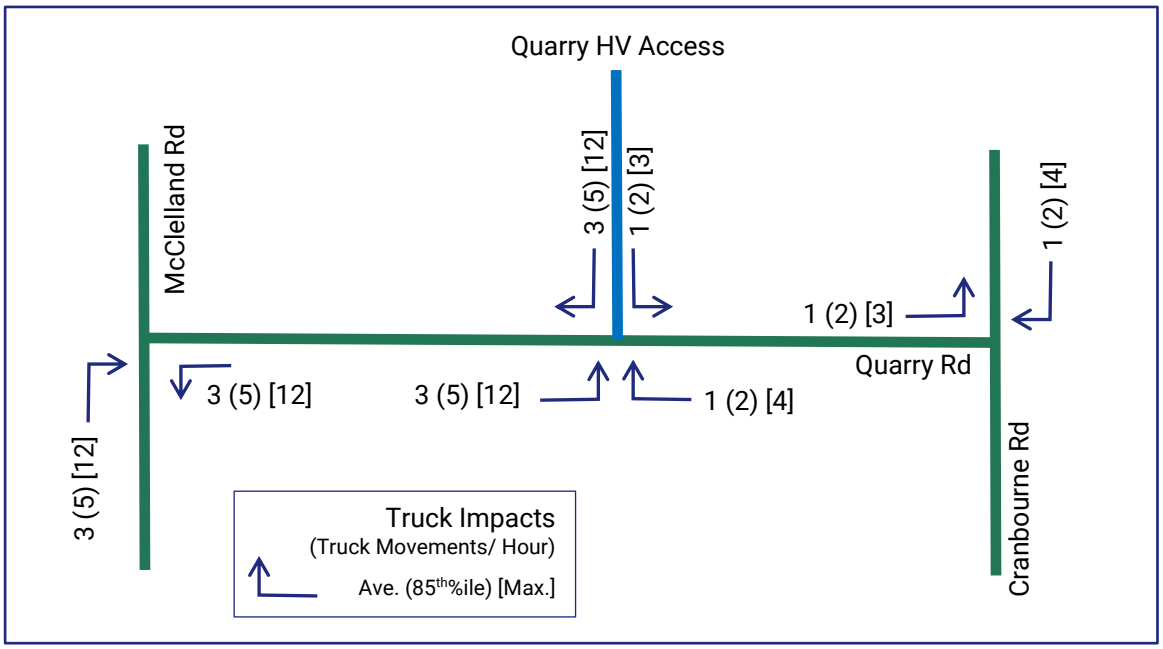


Figure 57: Proposed Sand Extraction Truck Impacts

When considering the daily impacts, the adopted distribution of truck based traffic would result in impacts (Movements Per Day) of:

- Quarry Road – east of site
  - Average – 18 truck MPD (Weekday), 4 truck MPD (Saturday)
  - 85th percentile – 30 truck MPD (Weekday), 7 truck MPD (Saturday)
  - Maximum – 65 truck MPD (Weekday), 17 truck MPD (Saturday)
- Quarry Road – west of site
  - Average – 53 truck MPD (Weekday), 14 truck MPD (Saturday)
  - 85th percentile – 89 truck MPD (Weekday), 23 truck MPD (Saturday)
  - Maximum – 194 truck MPD (Weekday), 39 truck MPD (Saturday)

5.4.4. Truck Impacts on Quarry Road

It is important to consider that this Quarry Road accommodates a high number of truck based traffic associated with similar land uses. This scenario has existed for an extended period and is expected to continue for the foreseeable future.

A comparison of the existing truck volumes and impacts from the proposed development are provided in the following table. The table provides a comparison of the weekday average noting that significantly lower impacts are expected on Saturdays.

Table 12: Daily Truck Impact Comparison

Location	Existing Truck Volumes	Post Development Conditions		
		Average Impacts	85th Percentile Impacts	Maximum Impacts
Quarry Road outside #16	938 truck MPD	18	30	65
Post Development Volumes		956	968	1,003
Quarry Road east of site access	726 truck MPD	18	30	65
Post Development Volumes		744	756	791
McClelland Road north of Skye Road	935 truck MPD	53	89	194
Post Development Volumes		988	1,024	1,129

On the basis of the above, the truck impacts from the proposed development at the eastern end of Quarry Road would result in an increase of the existing truck movements of 1.9% under the average scenario or 3.2% under the 85th percentile scenario.

The level of variation in truck traffic is acceptable and will not result in a significant variation in the operating condition along this road compared to existing conditions.

The impacts towards the west would be higher, however this section of Quarry Road does not include any residential interface and connects to the arterial road network via higher order roads only (i.e. Major Roads).

5.4.5. External Intersection SIDRA Analysis

Quarry Road & McClelland Drive

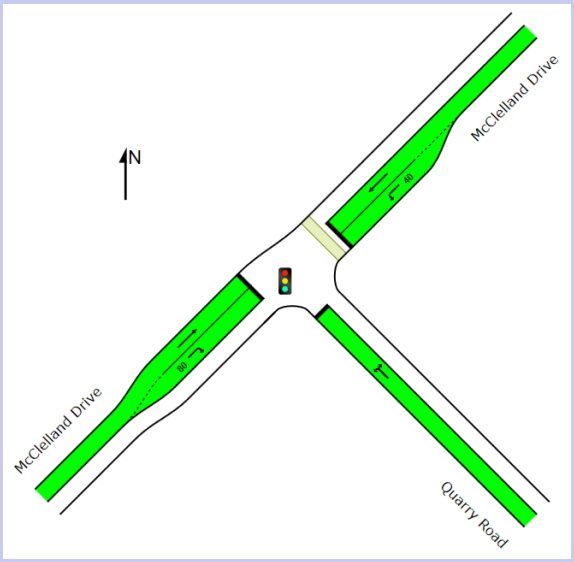
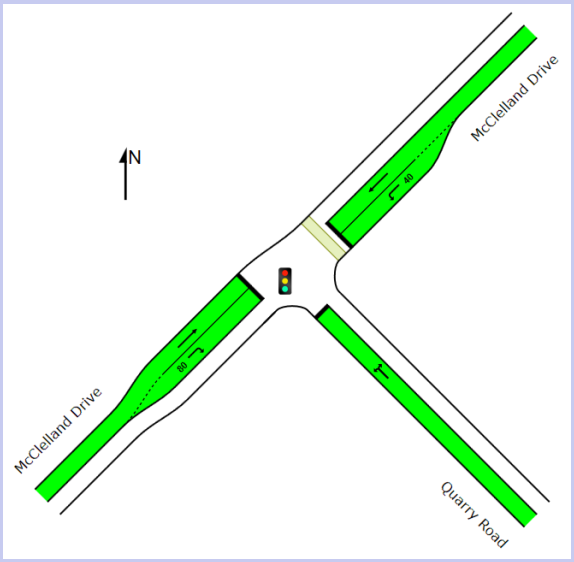
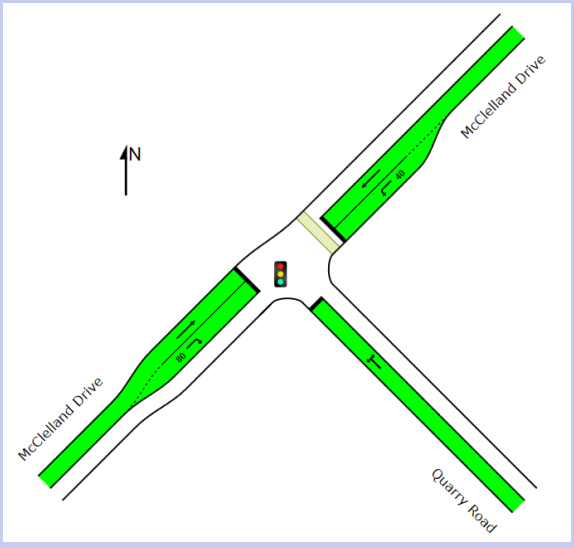
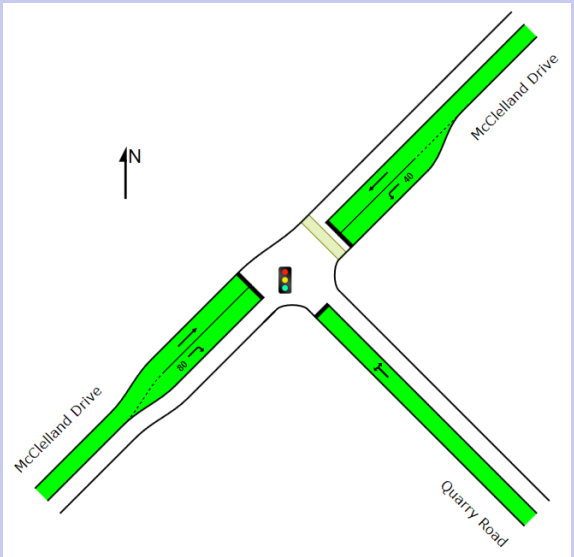
We have assessed the post-development intersection conditions of the intersection between Quarry Road and McClelland Drive using SIDRA 9.0, adopting the existing peak hour traffic conditions detailed at Section 3.6.1 and the applying an increase in the truck movements as set out at Figure 57.

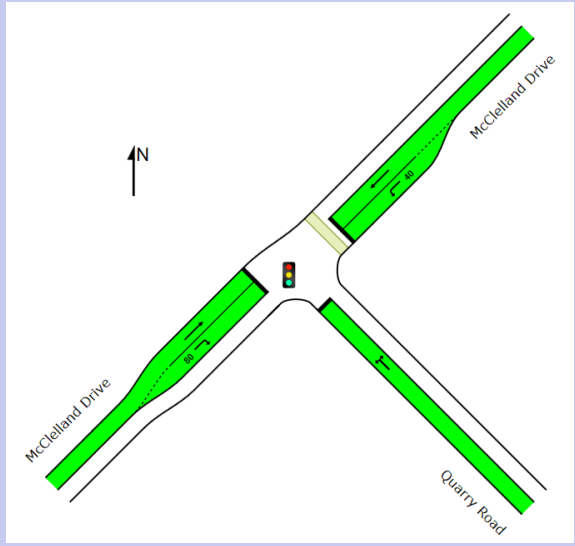
I undertook and assessment for two post development scenarios including the 85th percentile impacts and the maximum traffic impacts. It was conservatively assumed that the maximum hourly truck impacts on any day would coincide with the recorded road network peak hour.

The timing and phasing of the intersection was based on the observed conditions and DTP IDM data with a 60 second cycle time recorded over a simple two-phase intersection.

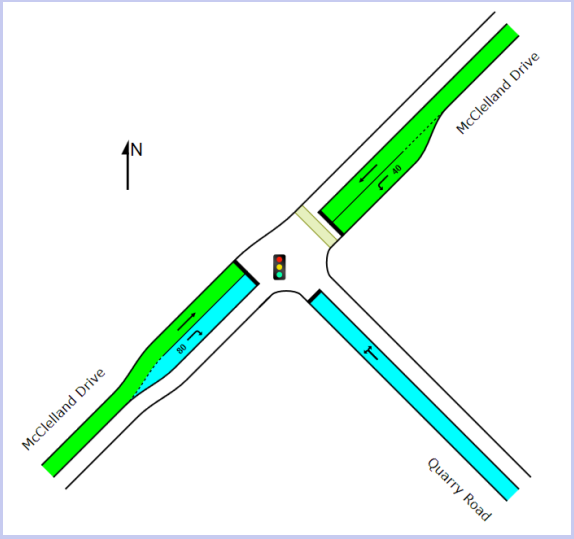
Table 13 illustrates the lane degree of saturation for the intersection under the existing and post development scenarios.

Table 13: Development Traffic Impacts – SIDRA DOS Results

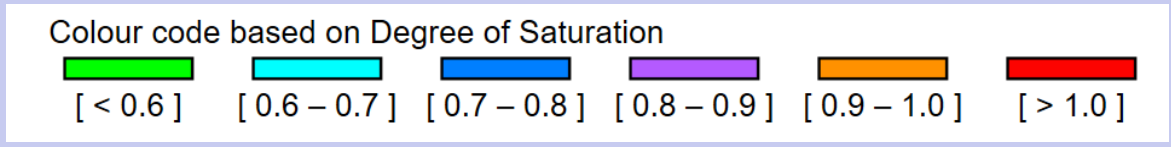
	
AM Peak Hour – Existing Conditions	*PM Peak Hour – Existing Conditions*
	
AM Peak Hour – Plus 85th Percentile Impacts	*PM Peak Hour – Plus 85th Percentile Impacts*



AM Peak Hour – Plus Maximum Impacts



PM Peak Hour – Plus Maximum Impacts



The full SIDRA results are provided at Appendix B.

The key results of the analysis are:

- During the AM Peak hour for both the 85th percentile and maximum traffic impact scenario, the DOS for all moments will remain less than 0.6. This represents excellent operating conditions with minimal impact on delays and queuing of the turning movements through the intersection.
- During the PM Peak hour for the 85th percentile traffic impact scenario, the DOS for all moments will remain less than 0.6. This represents excellent operating conditions with minimal impact on delays and queuing of the turning movements through the intersection.
- During the PM Peak hour for the maximum traffic impact scenario, the DOS for most moments will remain less than 0.6 (excellent) with an increase to 0.7 only occurring for the right-turn lane on McClelland Drive and Quarry Road. This continues to represent very good operating conditions.

  Importantly, under this scenario the length of the queue for the right-turn movement will remain wholly contained within the existing right-turn lane available at this location.

Overall, the traffic impacts from the sand extraction activities can be comfortably accommodated through the existing intersection between Quarry Road and McClelland Drive with minimal impacts on queueing and delays.

Quarry Road & Cranbourne Road

The traffic through the intersection between Quarry Road and Cranbourne Road are negligible with the 85th percentile scenario suggesting no more than 2 trucks per hour on any individual movement.

This level of traffic would be imperceptible noting the existing level of truck and light vehicle traffic that currently occurs through this intersection during peak hours.

5.4.6. Traffic Impacts Valley Road

As per the application material site access for Valley Road would be limited to light vehicles with access only required for emergency access or site maintenance.

The traffic movements associated with this activity will be negligible in context to the existing traffic conditions along this road which currently carries an average of 3,300 vehicles per day.

6. Conclusions

Having undertaken a detailed traffic engineering assessment of the proposed quarry expansion at 60 Valley Road & 150 Quarry Road, Langwarrin, we are of the opinion that:

a) under the requirements of Clause 52.06 car parking for the proposed use is to be provided on-site to the satisfaction of the Responsible Authority,

b) a maximum car parking demand of 12 car spaces associated with 10 staff and 2 visitors will occur, this level of demand will be accommodated within the existing car parking areas adjacent to the site offices within 150 Quarry Road,

c) the plan attached at Appendix A demonstrate how suitable car parking areas will be accommodated on the site with dimensions that accord with the requirements of Clause 52.06-9,

d) loading and waste collection arrangements will be fully accommodated on-site, in accordance with the objectives of Clause 65.01 of the Planning Scheme and the existing Work Authority,

e) the traffic impacts from the proposed expanded sand extraction activity can be accommodated by the nearby road network with acceptable impacts on the existing traffic conditions, this is demonstrated in the Sidra analysis at Appendix B,

f) Quarry Road and McClelland Drive carry high levels of truck traffic under existing conditions due to extensive commercial land uses that are accessed from Quarry Road. The additional truck traffic generated as a result of the sand extraction activities will not result in significant variation in these existing truck volumes,

g) while some of the relevant larger design vehicles overhang kerb at the intersection between Quarry Road and McClelland Drive, this arrangement has existed for an extensive period and the sand extraction will not result in any variation in the types of trucks that negotiate this intersection,

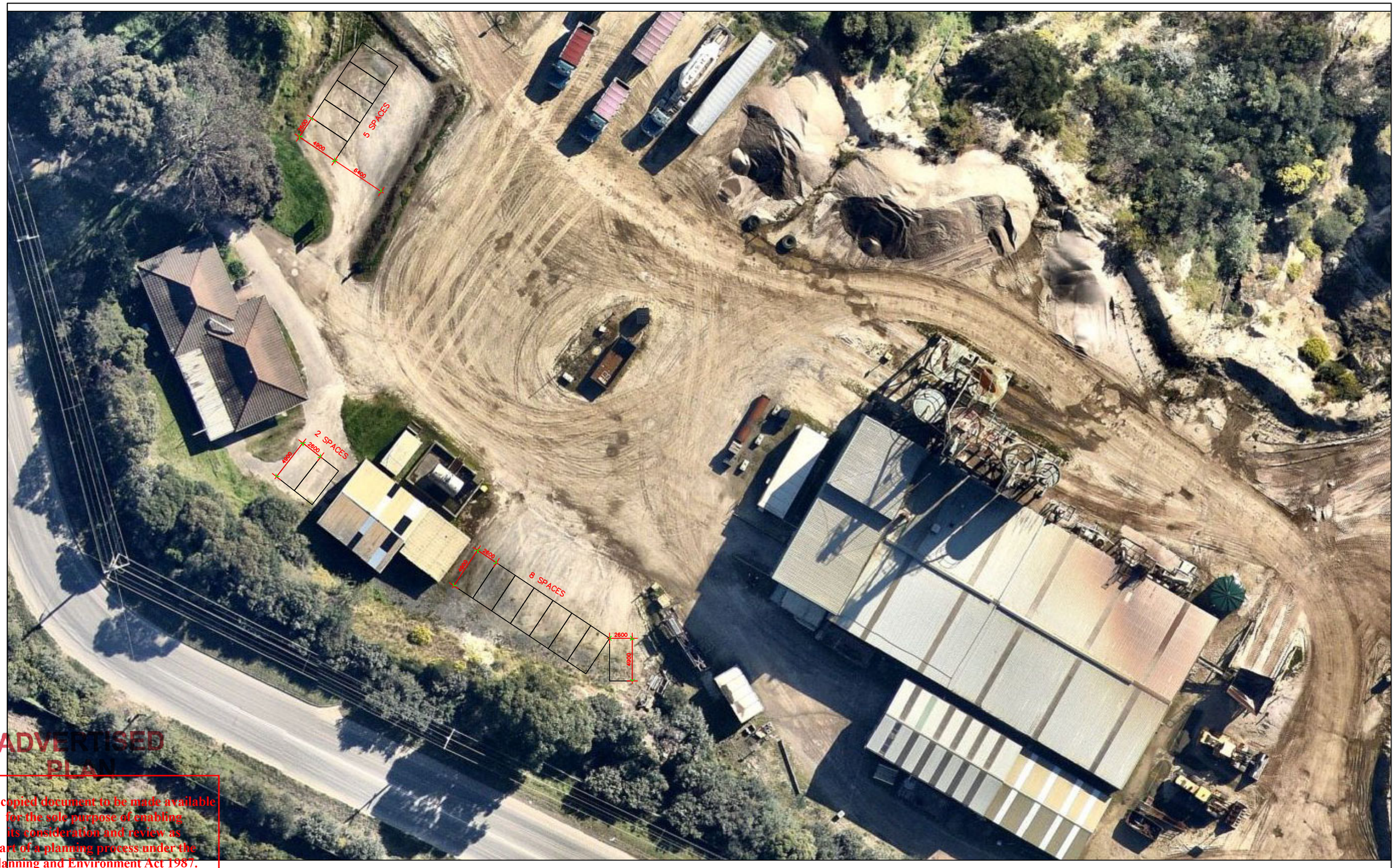
h) there is no specific crash history at the intersection between McClelland Drive and Quarry Road that relates to the types of design vehicles that will be required to access the site, and

i) there are no traffic engineering reasons why the proposed quarry expansion should be refused subject to appropriate conditions.

Appendix A

Car Parking Plan

ON-SITE PARKING OPPORTUNITIES



REV	DATE	NOTES	DESIGNED BY	CHECKED BY
A	06/03/2024	VCAT	J. MITROPOULOS	C. DUNSTAN

150-190 QUARRY ROAD, LANGWARRIN AND 60 VALLEY ROAD, LANGWARRIN

PROPOSED QUARRY EXTENSION

GENERAL NOTES:

BASE PLAN: NEARMAP AERIAL
DATED: SUNDAY 3 SEPTEMBER 2023

FILE NAME: G34433-01

SHEET NO.: 01

N

SCALE: 1:400 (A3)

0 4 8

Traffix Group
Level 28, 459 Collins St, MELBOURNE VIC 3000
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Appendix B

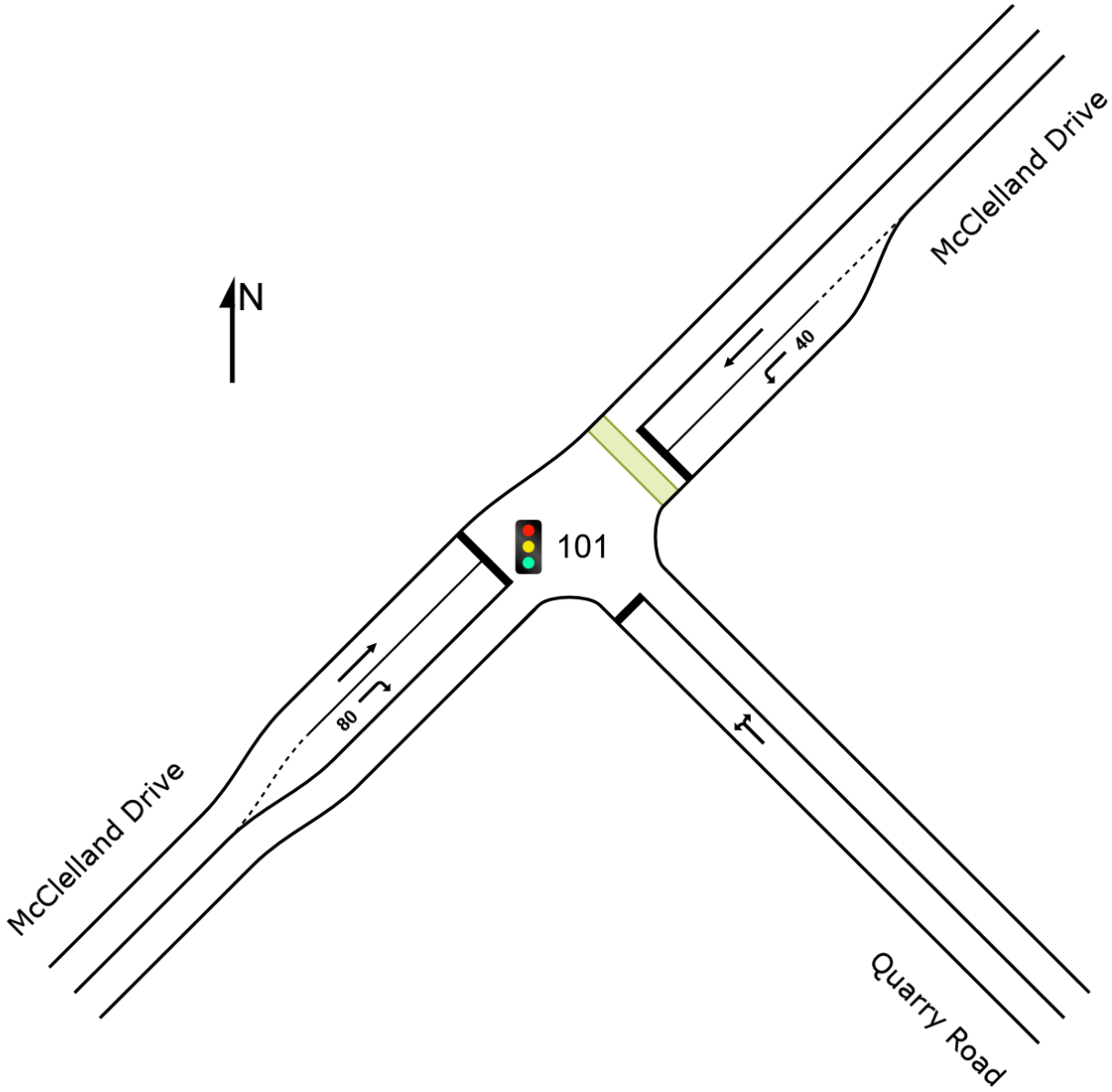
SIDRA Analysis

SITE LAYOUT

Site: 101 [AM Peak (Site Folder: General)]

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Organisation: TRAFFIX GROUP PTY LTD | Licence: NETWORK / Enterprise Level 3 | Created: Wednesday, 13 March 2024 2:25:39 PM
Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP34433\07-Analysis\SIDRA\G34433.sip9

MOVEMENT SUMMARY

Site: 101 [AM Peak (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	204	19.1	204	19.1	0.567	25.5	LOS A	7.1	58.0	0.89	0.82	0.89	40.6
3	R2	All MCs	75	16.9	75	16.9	* 0.567	25.5	LOS A	7.1	58.0	0.89	0.82	0.89	40.6
Approach			279	18.5	279	18.5	0.567	25.5	LOS A	7.1	58.0	0.89	0.82	0.89	40.6
NorthEast: McClelland Drive															
4	L2	All MCs	56	39.6	56	39.6	0.048	8.3	LOS A	0.2	1.6	0.22	0.61	0.22	50.7
5	T1	All MCs	534	1.2	534	1.2	0.558	12.1	LOS A	10.9	77.4	0.74	0.65	0.74	50.6
Approach			589	4.8	589	4.8	0.558	11.8	LOS A	10.9	77.4	0.69	0.65	0.69	50.6
SouthWest: McClelland Drive															
11	T1	All MCs	386	1.9	386	1.9	0.401	10.2	LOS A	7.1	50.7	0.67	0.58	0.67	51.4
12	R2	All MCs	113	37.4	113	37.4	* 0.448	24.8	LOS A	2.8	26.2	0.84	0.79	0.84	40.3
Approach			499	9.9	499	9.9	0.448	13.5	LOS A	7.1	50.7	0.71	0.62	0.71	48.4
All Vehicles			1367	9.5	1367	9.5	0.567	15.2	LOS A	10.9	77.4	0.74	0.67	0.74	47.4

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [AM Peak - 85th Impacts (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	209	21.1	209	21.1	0.552	24.7	LOS A	7.1	58.5	0.88	0.81	0.88	41.0
3	R2	All MCs	75	16.9	75	16.9	* 0.552	24.6	LOS A	7.1	58.5	0.88	0.81	0.88	41.0
Approach			284	20.0	284	20.0	0.552	24.7	LOS A	7.1	58.5	0.88	0.81	0.88	41.0
NorthEast: McClelland Drive															
4	L2	All MCs	56	39.6	56	39.6	0.048	9.1	LOS A	0.2	1.6	0.22	0.61	0.22	50.7
5	T1	All MCs	534	1.2	534	1.2	0.580	13.3	LOS A	11.3	80.2	0.77	0.68	0.77	50.0
Approach			589	4.8	589	4.8	0.580	12.9	LOS A	11.3	80.2	0.72	0.67	0.72	50.1
SouthWest: McClelland Drive															
11	T1	All MCs	386	1.9	386	1.9	0.415	10.9	LOS A	7.4	52.5	0.69	0.60	0.69	50.9
12	R2	All MCs	118	40.2	118	40.2	* 0.501	26.9	LOS A	3.1	29.4	0.88	0.80	0.88	39.4
Approach			504	10.9	504	10.9	0.501	14.6	LOS A	7.4	52.5	0.73	0.64	0.73	47.6
All Vehicles			1378	10.2	1378	10.2	0.580	16.0	LOS A	11.3	80.2	0.76	0.69	0.76	47.0

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [AM Peak - Max Impacts (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	217	23.8	217	23.8	0.574	24.9	LOS A	7.4	61.5	0.89	0.82	0.89	40.8
3	R2	All MCs	75	16.9	75	16.9	* 0.574	24.8	LOS A	7.4	61.5	0.89	0.82	0.89	40.9
Approach			292	22.0	292	22.0	0.574	24.9	LOS A	7.4	61.5	0.89	0.82	0.89	40.9
NorthEast: McClelland Drive															
4	L2	All MCs	56	39.6	56	39.6	0.048	9.1	LOS A	0.2	1.6	0.22	0.61	0.22	50.7
5	T1	All MCs	534	1.2	534	1.2	0.580	13.3	LOS A	11.3	80.2	0.77	0.68	0.77	50.0
Approach			589	4.8	589	4.8	0.580	12.9	LOS A	11.3	80.2	0.72	0.67	0.72	50.1
SouthWest: McClelland Drive															
11	T1	All MCs	386	1.9	386	1.9	0.415	10.9	LOS A	7.4	52.5	0.69	0.60	0.69	50.9
12	R2	All MCs	125	43.7	125	43.7	* 0.542	27.4	LOS A	3.4	32.6	0.89	0.81	0.91	39.1
Approach			512	12.1	512	12.1	0.542	14.9	LOS A	7.4	52.5	0.74	0.65	0.74	47.4
All Vehicles			1393	11.1	1393	11.1	0.580	16.2	LOS A	11.3	80.2	0.76	0.69	0.76	46.9

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [PM Peak (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	135	18.8	135	18.8	0.563	30.4	LOS A	5.2	41.8	0.95	0.81	0.95	38.6
3	R2	All MCs	51	16.7	51	16.7	* 0.563	30.3	LOS A	5.2	41.8	0.95	0.81	0.95	38.5
Approach			185	18.2	185	18.2	0.563	30.4	LOS A	5.2	41.8	0.95	0.81	0.95	38.6
NorthEast: McClelland Drive															
4	L2	All MCs	67	15.6	67	15.6	0.050	6.4	LOS A	0.2	1.7	0.22	0.62	0.22	51.6
5	T1	All MCs	422	3.2	422	3.2	0.368	6.6	LOS A	6.4	45.8	0.55	0.48	0.55	54.1
Approach			489	4.9	489	4.9	0.368	6.6	LOS A	6.4	45.8	0.50	0.50	0.50	53.7
SouthWest: McClelland Drive															
11	T1	All MCs	568	2.0	568	2.0	0.492	7.4	LOS A	9.5	67.6	0.61	0.54	0.61	53.5
12	R2	All MCs	269	5.9	269	5.9	* 0.575	17.4	LOS A	5.8	42.6	0.75	0.80	0.75	44.8
Approach			838	3.3	838	3.3	0.575	10.6	LOS A	9.5	67.6	0.65	0.63	0.65	50.3
All Vehicles			1513	5.6	1513	5.6	0.575	11.7	LOS A	9.5	67.6	0.64	0.61	0.64	49.5

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: TRAFFIX GROUP PTY LTD | Licence: NETWORK / Enterprise Level 3 | Processed: Wednesday, 6 March 2024 11:23:58 AM
Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP34433\07-Analysis\SIDRA\G34433.sip9

MOVEMENT SUMMARY

Site: 101 [PM Peak - 85th Impacts (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	140	21.8	140	21.8	0.588	30.7	LOS A	5.4	44.3	0.96	0.82	0.98	38.4
3	R2	All MCs	51	16.7	51	16.7	* 0.588	30.6	LOS A	5.4	44.3	0.96	0.82	0.98	38.4
Approach			191	20.4	191	20.4	0.588	30.7	LOS A	5.4	44.3	0.96	0.82	0.98	38.4
NorthEast: McClelland Drive															
4	L2	All MCs	67	15.6	67	15.6	0.050	6.4	LOS A	0.2	1.7	0.22	0.62	0.22	51.6
5	T1	All MCs	422	3.2	422	3.2	0.368	6.6	LOS A	6.4	45.8	0.55	0.48	0.55	54.1
Approach			489	4.9	489	4.9	0.368	6.6	LOS A	6.4	45.8	0.50	0.50	0.50	53.7
SouthWest: McClelland Drive															
11	T1	All MCs	568	2.0	568	2.0	0.492	7.4	LOS A	9.5	67.6	0.61	0.54	0.61	53.5
12	R2	All MCs	275	7.7	275	7.7	* 0.593	17.6	LOS A	6.0	44.7	0.76	0.81	0.76	44.6
Approach			843	3.9	843	3.9	0.593	10.7	LOS A	9.5	67.6	0.66	0.63	0.66	50.2
All Vehicles			1523	6.3	1523	6.3	0.593	11.9	LOS A	9.5	67.6	0.65	0.61	0.65	49.3

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Organisation: TRAFFIX GROUP PTY LTD | Licence: NETWORK / Enterprise Level 3 | Processed: Wednesday, 6 March 2024 11:23:59 AM
Project: \\tfxsrv02\Group\Synergy\Projects\GRP3\GRP34433\07-Analysis\SIDRA\G34433.sip9

MOVEMENT SUMMARY

Site: 101 [PM Peak - Max Impacts (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Intersection Quarry Road / McClelland Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Quarry Road															
1	L2	All MCs	147	25.7	147	25.7	0.622	31.3	LOS B	5.7	47.8	0.96	0.83	1.02	38.1
3	R2	All MCs	51	16.7	51	16.7	* 0.622	31.2	LOS B	5.7	47.8	0.96	0.83	1.02	38.2
Approach			198	23.4	198	23.4	0.622	31.3	LOS B	5.7	47.8	0.96	0.83	1.02	38.1
NorthEast: McClelland Drive															
4	L2	All MCs	67	15.6	67	15.6	0.050	6.4	LOS A	0.2	1.7	0.22	0.62	0.22	51.6
5	T1	All MCs	422	3.2	422	3.2	0.368	6.6	LOS A	6.4	45.8	0.55	0.48	0.55	54.1
Approach			489	4.9	489	4.9	0.368	6.6	LOS A	6.4	45.8	0.50	0.50	0.50	53.7
SouthWest: McClelland Drive															
11	T1	All MCs	568	2.0	568	2.0	0.492	7.4	LOS A	9.5	67.6	0.61	0.54	0.61	53.5
12	R2	All MCs	282	10.1	282	10.1	* 0.619	18.1	LOS B	6.4	48.3	0.77	0.82	0.79	44.2
Approach			851	4.7	851	4.7	0.619	10.9	LOS B	9.5	67.6	0.66	0.63	0.67	50.0
All Vehicles			1538	7.2	1538	7.2	0.622	12.2	LOS B	9.5	67.6	0.65	0.62	0.66	49.1

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* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
NorthEast: McClelland Drive												
P2	Full	50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12
All Pedestrians		50	53	24.4	LOS C	0.1	0.1	0.90	0.90	178.2	200.0	1.12

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
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Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.