Waihi North Project

Transportation Assessment Report

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Prepared by:
Stantec New Zealand

Project/File:
310206197

Stantec New Zealand

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date
A	For consent	IC	23/9/21	CR	30/9/21
B	Address peer review	IC	15/12/22		
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D	Final report for Fast Track Consent	AM	19/2/25	CR	19/2/2025

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Prepared by 

Signature

Andrew Metherell

Printed Name

Reviewed by 

Signature

Chris Rossiter

Printed Name

Approved by 

Signature

Andrew Metherell

Printed Name

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Acronyms / Abbreviations

AADT	Annual Average Daily Traffic Volume
ADT	Average Daily Traffic volume
CAF	Cemented Aggregate Fill
CAS	Crash Analysis System
FTE	Full Time Equivalent staff
GOP	Gladstone Open Pit
HDC	Hauraki District Council
HDP	Hauraki District Plan
LOS	Level of Service
MOP4	Martha Phase 4 Cutback (part of Project Martha)
MTPA	Metric Tonne Per Annum
NAF	Non Acid Forming material
NRS	Northern Rock Stack
NZTA	NZ Transport Agency
OGNZL	Oceana Gold New Zealand Limited
ONF	One Network Framework
ONRC	One Network Road Classification
PAF	Potentially Acid Forming material
PPE	Personal Protective Equipment
PPM	Planning Policy Manual
PTMP	Project Traffic Management Plan
SFA	Surface Facilities Area including
SH2	State Highway 2
SH25	State Highway 25
SIDRA	SIDRA Intersection traffic modelling software
TMP	Traffic Management Plan
TSF	Tailings Storage Facility
vpd	Vehicles per day
vph	Vehicles per hour
WNP	Waihi North Project
WRS	Willows Rock Stack
WTP	Water Treatment Plant
WUG	Wharekirauponga Underground Mine

1 Introduction

The current Waihi mine authorised by existing consents including Project Martha, is expected to cease production at the end of 2030. The Waihi North Project (WNP), proposed by Oceana Gold New Zealand Limited (OGNZL), seeks to extend the life of the mine operation through to approximately 2042 with rehabilitation and closure in the following year(s). This report provides assessment of transportation related effects of the project.

The existing and consented mining activities at Waihi are shown in Figure 1-1.

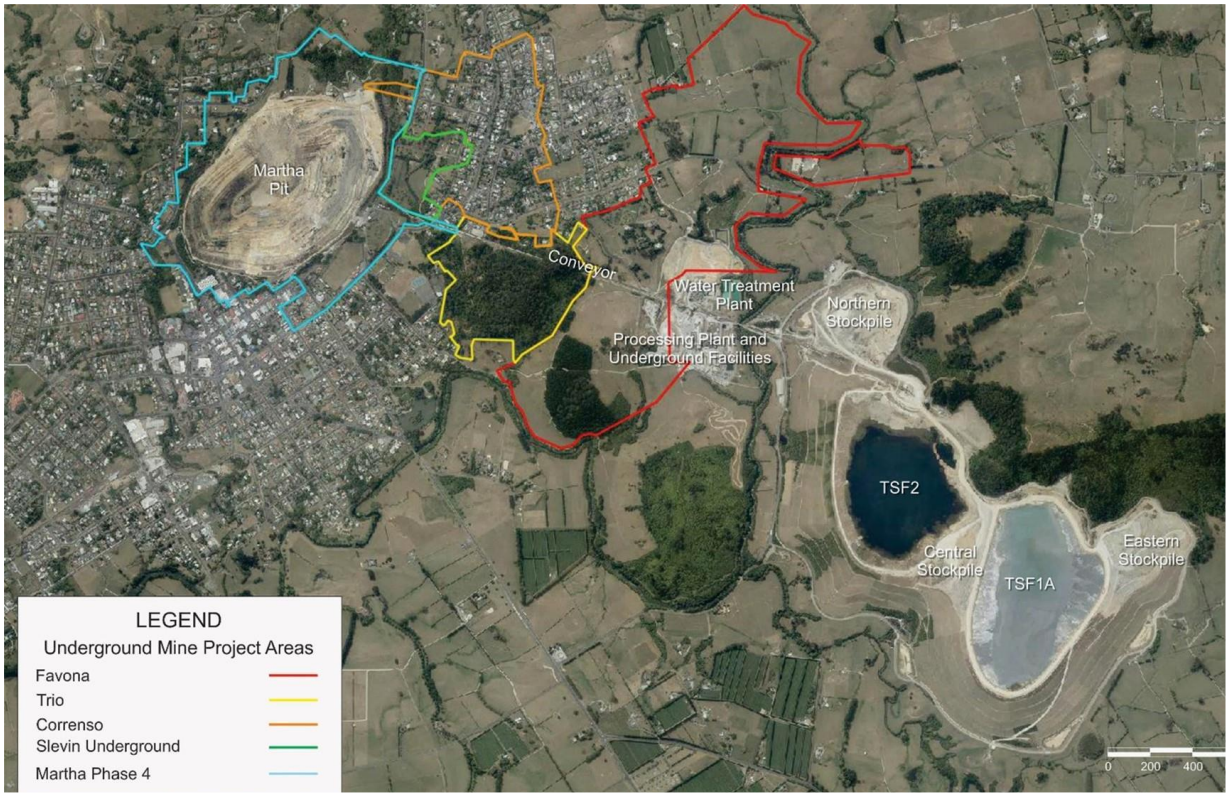

Figure 1-1: OGNZL's existing and consented mining activities at Waihi

The proposed WNP includes the following key elements, generally in two distinct locations but linked by tunnel, which are shown in Figure 1-2:

- The Wharekirauponga Underground Mine (WUG) northwest of Waihi, with associated surface infrastructure to be located on OGNZL owned farmland at Willows Road and with underground access to the existing Processing Plant at Waihi, including:
  - The Willows Portal - a single main access portal to the decline for tunnelling and return of stored rock for backfilling, located at Willows Farm on the northern side of the Willows waste rock stack.
  - The Willows Farm SFA - surface supporting infrastructure sited on land owned by OceanaGold, which includes service buildings and workshops, laydown areas, development ore, waste rock stack and top soil stockpiles, private road connection to Willows Road and internal site access roads, and substation, amongst other facilities described in the AEE.

  - The Willows Farm Helipad - a new helipad at the northern end of the Willows Road farm.
  - The Services Trench - buried services trench connecting the Willows Farm to the existing Waihi processing plant that will carry 33kV power (7MW peak demand at current estimation), fibre optic for communications and several waste and potable / raw / recycled water / treated sewage services.
- New mine areas and facilities in the vicinity of the existing processing area in the southeast of Waihi:
  - A new open pit, the Gladstone Open Pit (GOP) adjacent to the existing Waihi site, that will be mined and converted to a Tailings Storage Facility (TSF) on completion of mining;
  - A Northern Rock Stack (NRS) near the existing TSFs and Processing Plant;
  - A new TSF, referred to as TSF3 constructed to the east of the existing TSF1A;
  - An upgrade of the existing Processing Plant to 2.25 MTPA throughput capacity; and
  - Upgrading of the existing Water Treatment Plant (WTP) and reconsenting of the treated water discharge to the Ohinemuri River.

The key stages of the WNP would comprise:

- Stage One – Willows Access Tunnel declines, infrastructure associated with the Willows Access Tunnel, upgrades to the existing WTP, and Wharekirauponga resource investigation and exploration progression;
- Stage Two – Wider mining development and production associated activities; and
- Stage Three – Remediation / Closure Activities.

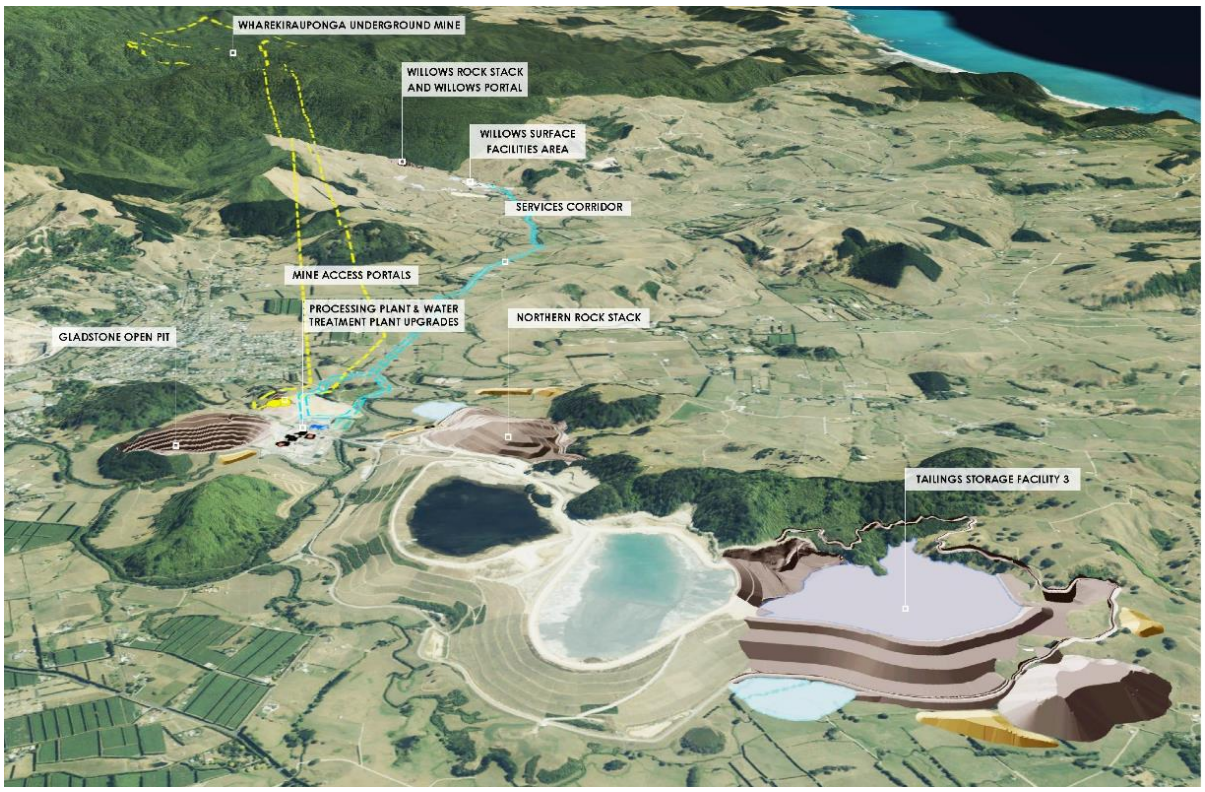

Figure 1-2: Overview of Project Components

Stantec has been commissioned by OGNZL to describe and assess the traffic and transportation effects associated with the WNP. The key transportation elements that are considered in this report include:

- An outline of the existing transport environment in the vicinity of the project;
- A description of the changes in traffic generation expected from the project;
- Assessment of likely effects of the expected traffic associated with the proposed activity on the local roads and their points of access to the state highway network; and
- Recommendations on potential mitigation measures to be adopted in order to accommodate the expected traffic loading;

The project related transport changes are in two distinct locations, being within the existing Waihi mine area and the proposed Willows Road area associated with access to the WUG. The report is structured to describe and assess these distinct areas separately.

- Part A – Project Context
- Part B – Waihi Site assessment
- Part C - Willows Road Site Assessment
- Part D – Other Matters

In summary, based on the recommendations and associated mitigation measures described herein, it is assessed that the potential adverse transportation-related effects of vehicular access and traffic movement associated with the project, during construction and over the longer term, will be avoided or mitigated to an acceptable level.

Part A – Project Context

2 Site Location

The Hauraki District Plan includes a road classification system, and this is reproduced in Figure 2-1 for the wider area of interest surrounding Waihi together with the general site location of the existing Waihi processing plant and the proposed Willows Road WUG Portal.

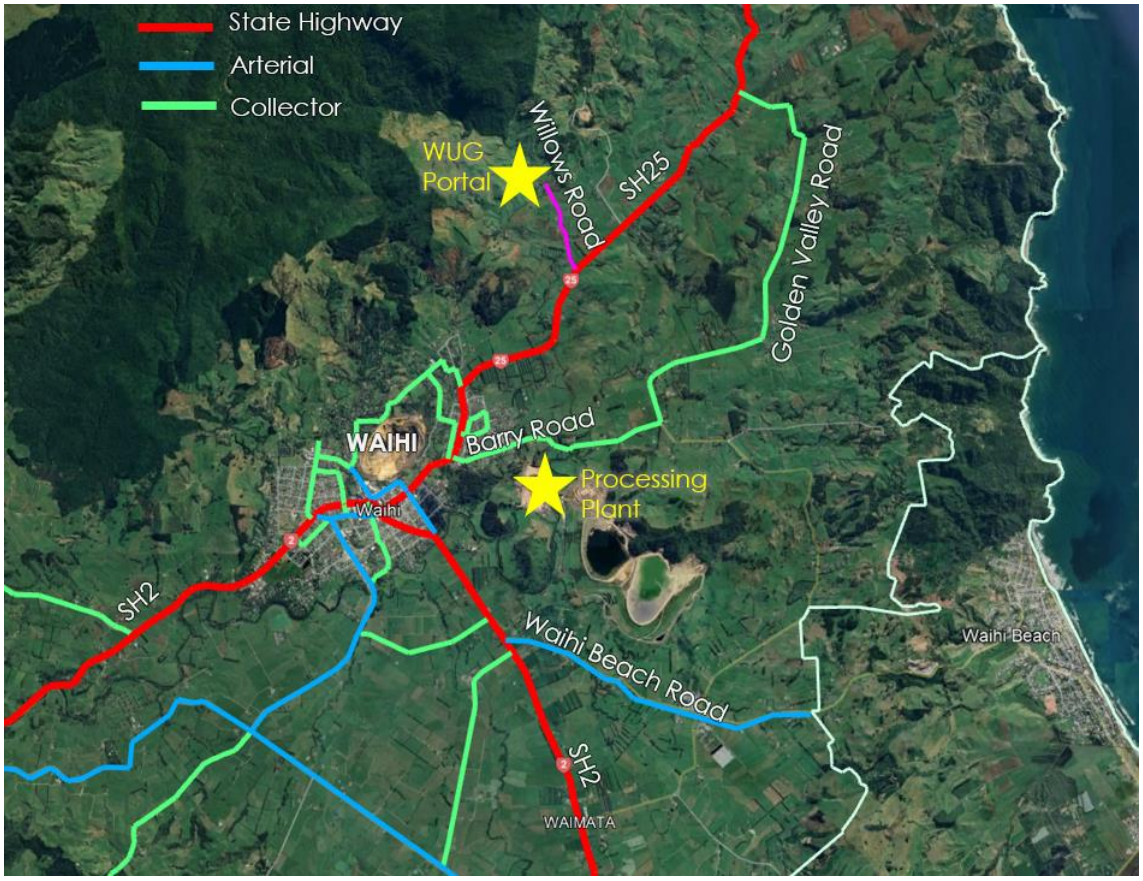

Figure 2-1: Hauraki District Plan Road Hierarchy Classification (Image Source Google Earth)

It can be seen that SH2 and SH25 provide a state highway network connecting or passing through Waihi. SH2 provides a key route from Tauranga to Auckland, whilst SH25 connects Waihi to the Coromandel Peninsula.

The existing Waihi operations are located within, and to the southeast of the Waihi township.

Willows Road is northeast of Waihi and is located in a rural area adjacent to the Department of Conservation reserve land.

3 Historical Mine Operations

Historical employment data for the mine operation is useful for demonstrating variations in the workforce, which has a direct influence on peak traffic patterns at the mine accesses.

Figure 3-1 shows the average full time equivalent (FTE) workforce including contractors associated with the mine through to 2024. The total workforce varied between 260 and 600 throughout this period.

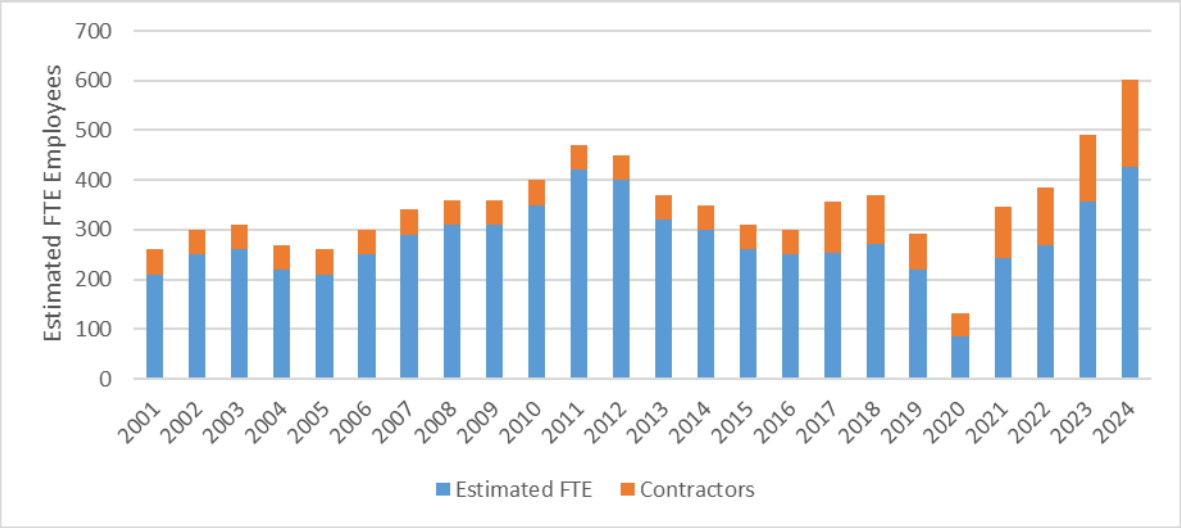

Figure 3-1 Mine Workforce 2001 to 2024

The increase in full time employees in recent times related to increase in underground mining activity with approximately 265 full time employees now involved in that activity, albeit on shift rotations. It can be seen that in recent times the number of contractors has also increased in comparison with full time employees, with a high number engaged in exploration activities associated with the WNP project.

It is noted that activity in the Martha Pit reduced significantly to occasional maintenance work as a land slip in 2015 effectively suspended the work within the pit. Following the slip, the mine workforce steadily decreased such that by 2016 the workforce comprised personnel associated with activity at the company office, and the underground operations and processing area accessed from Baxter Road.

The majority of underground mine activity is a 24-hour operation and is undertaken by shift workers. Typically, there are two shifts per day which start at around 7 am and 7 pm respectively.

Open pit work was typically a daytime-only operation. The consented hours of work are 7 am to 7 pm weekdays and 7 am to 12 pm Saturdays.

As part of previous studies, OGNZL provided historical gate log data for Baxter Road. Some relevant outputs included:

- Approximately 0.95 people per light vehicle on average;
- Approximately 5%-10% heavy vehicles;
- Weekend and public holiday activity is approximately 40% of typical weekday activity.

4 Project Martha (Consented)

There are numerous previously granted consents relating to the Waihi mining operation, the most recent of which was Project Martha which extended the life of the mine. Consent for Project Martha was granted in December 2018 which permits the following key components:

- The Martha Phase 4 Cutback (MOP4);
- The Martha and Rex underground; and
- Use of existing rock and tailings storage facilities and the Processing Plant.

The consent was based on the principal access to the two key entrances, with access to Martha Pit from Kenny Street (SH25), and access to the underground workings and processing area from Baxter Road.

OGNZL provided forecasts for personnel expectations for the Project Martha at the time of consenting over the 11-year life of the project as shown in Figure 4-1. The expected traffic demands resulted in minimal changes to movements through the Baxter Road entrance, and an increase in activity at the Kenny Street access in comparison to pre-existing levels, and the peak workforce was forecast to be less than has been experienced during earlier phases of mining.

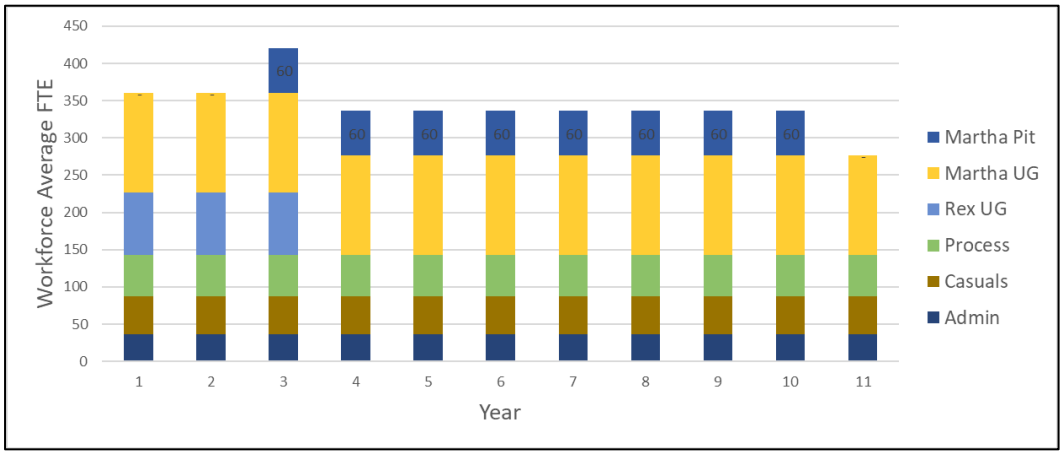

Figure 4-1 Project Martha Consented Workforce

The MOP4 component of the project was to involve laying back the northern side of the pit wall which will move the edge of the pit northwards. The proposed changes to the pit rim required a realignment of the current curve(s) linking Cambridge Road and Bulltown Road. It was proposed to realign these roads over a length of approximately 270 m to accommodate the proposed pit wall.

In addition to the traffic movements associated with the direct and casual workforce, it was expected at that time that aggregate may be required to be imported to be used in the production of cemented aggregate fill (CAF) in the Martha underground. One possible source of aggregate is the Waitawheta Quarry, located to the south-west of the site and SH2.

The consented project is subject to a number of conditions pertaining to traffic and the key ones are summarised as:

- Prior to the haulage of aggregate for the manufacture of cement aggregate fill, an annual programme for inspection, recording and maintenance of Baxter Road pavement condition, and bridge condition shall be undertaken; and the road is to be returned to at least its standard / condition prior to the commencement of the aggregate / backfill haulage activity on completion.
- No heavy vehicles associated with the Martha Underground Mine that are larger than a 11 m long rigid heavy vehicle shall travel via Baxter Road, State Highway 2 and Crean Road (in either direction) prior to the intersections being upgraded to accommodate the design vehicle.
- The consent holder shall submit a Traffic Management Plan for the haulage of aggregate for the manufacture of cement aggregate fill for backfilling the Martha Underground Mine to the Hauraki District Council for certification at least 30 working days prior to the haulage of aggregate first occurring. If certification is not provided within 30 working days of Council's receipt of the Traffic Management Plan the hauling of aggregate material authorised by this consent may commence.
- The consent holder shall maintain a log at the Baxter Rd Mine Access Gate for the duration of this consent, which records details on the vehicle movements associated with the import of aggregate for the manufacture of Cement Aggregate Fill.

5 WNP Proposal

5.1 Overview

The WNP seeks to extend the life of the mine operation out to approximately 2042, with an 18-year programme of works once consented. The current mine plan involving work on the Martha underground and open pit is expected to otherwise be completed within approximately 10 years without the Waihi North Project.

To extend the life of the mine, the WNP has been developed to expand the Waihi operation with one new open pit (GOP) and one new underground development (WUG).

A full project description is contained in the Assessment of Environmental Effects prepared by Mitchell Daysh Limited. The key elements of the WNP from a transportation perspective are:

- A new underground mine, WUG, located approximately 11 km north-west of the current Processing Plant. Site infrastructure supporting the mine will be located on OGNZL-owned farmland located at the end of Willows Road.
- The mining of a new open pit (GOP) near the existing Processing Plant and centred over Gladstone Hill. This pit will be converted to a tailings storage facility once mining is complete;
- A new tailings storage facility (TSF3) to the east of existing TSF1A;
- New rock stack (NRS) at the Northern Stockpile area adjacent to the existing TSF2;
- Upgrading of the existing Water Treatment Plant (WTP) and reconsenting of the treated water discharge to the Ohinemuri River;
- Modifications to the existing overland and load out conveyors to allow rock loading and conveying to the NRS and return of rock for backfilling; and
- Upgrading of the existing Waihi Processing Plant to enable ore processing up to 2.25 million tonnes per annum (MTPA), up from 1.25 MTPA currently.

The WNP will operate concurrently with the existing consented operations. However, it is noted that the MOP4 is no longer planned to be carried out with the WNP proposal. The aspects of Project Martha will be confined to the Martha Underground.

Road access to the WNP mine components will utilise the existing principal mine road access Baxter Road, access to Kenny Street for WUG workers to transfer to a bus, and a new access located on Willows Road.

Administration offices on Moresby Avenue will continue to provide support systems and administration.

5.2 Employment Forecasts

Traffic generation of the project will have a correlation with employment numbers. An economic forecast of employment for WNP shows total workforce (including all shift workers) associated with WNP and the Martha Underground, as represented in Figure 5-1. Employment peaks around year 8, when the Martha underground is coming to an end, WUG is producing, GOP has started producing,

and there is still a high level of construction activity. Employment transitions back to a similar level to existing over the longer term.

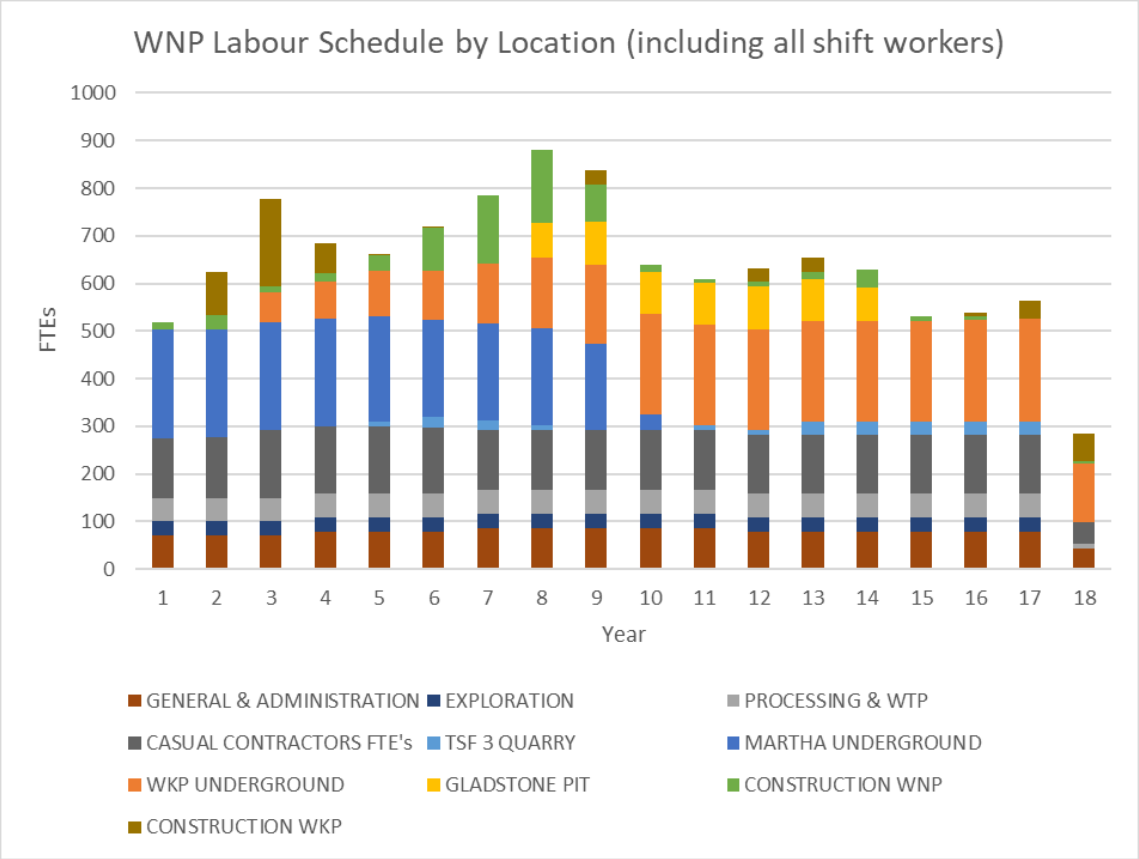

Figure 5-1: WNP Labour Schedule (Source Economic Model)

The incremental increases (excluding existing and consented operations) as a direct result of the WNP project peak later at approximately year 13, as indicated by the graph in Figure 5-2.

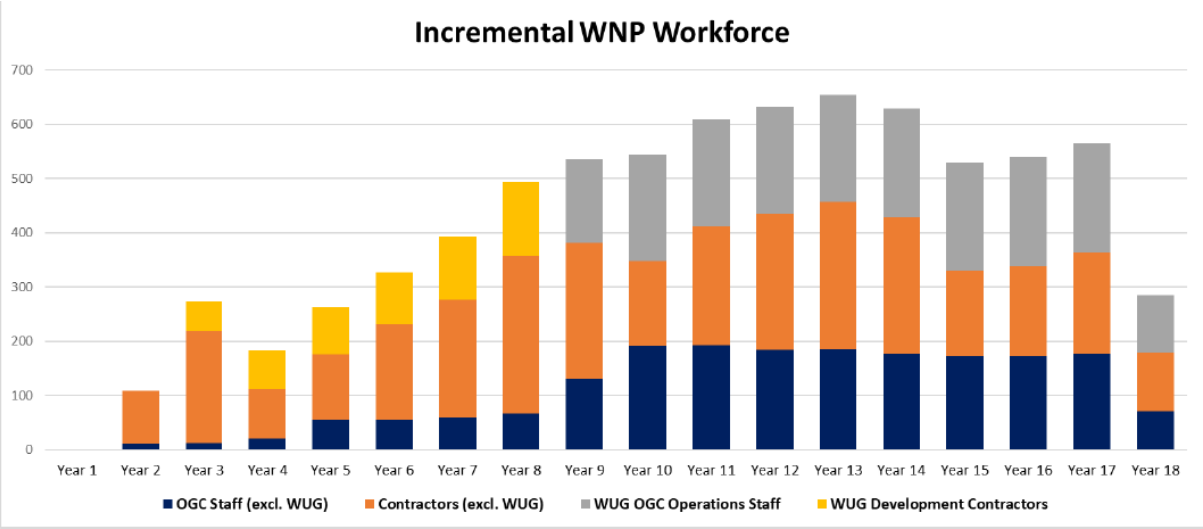

Figure 5-2 WNP Workforce Build-up (Source Mitchell Daysh Project Description)

5.3 Access Movements

In order to understand potential future traffic generation of the site, each of the accesses is expected to generally be used as follows.

Baxter Road

- Martha underground personnel/visitors/deliveries and heavy deliveries
- Processing plant personnel/visitors/deliveries
- Gladstone Pit personnel/visitors/deliveries
- Martha underground exploration
- Construction light vehicles and heavy deliveries associated with:
  - GOP Infrastructure
  - GOP TSF
  - TSF1A & 2
  - TSF3
  - NRS
  - Processing Plant Expansion

Kenny Street

- Martha Pit personnel / visitors / deliveries and heavy deliveries
- WUG operations staff and contractor movements that will use the park and ride bus service to the Willows Road site

Moresby Ave

- General and administration
- Exploration and Geology staff
- Project management staff
- No heavy vehicles

Other secondary accesses will have a negligible change from existing use.

Part B – Waihi Site Assessment

6 Waihi Site Transport Network

6.1 Existing Mine Location and Access

The existing Waihi mining processing facilities including the Processing Plant, WTP and tailings storage are located to the southeast of Waihi town centre with primary access from Baxter Road. These processing facilities serve the mine operations including the Martha Pit immediately to the north of Waihi town centre and a series of underground mines under, and to the east and southeast of the Martha Pit. Material can be transported between the Pit and the ore processing and storage areas by a conveyor which passes beneath SH25, as has occurred in the past when mining occurred in the Martha Pit.

The main administrative offices for the mine are located on the corner of Moresby Avenue and Martha Street adjacent to the Martha Pit.

A street network encircles the Martha Pit comprising of various road classifications defined in the Hauraki District Plan (HDP) as depicted in Figure 6-1.

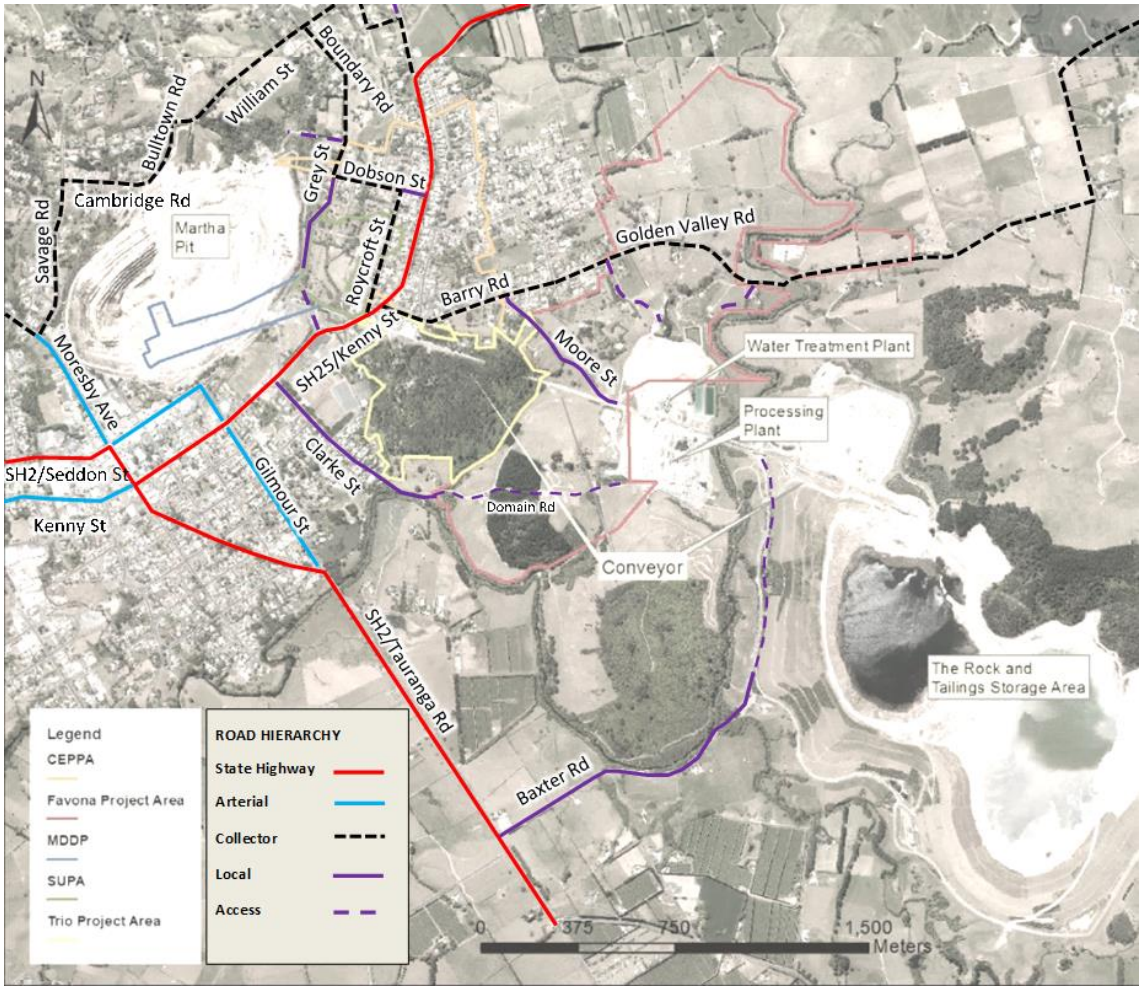

Figure 6-1: Mine and Access Locations with respect to Road Hierarchy

OGNZL has provided advice with respect to the use of the mine accesses. With very few exceptions, current mine traffic passes through one of the two main access gates which are located on Kenny Street (SH25) and Baxter Road. Other access locations are also shown.

Principal vehicular access to the Martha Pit is as follows:

- **Kenny Street:** by way of a gated entrance located on SH25 on the corner of Barry Road (previously known as Barry Road now site access only) and Kenny Street (east of Clarke Street).
- **Baxter Road:** The main vehicular access to the processing area is a gated access at the eastern end of Baxter Road, approximately 1.2 km east of its intersection with SH2.

Over-weight and over-dimension vehicles also use the main gates whenever possible, with other secondary accesses being used only when access via the main gates is impractical.

Other secondary accesses are available as follows:

- A secondary access gate to the Martha Pit (northern area) is located on Grey Street approximately 115 m north of Dobson Street. This gate was previously used for access to the Martha Pit but is no longer used with no Pit activity occurring.
- There are other secondary access gates to the processing area, however these are used relatively infrequently and include:
  (i) Moore Street approximately 500 m southeast of its intersection with Barry Road is used in cases where an oversize or heavy load cannot access via Baxter Road and is also used by light vehicles approximately 1 to 3 times per week. It is also used as an alternative to the Baxter Road access in the infrequent event that the Ohinemuri River floods, preventing access via Baxter Road.
  (ii) Clarke Street is used by light vehicles only, approximately 1 to 3 times per week.
  (iii) Two access gates off Golden Valley Road to the east of Moore Street. These accesses are also used infrequently (average of once a week over a year) by light vehicles for monitoring or exploratory work.

6.2 Access Roads and Intersections

6.2.1 Baxter Road

Baxter Road is a no-exit rural road, classified as a local road in the HDP. It is a no exit road and is primarily used to access the underground mines and the processing and tailings disposal area. Baxter Road has a typical seal width between 6.7 m and 7.7 m. The road is marked with a centre line and edge lines. Baxter Road is in flat terrain and has a curvilinear alignment.

Baxter Road operates with a posted 70 km/h speed limit, and incorporates a one-lane bridge located approximately 960 m from its intersection with SH2.

Figure 6-2 and Figure 6-3 show the current mid-block form of Baxter Road facing west and east respectively.

Figure 6-2: Baxter Road looking East

Figure 6-3: Baxter Road looking West

Traffic count data was recorded on Baxter Road during the two-week period between 7 January 2019 to 20 January 2019. The weekday average traffic volume was recorded as 665 vpd, with a 7 day Average Daily Traffic Volume (ADT) of 572 vpd.

The hourly flows are shown on Figure 6-4 and Figure 6-5.

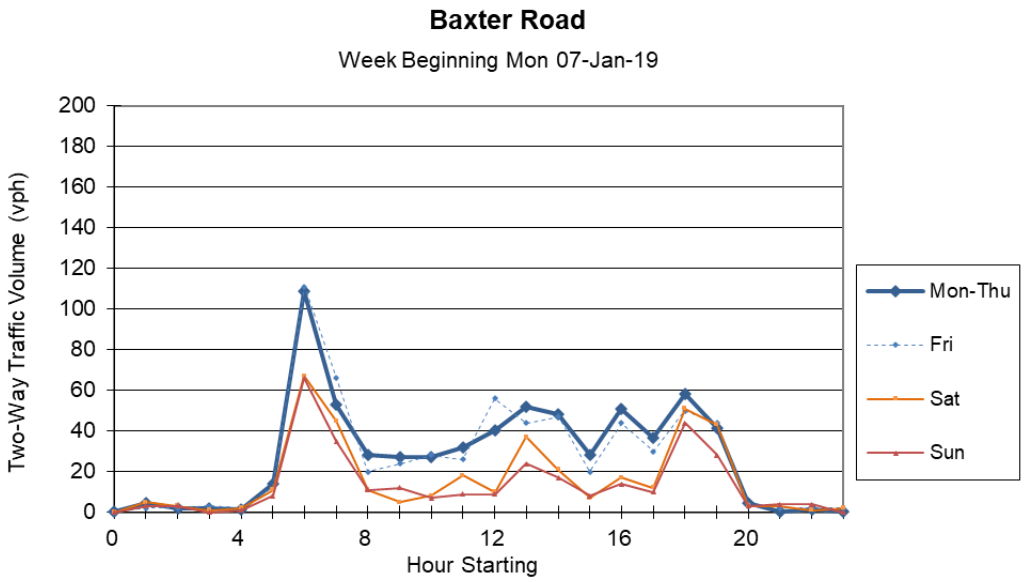

Figure 6-4: Hourly Traffic Flows (vph) on Baxter Road for week starting 7 January 2019

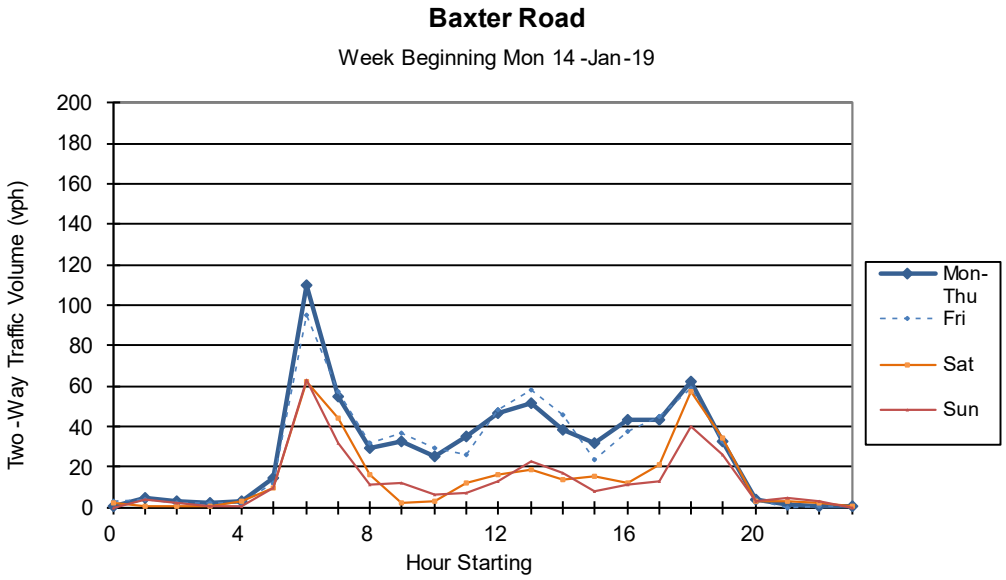

Figure 6-5 Hourly Traffic Flows (vph) on Baxter Road for week starting 14 January 2019

The data indicates clear peaks each morning of up to approximately 110 vph. Traffic flows at other times are typically up to 60 vph. The busiest hour during this two-week period occurred on the morning of Wednesday 9th January.

The data highlights the peak periods of activity which relate to the periods 6 am to 7 am as most workers arrive, and 6 pm to 7 pm, i.e. at the scheduled change of shift times.

6.2.2 Baxter Road / State Highway 2 Intersection

Baxter Road intersects SH2 approximately 1.2 km south of Waihi town centre within a posted speed zone of 100 km/h. On the opposite side of SH2 approximately 50 m to the south is located Crean Road, also a side road intersecting SH2 forming a staggered T-intersection.

The operating speed environment has been assessed from Tom Tom data and records an 85th percentile speed of 92 km/h northbound, and 95 km/h southbound. The Austroads safe intersection sight distance requirements[1] for a 95 km/h operating speed is 244 m, which is available in each direction at the intersection.

The intersection was upgraded in 2019 by NZTA as part of the safe roads programme. The upgrade included the installation of back-to-back right turn bays for both Baxter Road and Crean Road and a 3.0 m minimum width left-turn lane. The auxiliary lanes allow turning traffic to pull clear of through traffic to make a turn.

[1] 3 second observation time, 2.5 second reaction time, 0.36 deceleration co-efficient

Figure 6-6 shows the current form of the intersection.

Figure 6-6: SH2 / Baxter Road Intersection aerial photo facing south

As part of previous assessments for the mining operations at Waihi, a turning movement survey was undertaken on Wednesday 9th January 2019 to identify the numbers and types of vehicles turning into and out of Baxter Road over the course of a day. The hourly traffic flow in and out of Baxter Road are depicted in Figure 6-7. As there is negligible other activity which uses Baxter Road, this is largely indicative of vehicle movements associated with mine activity. OGNZL also provided gate log data for the number of vehicles which entered the site at the Baxter Road gate every day for the full year in 2018. On the day of the survey there was a total expected workforce of 374 people, and the traffic survey recorded 704 vpd.

It is noted that the peaks for the surveyed activity occur outside of the peaks on the highway, i.e. earlier in the morning and later in the evening coinciding with the 7 am to 7 pm shift times. At the time of the highway peak hours in the morning and afternoon, traffic volumes turning at Baxter Road are much lower.

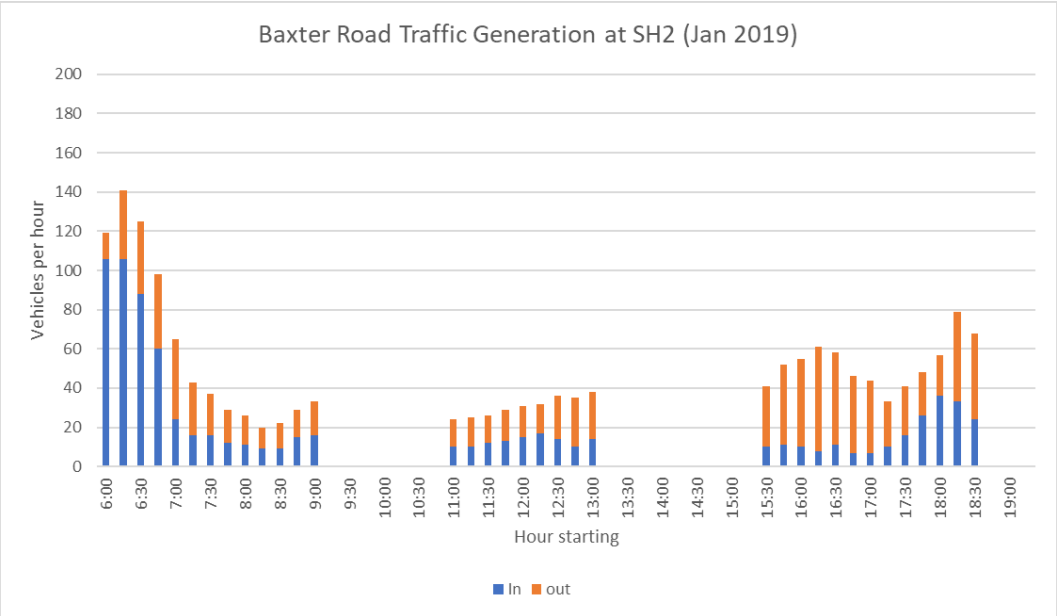

Figure 6-7: Baxter Road In and Out Movements

The turn movement proportions at the SH2 intersection are shown in Figure 6-8.

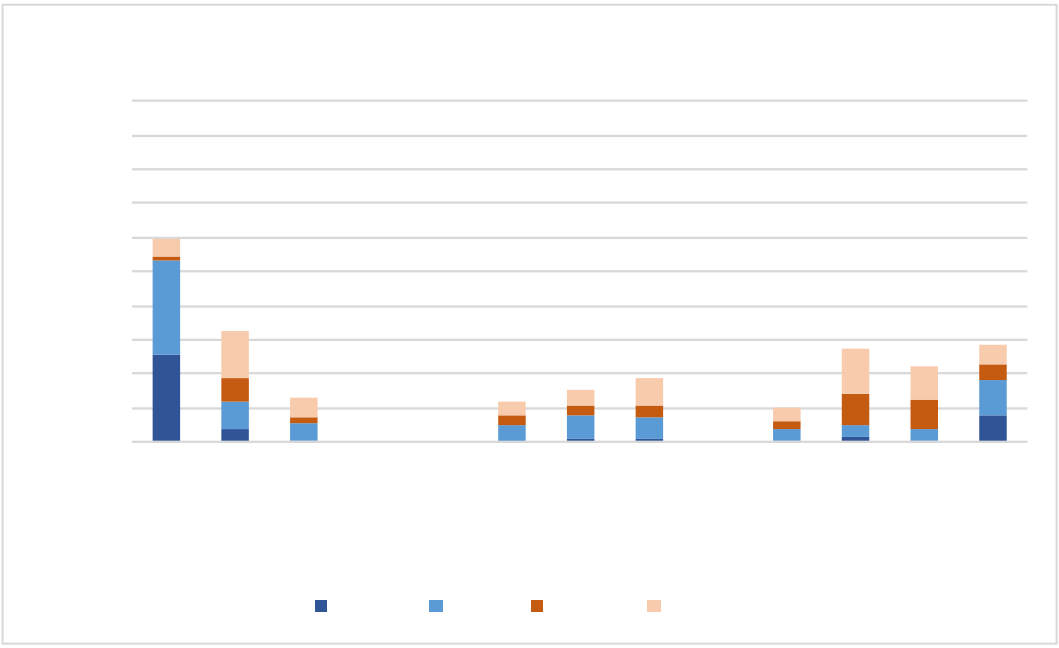

Figure 6-8: SH2/ Baxter Road Turning Movements for 9 January 2019

These show that at the shift change times there is a relatively even split between those approaching from the north and south turning in, and that pattern is also shown in the evening outbound movements. At other times there is a dominance of movement to and from Waihi (left in and right out).

6.3 SH2 Daily Traffic Volumes

Data published by NZTA indicates an annual average daily traffic (AADT) volume for the year 2023 of 10,326 vpd at the count site located on SH2 immediately south of Crean Road (site 00200095), down from a previous AADT of 11,770 vpd in 2019.

The historical AADT counts for SH2 have been used to assist with a forecast of future growth. Over the 15-year period 2005-2019 a long term average linear traffic growth rate of 1.6% per annum was exhibited. This is shown in Figure 6-9 which also demonstrates that the period post 2019 appears to have been severely influenced by the effects of the Covid pandemic and Cyclone Gabrielle where negative growth has occurred.

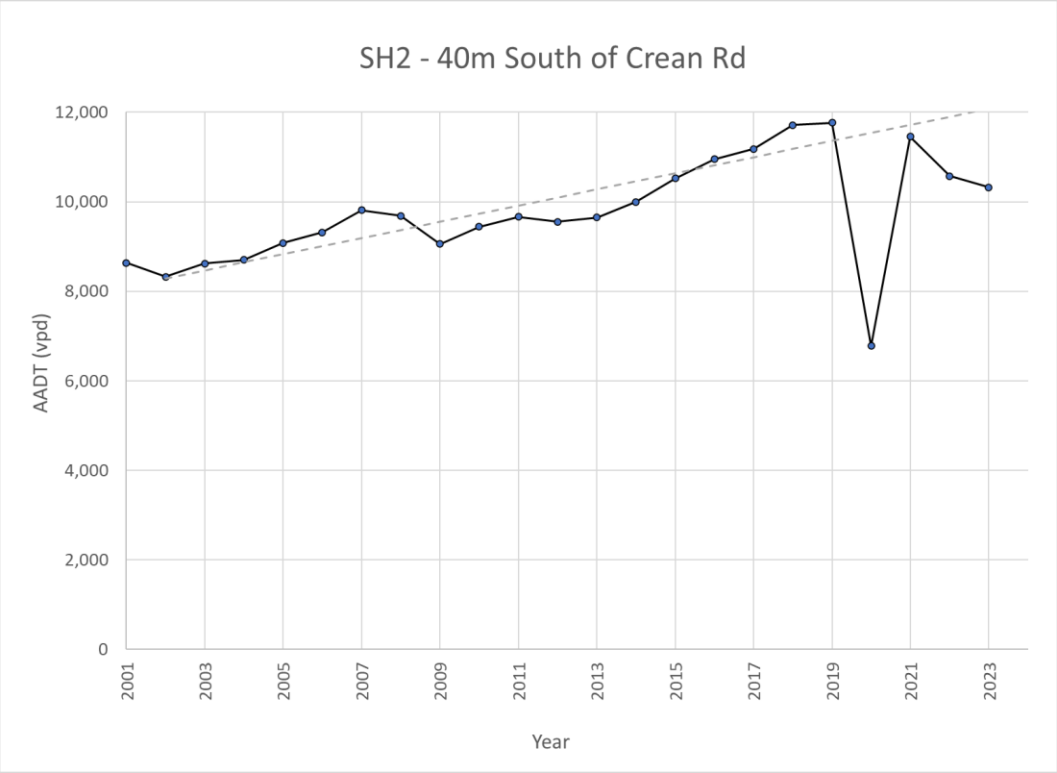

Figure 6-9: SH2 Historical Growth

The long-term data shows a range of shorter term growth rates, and the 15 year growth rate has been used to avoid the relative volatility of growth rates recognising the long period to be forecast (also 15 years into the future). The analysis period incorporates several economic cycles, and it is likely that the next 15-year period will also include at least one complete cycle (a 7-year period is typically considered the length of an economic cycle).

6.3.1.1 State Highway Seasonal Patterns

Seasonal patterns on the highway network can be considered by referring to continuous traffic count data. NZTA has a continuous traffic count site on SH2 approximately 2.8 km west of Waihi (site

00200091). Due to the obvious effects of Covid and Cyclone Gabrielle over the 2020-2023 period the SH2 seasonal profile has been assessed for 2019, 2022 and 2024.

Figure 6-10 shows comparative patterns with peak volumes through summer months, and as particularly indicated by the 2019 patterns the highway is also influenced by public holidays with peak traffic flows focussed on the holiday periods including long weekends (Auckland Anniversary, Easter, Queens Birthday and Labour weekend) and the Christmas/ New Year period.

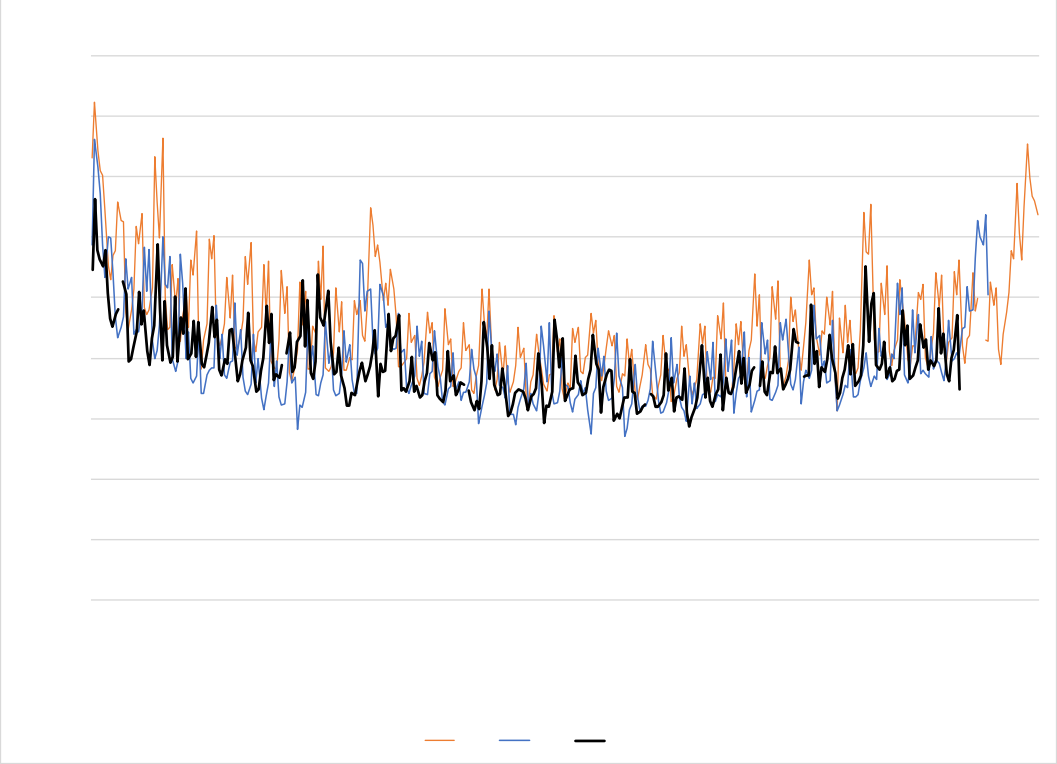

Figure 6-10: SH2 Telemetry Site (West of Waihi) Seasonal Patterns (2019, 2022, 2024)

March and November have weekday volumes close to a “design” level for assessment, indicative of the 85th percentile weekday (which is approximately 15% higher than the AADT) in each of the assessed years.

6.3.1.2 SH2 Hourly Patterns

Hourly traffic volumes for this location during the week beginning 2nd November 2024 are shown on Figure 6-11. As noted earlier, this is a period of the year close to a “design” level for assessment.

The data depicted in Figure 6-12 indicates that the busiest times on this part of the highway are Friday afternoons 4 pm to 5 pm, and midday Sunday on the weekend, with two-way flows of around 1,050 vph and 1,000 vph respectively. On a typical weekday the morning peak volume is 800 vph from 8 am to 9 am and 825 vph from 3 pm to 4 pm.

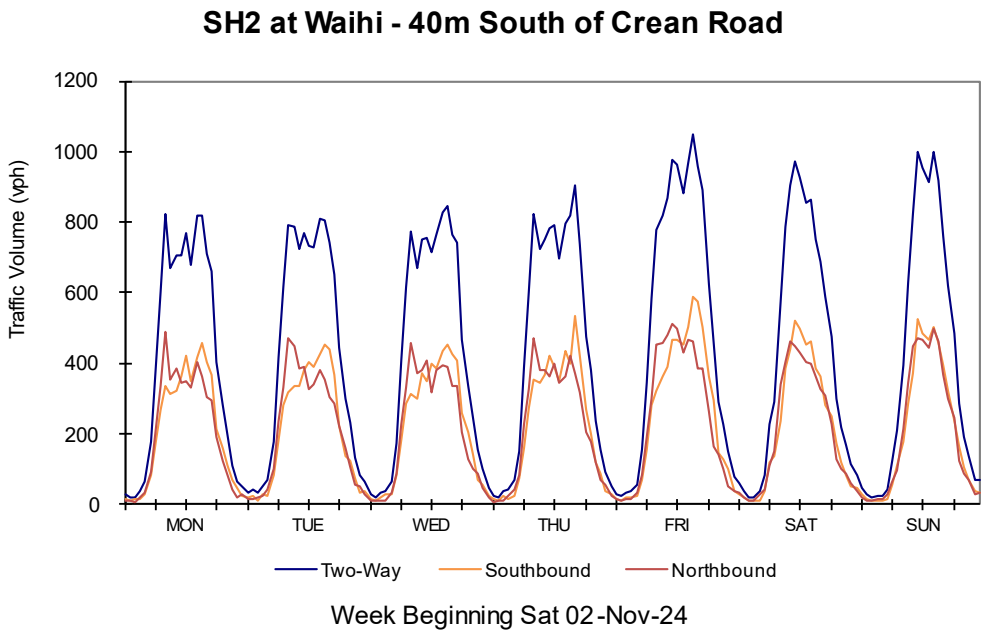

Figure 6-11: Hourly flow by day on SH2 week starting 2 November 2024

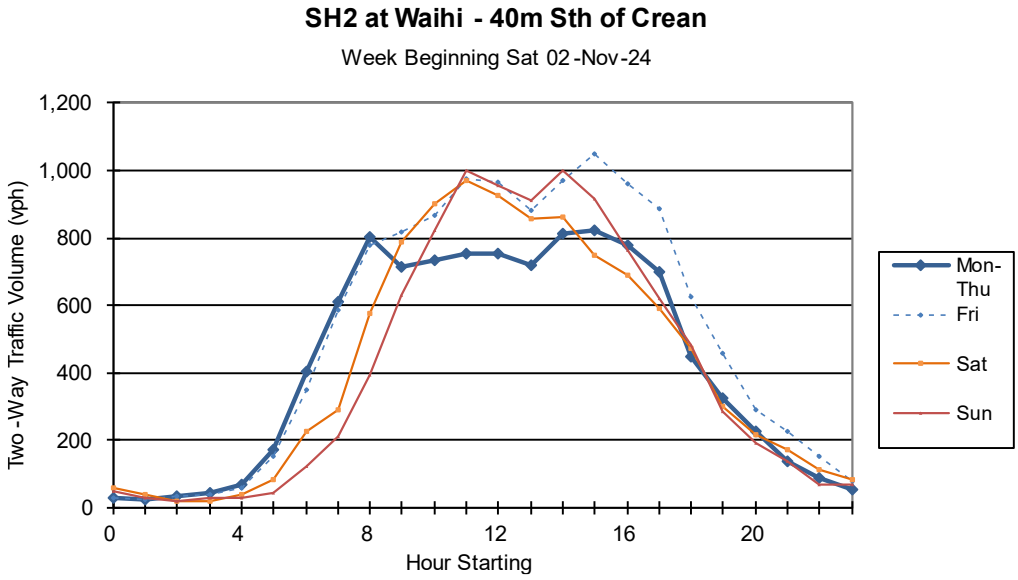

Figure 6-12: Hourly flow distribution on SH2 week starting 2 November 2024

6.3.2 SH25 Kenny Street Access

The principal Martha Pit vehicular access is located on the outside of a horizontal curve on Kenny Street (SH25) where the old Barry Road alignment intersects with Kenny Street. The mine security gate is located approximately 43 m back from the SH25 carriageway.

SH25 in the vicinity of the open pit mine access on Barry Road (SH25) is a two-lane urban arterial route with a 50 km/h posted speed limit. A right-turn lane is provided for westbound traffic turning right into the mine.

The operating speed environment has been assessed from Tom Tom data and records an 85th percentile speed of 55 km/h westbound, and 56 km/h eastbound. At this speed, the Austroads recommended safe intersection sight distance[2] is 112 m.

The available sight distance has been assessed and the sight line in both directions exceeds the recommended requirement of 112 m.

Figure 6-13 shows the layout of the Martha Pit mine access on SH25, and Figure 6-14 shows the westbound approach to the intersection.

[2] 3 second observation time, 2.0 second reaction time, 0.36 deceleration co-efficient

Figure 6-13: SH25 (Kenny Street) Mine Access

Figure 6-14: SH25 (Kenny Street) Westbound to Mine Access

6.3.3 Moresby Avenue

Moresby Avenue, between Seddon Street and Savage Road, is classified in the District Plan as an Arterial Road. For approximately 120 m from its intersection with Seddon Street it is flanked by a mix of commercial and residential activities, and Waihi Central School. This section generally has a through lane in each direction with parallel parking on each side. The carriageway width varies over this section with a widened segment of nominally 14.5 m kerb-to-kerb adjacent to the school providing

wider parking bays and a narrower segment of approximately 11.5 m width north of the school where parking is only provided on the west side of the street.

Adjacent to the Savage Road intersection, the carriageway width reduces further to approximately 8.2 m, and the road is marked with a centre line only.

West of Savage Road, Moresby Avenue is classified as a Collector Road, and has residential activity on both sides. The carriageway at this location is approximately 8 m to 9 m in width, with kerb, channel, and footpath on the south side, and a narrow shoulder, feathered edge and grass berm on the north side.

Data obtained from the MobileRoad website indicates the following average daily traffic (ADT) volumes on Moresby Avenue of 2,200 vpd. Peak hour volume data for these roads is not available and has been estimated at 10% of the ADT, being 220 vph.

6.3.4 Martha Street / Haszard Street

Martha Street and Haszard Streets are both local roads with nominal carriageway widths of 10.5 m (Marta Street) and 12.5 m (Haszard Street) which allows for parallel parking on each side. The streets provide access to the adjacent properties including commercial activities at the southern end of Haszard Street, the building on the corner of Moresby Avenue and Martha Street which houses the mine administrative offices as well as several other commercial activities, the carpark on Martha Street used predominantly by the mine personnel, and neighbouring residences.

As well as the local property access function, the streets are linked and provide an alternative route between Moresby Avenue and Seddon Street.

6.4 Other Accesses

The key features[3] of the existing road layouts in the immediate vicinity of the other secondary access points to the processing plant area are summarised below:

Moore Street: Moore Street is a 0.5 km long cul-de-sac with a nominal sealed carriageway width of 5.7-5.8 m. Beyond the end of the sealed section is a short (70 m) unsealed road with a turning head and gate into OGNZL property. The unsealed section is within the OGNZL property. The ADT on Moore Street (from Mobileroad) is approximately 60 vpd.

Golden Valley Road: Golden Valley Road in the vicinity of the western most OGNZL entrances is an urban road with a nominal width of 7.4 m between a kerb face on the northern side and edge of seal on the southern side of the road. The access is located at the end of the 50 km/h posted speed zone with the speed change located approximately 45 m to the east. Access sightlines from the entrance exceed the urban sight distance requirements in both directions with the approximately 160 m to the east meeting full requirements for a 70km/h operating speed (noting the access is within a 50km/h speed limit area). The

[3] All average daily traffic volumes (ADT) sourced from mobileroad.org

ADT is 630 vpd with 3% HCV. The entrance has a short, sealed apron beyond which it is unsealed with some loose metal spilling onto the adjacent seal.

Golden Valley Road in the vicinity of the eastern most OGNZL entrances is a rural road with a nominal width of 6.7 m. The access is located approximately 610 east of the first entrance described above and 160 m west of a bridge over the Ohinemuri River. The posted speed limit is 100 km/h but the curvilinear nature of the road (with horizontal curves, with 35 km/h advisory speeds, to the west and east of the access) result in an estimated operating speed over a 1 km section of approximately 60 km/h on each approach. The access is assessed as being able to meet the safe intersection sight distance[4] of 123 m for 60 km/h operating speed. A further property access to a residence is located approximately 45 m to the east of this access. The ADT is 630 vpd with 3% HCV.

Clarke Street: The OGNZL property access on Clarke Street is located at the end of the formed road approximately 0.8 km from SH25 (Kenny Street). The access is also used by members of the Black Hill Motocross Club. The road widths and formation vary along its length:

- The initial 100 m from Kenny Street is a 10.8 m kerbed road
- reducing to 8.2 m west of Baker Street (also kerbed)
- followed by a section between Baker and George Street which is approximately 7.2 m wide, kerb to kerb.
- An approximately 150 m section east of George Street (to a culvert) which is between 4.9 to 5.4 m wide plus variable grass shoulder, and
- 5.75 m between kerbs over the last 150 m between the culvert and the turning head at the end of the road.

The ADT (reported by mobileroad.org) east of Kenny Street is 482 vpd, west of George Street is 282 vpd, 129 vpd east of George Street and 70 vpd over the last 150 m. There is no evidence of any edge-break or maintenance issues on the road.

6.5 Road Safety Records

NZTA maintains a Crash Analysis System (CAS) database of all reported road crashes in New Zealand. The database has been searched to identify all reported crashes which occurred during the most recent five-year period from October 2019 to September 2024 inclusive for the principal access roads and the associated intersections with state highways. The areas searched are shown in blue shading within Figure 6-15, together with locations of reported crashes (green= non-injury, yellow=minor injury, orange=serious injury).

[4] Decision time 3 seconds, observation time 2 seconds, deceleration coefficient 0.36

Figure 6-15: Processing and Pit Access Search Area and Crash Record

The search areas of the principal access included:

- Baxter Road and the intersection of Baxter Road with SH2;
- Kenny Street Access.

The crash reports indicated the following:

- No crashes were recorded on Baxter Road;
- No crashes on were recorded on Kenny Street.
- Two crashes occurred on SH2 in the vicinity of Baxter Road intersection but none at the intersection itself:
  - A minor injury crash occurred approximately 200 m south of Baxter Road. The incident was caused by a vehicle pulling into the southbound lane from a parked position on the left side of the road, resulting in a rear-end collision with a vehicle traveling southbound on SH2.
  - A non-injury crash 60 m north of Baxter Road involving a multiple vehicle rear end collision in a road construction zone under temporary traffic control.

Additionally, the crash records for the roads adjacent to the secondary accesses recorded the following crashes, none of which related to access movement:

- One minor injury crash occurred on Clarke Street just off Kenny Street. The minor injury occurred approximately 80 m from Kenny Street when a driver has driven out of their driveway at a speed and overcorrected their turn causing them to crash into a parked vehicle on the side of the road.
- No recorded crashes on Moore Street.
- Three recorded crashes on Golden Valley Road, including two minor injury and one serious injury crash. One of the minor injury crashes occurred on the road from a loss of control due to wet and slippery road conditions. The second minor injury crash occurred near the Ohinemuri Stream bridge involving a single vehicle loss of control on a curve from speeding resulting in a minor injury. The serious injury crash involved a motorcyclist traveling south on the Ohinemuri Stream bridge lost control after hitting a small patch of gravel in the middle of the sealed road, causing them to flip multiple times and sustain injuries.

In summary, there were no crashes that involved vehicles turning into or out of any of the mine access roads or associated intersections. The existing injury crash record does not indicate any current safety concern with any of the access roads or adjacent intersections.

7 WNP Main Processing Area

7.1 WNP – Moresby Avenue and Baxter Road Facilities

The traffic movements associated at the Moresby Avenue and Baxter Road Facilities of the WNP are primarily related to the transportation of the workforce, plus the less frequent delivery of materials and plant. Moresby Avenue Facilities include the existing administrative office building and carpark. Baxter Road Facilities include the following infrastructure in relation to the WNP:

- Processing Plant;
- Water Treatment Plant;
- GOP and associated infrastructure;
- Overland Conveyor and Loadout Station;
- MUG and WUG Portals;
- NRS and associated infrastructure; and
- TSF3 and associated infrastructure

Ore, overburden and tailings associated with the mining activity will be transported within the mine by truck, conveyor or pipeline to and within the existing processing area. All vehicle movements associated with the movement of these materials will occur on internal roads within the mine and will not use the public road network.

Changes in traffic movements are expected as a result of:

- Increased workforce over the expected life of the WNP- principally the construction period.
- The Processing Plant expansion: the expectation is that the workforce numbers associated with the upgraded plant will not materially differ from the current staffing level and an additional 1-2 trucks per week are expected for materials deliveries.
- The company office on Moresby Avenue will continue to house administrative staff associated with the mine.
- The GOP aspect of the WNP involves open pit mining from development and production through to closing of the pit as a tailing's storage facility. The pit will be mined over a period of approximately six years and conversion of GOP into a TSF will commence thereafter.
- Progressive transfer of underground mining personnel from the Martha Underground to the WUG (with the MUG estimated to be completed at Year 9/10).

Project Martha (including MOP4 and Martha underground operations) previously consented a range of activities as described earlier. The cumulative performance of all these operations has been assessed for WNP.

All hauling and storing of ore and/or rock will be contained within the site.

7.1.1 Access

Staff, contractor and delivery traffic will continue to use the main access point to the site on Baxter Road (located on SH2). It is understood that staff and contractors associated with the MOP4 previously consented activity will access the site at Kenny Street, and all staff and contractors associated with the other project components will use the Baxter Road access. The majority of these vehicle movements are expected to be light vehicles.

Other existing secondary access locations as described in Section 6.4 will be retained and it is understood that activities that utilise these accesses are already consented. The main entrance during construction and operations will be via the Baxter Road Gate and the Perimeter Road around TSF1A and 2.

Information from OGNZL indicates that these accesses will predominantly operate with similar traffic patterns to the existing operation with the exception of the following small increases during the construction period:

- At Moore Street during the processing plant and water treatment plant upgrade phase (approximately 1 year) there will be a total of 10 oversize or heavy loads with traffic management plan established for each. As these movements will be subject to over-dimension permits the movements will be assessed at that time when the transporter configuration is known.

At Golden Valley Road accesses, during the construction of the service trench near Golden Valley Road (period of 2 months), there will be a small construction crew (4 people) using these accesses daily from Golden Valley Road for approximately 1 month.

7.1.2 Workforce and Hours of Work

The Processing Plant and WTP will operate continuously, as occurs at present.

It is understood that GOP may operate on a 24/7 operation Mon-Sun 7 am to 7 pm. Operations will include excavation; trucking of ore from the pit to the ROM stockpile and conveying of rock to the existing rock and tailings storage area, and within the pit.

Construction activities are expected to involve a single day shift from 7 am to 5 pm Monday through Friday.

7.1.3 Aggregate Importation

The import of aggregate to the site has been previously consented as part of the Correnso and Project Martha developments. A peak traffic movement (trucks) of up to 8 vph and 71 vpd was anticipated at the time of planning the Correnso workings.

The consented Project Martha also includes provision for the use of imported aggregate for use as Cemented Aggregate Fill (CAF) in the Martha underground based on similar traffic movements as for the Correnso project.

Both previous consents include specific conditions that cover the importation of aggregate to site on Baxter Road.

OGNZL no longer expects to use imported aggregate for CAF. However, some other aggregate import is expected to be required for construction with the source not yet identified.

7.2 Traffic Generation Moresby Avenue and Baxter Road Facilities

7.2.1 Workforce Estimates

The traffic movements associated with the Moresby Avenue and Baxter Road Facilities of the WNP are primarily related to the transportation of the workforce, plus the less frequent delivery of materials and plant. The expected workforce requirements for Moresby Avenue and Baxter Road Facilities (including Project Martha but excluding those using Kenny Street for Martha Pit or to Willows Road) are summarised over the life of the project in Figure 7-1. It also depicts which parts of the mine operation the workforce will be focussed on over the period of the project.

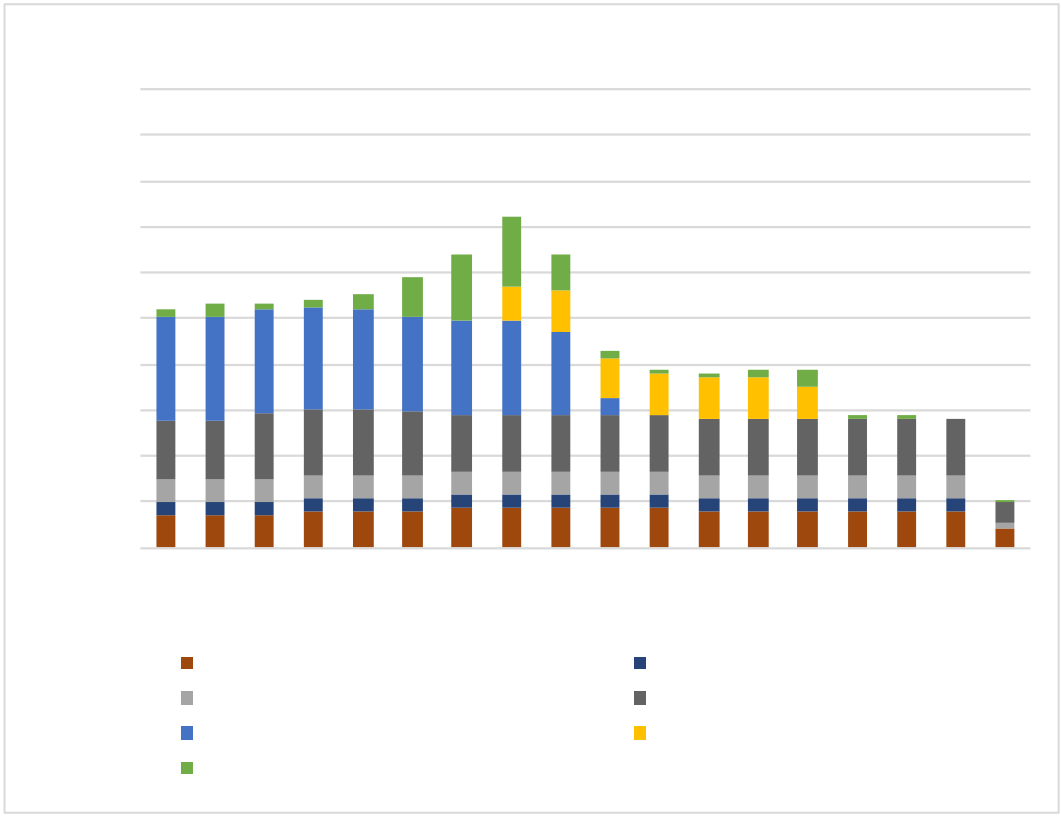

Figure 7-1: Moresby Avenue and Baxter Road Facilities - Workforce Forecasts (including Project Martha)

Much of the workforce is common to both Project Martha and the WNP. As the Martha Underground winds down, much of the workforce can be expected to transfer to the WNP. Existing employees involved in administration and support functions associated with Project Martha will also assist with the WNP and in the later years transfer completely to the WNP. Over the first nine years, the mine will

require workers in addition to those required for Project Martha largely associated with construction with skills in open pit mining, dam construction, civil works and related maintenance.

In comparison with existing levels of activity shown in Figure 3-1, those accessing the site around Baxter Road and Moresby Avenue will be at comparable levels to existing (with the Martha underground) and over time revert to levels comparable to existing.

In addition to the traffic movements described above, OGNZL has advised that there will be some additional traffic movements associated with the logging of a small forestry block in the vicinity of the proposed Gladstone Pit. It is understood that the logging is expected to involve around 5 logging trucks per day, 9 am to 4 pm Monday to Friday, for a maximum of 2 months sometime prior to the mine commencing. All movements (including associated crew which are understood to be included in the above-described schedules) are expected to utilise the Baxter Road gate as for the other construction traffic.

7.2.2 Baxter Road Gate Traffic Generation

The following Figure 7-2 shows the expected proportion of the workforce that will utilise the Baxter Road gate as per the allocation referenced in Section 5.3.

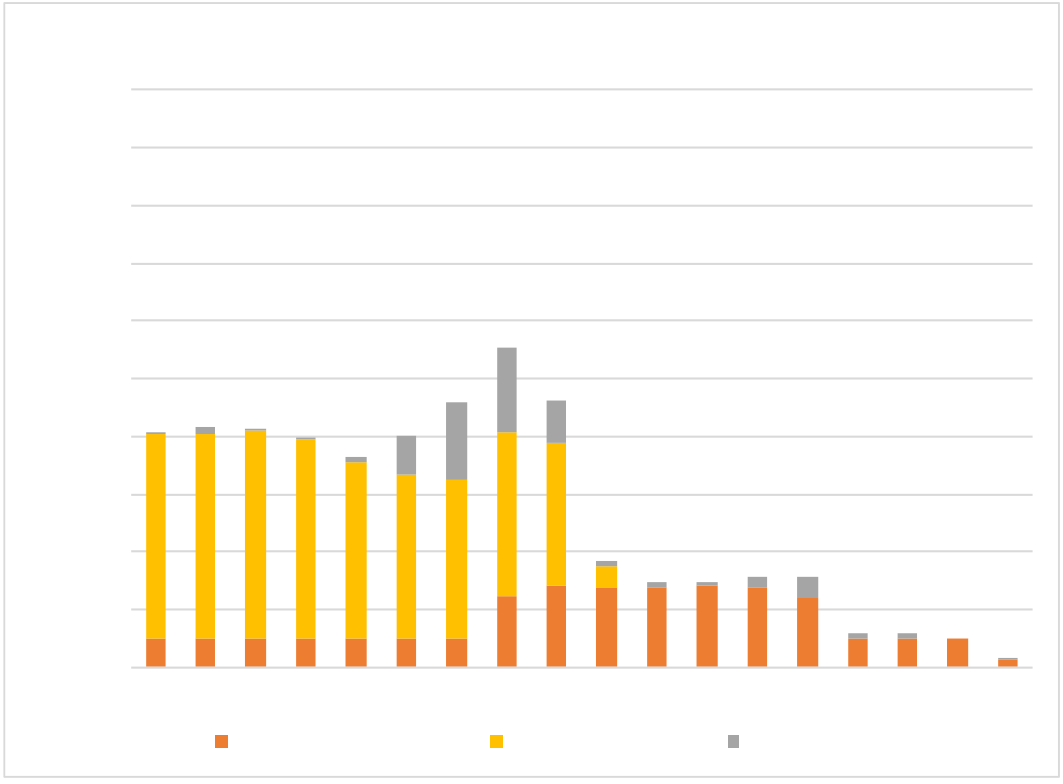

Figure 7-2 Workforce Using Baxter Road Gate During the Project Lifetime

It can be seen that the peak level of employment will be over the first 8-9 years. The ending of the Martha underground activity will result in a large drop in those using the gate. Around the time that the Martha Underground stops, there will be a small increase in staff related to the Gladstone Open Pit and processing will continue, albeit at lower levels of staffing than with the Martha Underground.

Based on previous traffic counts and forecast changes in the workforce, an indicative forecast of traffic generation at the Baxter Road gate has been developed. An allowance for general movements in and out in addition to the workforce movements is also included. These forecasts are shown by project year in Figure 7-3.

Peak activity will occur in the morning (6.30 to 7.30 am) ahead of the shift start, immediately followed by the departure of night shift workers. The evening peak is comparatively lower as operational staff leave through the later afternoon (e.g. 4 pm to 6 pm), with shift workers arriving and departing around 7 pm (6.30pm to 7.30 pm).

Figure 7-3: Baxter Road shift changeover movements

The busiest phase of the project is in approximately years 8 and 9 when the Gladstone Pit works commence, and the Martha Underground is still operating.

7.3 Kenny Street Access Traffic Generation

The Kenny Street access will be used for the Park and Ride service for the WUG, as described later in Section 10.4.1., and assessed in Section 11.5. In addition, the access may accommodate some traffic generated by the Martha Pit work, adding a low level of additional traffic (up to approximately 25-30 vph). For reference, the anticipated morning peak changeover traffic generation is shown in Figure 7-4 which shows the relative contribution of the Martha Pit (WNP Other) compared to the WUG Park and Ride.

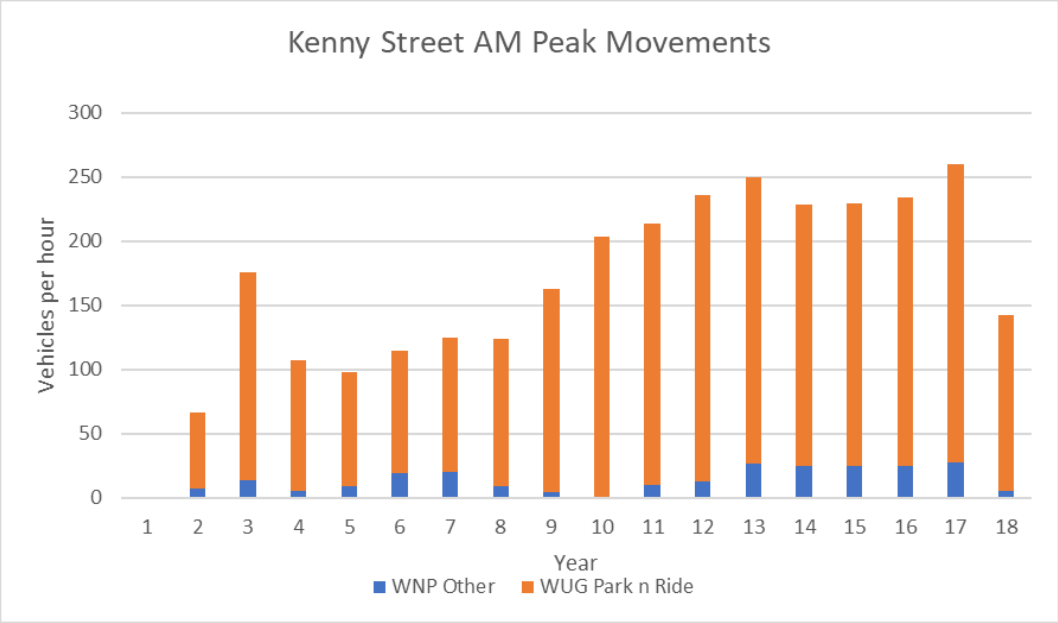

Figure 7-4: Kenny Street Traffic Generation (AM Peak)

The busiest period occurs around years 12 to 17.

8 Processing Area Traffic Effects

8.1 SH2 and Baxter Road Intersection

The Baxter Road and SH2 intersection has been modelled (using SIDRA intersection modelling package) to identify the expected performance during peak hours at various stages of the project. Based on the traffic generation data described above, the following scenarios have been identified as being the most critical for modelling:

- Year 8 (2034) of the project which is the busiest year when the Martha Underground will still be using Baxter Road, and WNP traffic adds to the total.
- Year 14 (2040) being the last year with any notable level of traffic generated at Baxter Road. Although the project traffic will be relatively low, background growth of SH2 traffic is expected to have accumulated to a higher level representing approximately 15 years of growth from now.

Modelling scenarios were tested of combinations of site and SH2 traffic at four periods:

- Activity peaks: 6.30 am to 7.30 am, and 6.30 pm to 7.30 pm when key shift changes occur.
- SH2 peaks: 7am to 8 am and 4 pm to 5 pm.
- Similar directional splits as surveyed at the intersection in 2019.
- All modelling to SIDRA default values unless noted otherwise.

The intersection modelling carried out for the busiest year for the site (year 8 or 2034) shows that the intersection can perform at suitable levels of performance (delays and queuing) during the peak periods of both the road network and the site generation. Performance improves beyond that period with lesser delays experienced in the 2040 modelling. As such, changes in road safety performance are not expected.

The intersection performance is less critical during the activity peaks compared with the road network peak periods. This indicates that performance is governed more by passing traffic volumes on SH2 than the traffic generating characteristics of the activity itself.

Performance from the key 2034 road network peak SIDRA intersection tests is shown Table 8-1 and Table 8-2 below.

Table 8-1: 2034 Baxter Road/SH2 AM Peak 7-8 am

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
South: SH2															
2	T1	All MCs	331	15.0	331	15.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	94.9
3	R2	All MCs	34	5.0	34	5.0	0.036	9.6	LOS A	0.1	1.0	0.46	0.69	0.46	64.1
Approach			364	14.1	364	14.1	0.184	0.9	NA	0.1	1.0	0.04	0.06	0.04	90.8
East: Baxter Rd															
4	L2	All MCs	66	5.0	66	5.0	0.084	11.4	LOS B	0.3	2.1	0.44	0.92	0.44	62.8
6	R2	All MCs	142	5.0	142	5.0	0.425	22.3	LOS C	1.9	14.1	0.79	1.07	1.09	53.2
Approach			208	5.0	208	5.0	0.425	18.9	LOS C	1.9	14.1	0.68	1.02	0.89	55.9
North: SH2															
7	L2	All MCs	58	5.0	58	5.0	0.032	7.8	LOS A	0.0	0.0	0.00	0.65	0.00	70.2
8	T1	All MCs	360	15.0	360	15.0	0.201	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	94.9
Approach			418	13.6	418	13.6	0.201	1.1	NA	0.0	0.0	0.00	0.09	0.00	90.5
All Vehicles			990	12.0	990	12.0	0.425	4.8	NA	1.9	14.1	0.16	0.28	0.20	80.2

Table 8-2: 2034 Baxter Road/SH2 PM Peak 4-5 pm

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
South: SH2															
2	T1	All MCs	352	15.0	352	15.0	0.196	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	94.9
3	R2	All MCs	6	5.0	6	5.0	0.009	11.2	LOS B	0.0	0.2	0.56	0.72	0.56	62.3
Approach			358	14.8	358	14.8	0.196	0.2	NA	0.0	0.2	0.01	0.01	0.01	94.0
East: Baxter Rd															
4	L2	All MCs	49	5.0	49	5.0	0.093	14.2	LOS B	0.3	2.2	0.60	1.00	0.60	60.2
6	R2	All MCs	73	5.0	73	5.0	0.359	30.5	LOS D	1.3	9.4	0.87	1.04	1.08	47.7
Approach			121	5.0	121	5.0	0.359	23.9	LOS C	1.3	9.4	0.76	1.03	0.89	52.0
North: SH2															
7	L2	All MCs	14	5.0	14	5.0	0.008	7.8	LOS A	0.0	0.0	0.00	0.65	0.00	70.2
8	T1	All MCs	638	15.0	638	15.0	0.355	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	94.7
Approach			651	14.8	651	14.8	0.355	0.2	NA	0.0	0.0	0.00	0.01	0.00	94.1
All Vehicles			1130	13.8	1130	13.8	0.359	2.8	NA	1.3	9.4	0.08	0.12	0.10	86.5

A further test of Friday afternoon performance where higher volumes of traffic are likely to be passing on SH2 (associated with weekend travel) has also been included for the busiest year (2034), and the results in Table 8-3 show potential additional delay of 5 s/veh compared to the weekday. Under the scenario assessed being a specific period for the busiest year this is considered generally acceptable performance, albeit with some additional delay (as will occur at any intersection in the vicinity).

Table 8-3: 2034 Baxter Road/SH2 PM Peak 4-5 pm - Friday

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
South: SH2															
2	T1	All MCs	594	15.0	594	15.0	0.331	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	94.8
3	R2	All MCs	6	5.0	6	5.0	0.008	10.2	LOS B	0.0	0.2	0.51	0.68	0.51	63.4
Approach			600	14.9	600	14.9	0.331	0.2	NA	0.0	0.2	0.01	0.01	0.01	94.3
East: Baxter Rd															
4	L2	All MCs	49	5.0	49	5.0	0.077	12.7	LOS B	0.3	1.9	0.52	0.96	0.52	61.5
6	R2	All MCs	73	5.0	73	5.0	0.423	36.0	LOS E	1.5	10.9	0.90	1.05	1.17	44.5
Approach			121	5.0	121	5.0	0.423	26.7	LOS D	1.5	10.9	0.75	1.02	0.91	50.1
North: SH2															
7	L2	All MCs	14	5.0	14	5.0	0.008	7.8	LOS A	0.0	0.0	0.00	0.65	0.00	70.2
8	T1	All MCs	518	15.0	518	15.0	0.288	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	94.8
Approach			531	14.7	531	14.7	0.288	0.2	NA	0.0	0.0	0.00	0.02	0.00	94.0
All Vehicles			1252	13.9	1252	13.9	0.423	2.8	NA	1.5	10.9	0.08	0.11	0.09	86.7

The performance statistics show that the delays do not directly affect the state highway traffic and, in reality, departing drivers from the site beyond hard shift change times would likely manage departure times to minimise exposure to any times that typically generate higher delay. Nonetheless it is recommended that traffic delays and hence driver frustration could readily be managed by staggering departure times through management of the end of shift of the construction workers, as it is predominantly the construction workers that are expected to depart site at around 5 pm. This could be more important if SH2 traffic volumes increase at a faster rate than they have historically.

8.2 Processing Area Secondary Accesses

As described in Section 7.1.1, the other existing secondary accesses will continue to operate with similar levels of traffic with negligible change to existing and consented movements with the exception of a small increase in construction movements at the Moore Street access and Golden Valley Road access. The road environment in the vicinity of each access is described in Section 6.4, and an assessment of effects for each follow:

8.2.1 Moore Street

There will be no change to existing and consented movements at this access except for during processing plant and water treatment plant upgrade phase (approximately 1 year) when there will be a total of 10 oversize or heavy loads with a traffic management plan established for each. As these movements will be subject to over-dimension permits the movements will be assessed at that time when the transporter configuration is known. Existing uses will continue as:

- Light vehicle use: approximately 1 to 3 vehicles per week - no change to existing.
- An alternative access point in the unlikely event access via Baxter Road is prevented by Ohinemuri River flooding - no change to existing use.

With consideration to the baseline existing use of this access, which is typically one to three vehicles per week, there are less than minor adverse effects on the safety or efficiency of the road network associated with Moore Street continuing to be used in this manner. However, in the event that a flooding event requires a significant volume of traffic to utilise this access, and the effects of that traffic volume had not been previously assessed, then it would be appropriate to monitor the effects of that traffic on the adjacent road network and implement temporary traffic management on those occasions should the need arise. The Project Traffic Management Plan would be an appropriate place to specify these measures.

8.2.2 Clarke Street

There will be no change to existing and consented movements at this access which includes light vehicles only, approximately 1 to 3 times per week.

Clarke Street has sufficient width to enable two-way traffic movement over the majority of its length with the exception of a culvert crossing located approximately 150 m east of George Street. Further, it is acknowledged that the 150 m section between the culvert and George Street is approximately 4.9 m wide, plus variable grassed shoulder, and has an estimated average daily traffic volume of 129 vpd (sourced from MobileRoad) which would likely require vehicles to make use of the grassed shoulder (or driveways) to comfortably pass each other. There was no evidence of any edge- break and this narrow section does not appear to have caused any maintenance issues.

Additionally, whilst there has been one non-injury crash on Clarke Street within the last 5-year period, that was unrelated to mine use and was associated with a driver exiting a property. With consideration to the baseline existing use of this access, which is typically one to three vehicles per week, the low traffic volume on lower Clarke Street and the absence of any maintenance issues or recorded crashes, it is concluded that there are less than minor adverse effects on the safety or efficiency of the road network associated with Clarke Street continuing to be used in this manner.

8.2.3 Golden Valley Road

There will be no change to existing and consented movements at these accesses which includes light vehicles approximately 1 per week.

During construction of the service trench near Golden Valley Road (period of 2 months), there will be a small construction crew (4 people) using these accesses daily from Golden Valley Road for approximately 1 to 2 months. The effect of this negligible increase in traffic movement has been assessed as follows:

- Both accesses have adequate width for the small volume of light vehicular traffic.
- Both accesses are unsealed resulting in metal spilling onto the adjacent road. It is recommended that both accesses are sealed for a minimum distance of 5 m from the edge of seal to be formed and sealed in accordance with HDC 302 of the HDC Engineering Manual.
- Both accesses are assessed as having adequate access sight distance for the expected volume and existing traffic speeds which is assessed as 130 m for 80 km/h for the westernmost access and 80 m for 60 km/h for the easternmost access (with reference to Table 3.4 of the HDC Engineering Manual).

- It is acknowledged that the separation distance of the westernmost access to the nearest residential driveway is estimated to be 45 m which is less that the 200 m recommended in HDC 306 for a 100 km/h posted speed. However, for the volume of traffic and the lower actual expected operating speeds, the reduced separation distance for this existing access is not considered to be any more than a minor issue.

8.3 Aggregate Supply

At this stage OGNZL does not anticipate the need to import aggregate for use as CAF as authorised by previous consents but does anticipate a nominal requirement for the use of aggregate for civils work.

While the source of any aggregate is yet to be finalised, it is noted that the closest supplier is the Waitawheta Quarry, which would likely result in trucks making a left turn out of Crean Road and a right turn into Baxter Road (and the opposite movement in the reverse direction). The upgraded SH2 intersections as completed by NZTA in 2019 has resulted in very short queuing space between the back-to-back right turn bays which would be challenging for a truck to turn across SH2 in opposite directions at the same time. While the likelihood of two trucks meeting at the same time is expected to be infrequent, should that occur, then any competent driver would observe the opposing truck and wait for the way to be clear. This can be managed as part of any traffic management plan.

A condition of consent for Project Martha also requires a Traffic Management Plan (TMP) to be prepared for the cartage of aggregate. The TMP enables the supplier of aggregate and route for cartage to be firstly confirmed and further assessment of that route should it be deemed appropriate in consultation with the relevant road controlling authority.

In the event that OGNZL does resolve to import aggregate from the Waitawheta Quarry, for any reason, utilising the Crean Road / Baxter Road route, then the TMP is recommended as above to identify measures and protocols to mitigate the possible conflict of opposing flows or other traffic occupying the right turn bays.

It is therefore appropriate to carry forward similar consent conditions relating to aggregate movements via long trucks between Baxter Road and Crean Road as outlined for Project Martha in Section 4. It is recommended that conditions are included to address the following matters:

- Prior to the haulage of large volumes of aggregate using Baxter Road, an annual programme for inspection, recording and maintenance of Baxter Road pavement condition, and bridge condition shall be undertaken; and the road is to be returned to at least its standard / condition prior to the commencement of the aggregate / backfill haulage activity on completion.
- The consent holder shall submit a Traffic Management Plan for the haulage of large volumes of aggregate if the aggregate haul route includes the use of Crean Road and Baxter Road together, to the Hauraki District Council for certification at least 30 working days prior to the haulage of aggregate first occurring.

Part C – Willows Road Site Assessment

9 Willows Road Transport Network

9.1 Site Location

The WUG component of the WNP involves constructing an underground mine with a portal and associated infrastructure located on OGNZL-owned farmland at the end of the Willows Road (Willows Road Surface Facilities Area or “Willows SFA”)). Willows Road is a short rural road which is currently formed over a distance of 1.3 km from its intersection with SH25. The intersection of SH25 and Willows Road is located approximately 2.3 km northeast of Waihi urban area.

Figure 9-1 shows the location of the Willows Road farm property in the context of the local environment and local transport network.

The Willows SFA will be situated within the rural zone within the jurisdiction of the Hauraki District Council (HDC) as depicted in Figure 9-2, being an extract from the HDP planning maps. The tunnel itself will extend to the north under land zoned Conservation (Indigenous Forest) Zone within the HDP.

The surrounding properties are also zoned rural with a Conservation zone located to the north of the site.

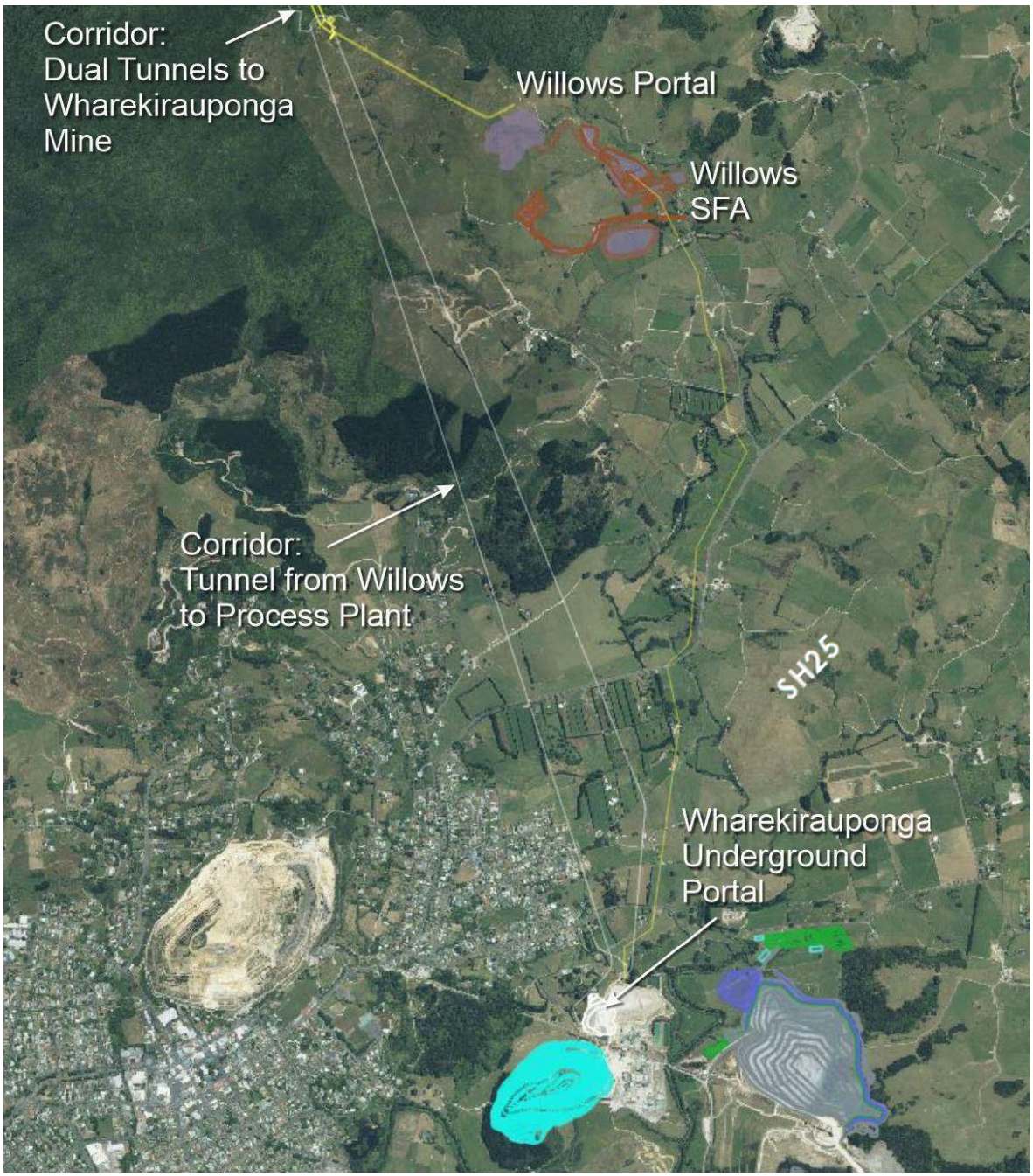

Figure 9-1: Setting of the Proposed WUG and Willows SFA

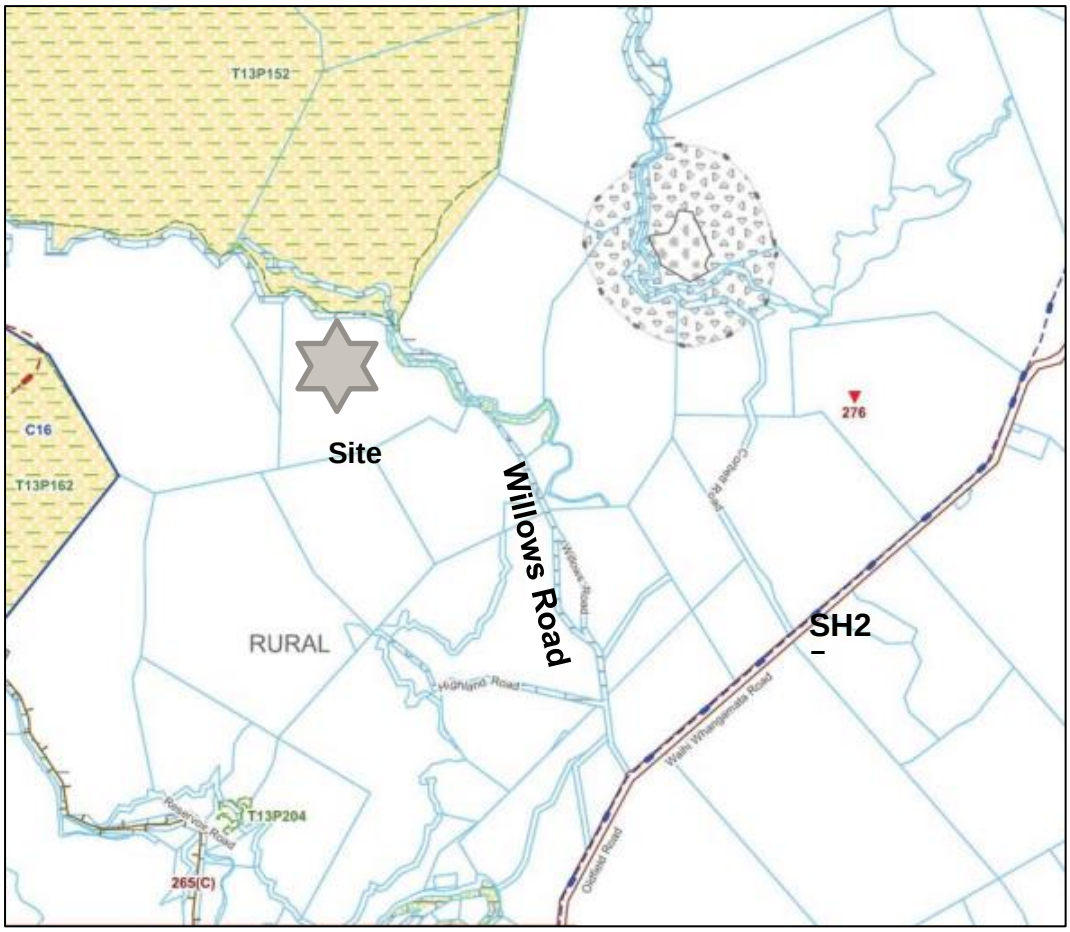

Figure 9-2: Site Zoning – Annotated Extract of HDP

9.2 Willows Road

9.2.1 Road Classification

Willows Road has no specific classification in the HDP road hierarchy, meaning that it is, by inference, a Local Road under the HDP. The dominant function of Willows Road is therefore access to adjoining properties. It is not categorised as a high-volume road, nor does it provide any key network function.

Reference has also been made to the NZTA One Network Framework (ONF) for road classification. In the ONF, SH25 is a Rural Connector, and Willows Road is simply a Rural Road.

9.2.2 Road Formation

Willows Road is a no-exit rural road formed and sealed over approximately 1.3 km. The road provides access to rural properties including the farm which will house the Willows SFA. Beyond the initial 1.3 km, the paper road corridor continues (unformed) northwards toward the Conservation estate with a farm track following a portion of the unformed alignment.

There are no road markings on Willows Road. The posted speed limit is 100 km/h, although the geometry and width of the road are unlikely to allow this speed. Tom Tom travel speed data is available indicating an operating speed of approximately 57 km/h southbound and 69 km/h northbound.

Measurement of actual road widths have been undertaken along the full length at key points and the width variation found is detailed in Table 9-1. With the exception of the single lane bridge approaches and a culvert, based on the spot measurements, a minimum sealed width of 5.7 m is achieved over the full length as far as distance 1.2 km (entrance to the site farm). The last 100 m section (to 1.3 km) has been formed and sealed to a single lane access standard at around 2.8 m wide.

A single lane bridge is located approximately 113 m north of SH25 which has a width between kerbs of 3.7 m. The bridge is signed with direction priority at each end with priority to northbound traffic.

A second narrow point is localised to a large diameter Armco culvert (around 2.0-2.5 m diameter) located around 0.4 km where the sealed carriageway is reduced to 5.5 m.

Table 9-1: Willows Road Carriageway Section Width

Willows Road Section	Existing Width (m)	Significant Structures
0.00 - 0.19 km	5.0 - 5.5	One Lane Bridge y.1957; Approx. 3.7 m wide
0.19 - 0.31 km	5.8 - 6.5	
0.31 – 0.48 km	5.7-6.5	Armco Culvert y.2000 (approx. 2 m dia.)
0.48 – 0.61 km	6.9 - 7.3	
0.61 – 1.19 km	5.7 - 6.2	
1.19 – 1.31 km	2.8 – 3.0	

The alignment is generally straight with good forward visibility. There is one section with a moderate radius s-bend approximately 200 m north of Highland Road where the forward sightline is restricted by vegetation on the inside of the bend (see Figure 9-3). The localised seal width at this location is 7.2 m and therefore there is opportunity to add an appropriately positioned centreline to separate opposing traffic movements around this curve.

Near the end of the two-lane section, at distance 1.15 km, the carriageway is nominally 5.9 m wide with roadside drains and fences in close proximity on one side and small embankment on the other, as shown in Figure 9-4.

Figure 9-3: Willows Road Facing north showing vegetation on curve around 0.5 km

Figure 9-4: Willows Road – Facing north to end of two-lane section at 1.15 km

There are several areas where the road batter and/or shoulder have steepened as a result of slips / erosion primarily at culvert headwalls, and the most noticeable of these are:

- Culvert at 0.4 km: This culvert (see Figure 9-5) has a rock rip rap style headwall at each end. The headwall itself appears to be intact with nominally 900 mm shoulders at a slope of 10%, but on the east side of the road the shoulder has slipped over a short section resulting in a steep shoulder of around 70%. The culvert and steep shoulder are located on a straight section of road with good sightlines which reduces the likelihood of an errant vehicle leaving the road at this location. As noted above the road width is reduced to around 5.5 m seal width at this culvert crossing.
- Steep batter at 0.62 km: A steep batter has formed (see Figure 9-6) on the east side of the road around 30 m south of the culvert at 0.65 km described below and within a horizontal curve. The existing carriageway width at this location is 6 m wide.
- Culvert at 0.65 km: At this culvert outlet (see Figure 9-7), the embankment above the culvert outlet has eroded creating a steep drop off and it is likely that the sight rail was installed at the time of the slippage. The slip is located on the inside of a curve which reduces the likelihood of an errant vehicle leaving the road on the inside of the curve. The road is narrower adjacent to the slip (around 5.6 m seal width with additional width due to proximity of a private property entrance) and there is an approximate 1.4 m shoulder offset between the edge of seal and the culvert head wall erosion.
- Culvert at 0.66 km: The culvert inlet results in a narrow shoulder with a steep (rock lined) drop to the inlet - albeit the drop off is limited to around 0.4-0.5 m.
- Culvert at 0.92 km: another rock headwall at the outlet resulting in an abrupt drop to the invert. The shoulder above is intact.
- Culvert at 1.13 km: some scouring of the road shoulder at both the inlet and outlet of the culvert.

In each of the above cases, the issues would typically be addressed as part of routine road maintenance.

Figure 9-5: Culvert at 0.4 km facing south

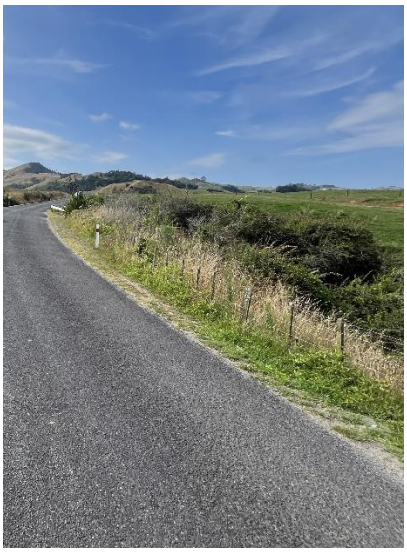

Figure 9-6: Steep berm at 0.62 km facing north

Figure 9-7: Culvert at 0.65 km facing south

9.2.3 Traffic Patterns

As part of the HDC traffic counting programme, traffic counts were carried out in the week beginning November 2020 located on Willows Road. The resultant 7-day ADT for Willows Road (110 m from SH25) was recorded as 97 vpd, with heavy vehicles comprising approximately 5% of that total. The typical hourly volume varied between 5 vph and 10 vph, which are very low traffic volumes.

The hourly flow distribution is shown in Figure 9-8 (at the same scale as the Baxter Road counts). It is highlighted that OGNZL was undertaking some investigatory work during the week of the traffic count.

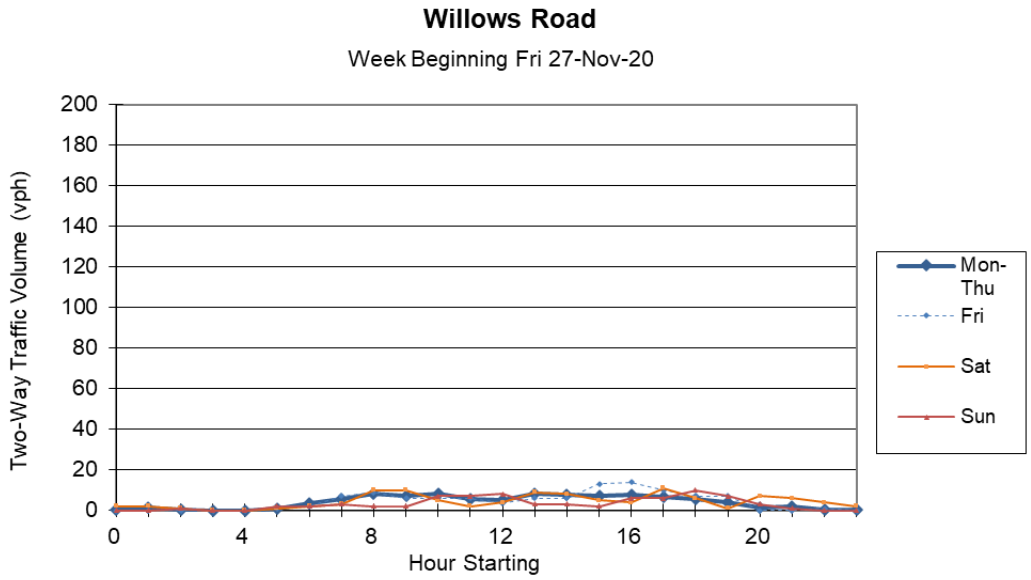

Figure 9-8: Willows Road 7-day Hourly Traffic Profile

9.3 Willows Road and SH25 Intersection

9.3.1 Intersection Characteristics

Willows Road is accessed from SH25 approximately 2.3 km north of Waihi urban boundary (where the existing speed change from 100 km/h to 70 km/h is located, immediately north of Gladstone Road).

The current intersection is a standard T-intersection on the outside of a large radius (estimated at 500 m radius) but relatively short horizontal curve of the highway, with give-way control on Willows Road. To the south of the intersection SH25 has a sealed width of 7.3 m. The width increases slightly at the intersection with 3.5 m traffic lanes, a tapered eastern shoulder of 0.4 m and a western offset from edge line to limit line of 1.3 m. The left turn in curve radius is estimated at 35 m which provides a relatively fast entry curve.

Operating speed has been determined with reference to Tom Tom data, which shows an 85th percentile operating speed of 96 km/h southbound, and 95 km/h northbound at the intersection. The Safe Intersection Sight Distance[5] associated with that speed is approximately 235 m. The available sight distance from Willows Road has been measured and exceeds 335 m in both directions as measured to both the side road and the highway centreline (Figure 9-9 and Figure 9-10).

[5] Decision time 3 seconds, reaction time 2 seconds, deceleration coefficient 0.36

Figure 9-9: SH25/ Willows Road intersection showing sight line to southwest

Figure 9-10: SH25/ Willows Road intersection showing sight line to the northeast

The current alignment of SH25 is curved passing the intersection which restricts the forward sightline for southwest bound vehicles to approximately 120 m across the apex of the curve. A stopping sight distance for users of the highway of 155 m is required for an operating speed of 96km/h. The available stopping sight distance meets an absolute minimum for constrained situations but this indicates some additional benching on the inside of the intersection to improve visibility would be desirable.

Figure 9-11: SH25/ Willows Road Restricted Forward Visibility Around Curve

9.3.2 SH25 Traffic Patterns at Willows Road

9.3.2.1 Daily Traffic Volumes

The nearest SH25 traffic count site to the Willows Road site is located on SH25 immediately north of Gladstone Road (count station 02500240). This site is counted sporadically for week periods through the year. As this count site is located close to Willows Road with no other intersecting roads between, this count site is regarded as a good representation of the traffic volumes in the vicinity of the intersection.

Data published by NZTA indicates an annual average daily traffic (AADT) volume for the year 2023 of 3,426 vpd at the count site northeast of Gladstone Road.

Figure 9-12 shows the historical SH25 growth since 2001, with the calculated growth being approximately 1.9% per annum over the long term.

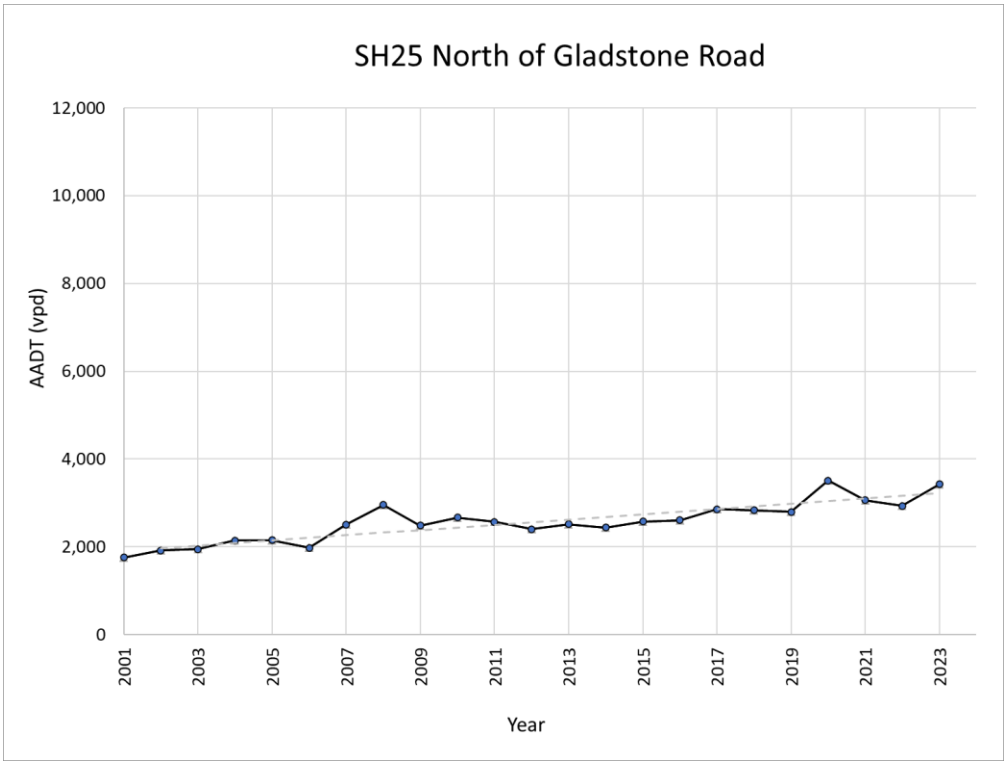

Figure 9-12: SH25 Linear Growth Trend 2001-2023

It is also noted that the count site on SH25 is located on the urban/rural boundary, and traffic volumes will progressively increase closer to the urban centre. An allowance of an additional 20% is made for the volumes passing the Kenny Street access.

9.3.2.2 Hourly Traffic Patterns

Hourly traffic volumes for this location on SH25 north of Gladstone Road a 7-day period in August 2023 are shown in Figure 9-13 and Figure 9-14. This is the most recently available traffic count, with an ADT during the week recorded at 3,540 vpd.

It is noted that if adjustments were made to allow for a forecast 2024 85th percentile week based on the SH2 seasonal patterns, then the traffic volume for a week in March or November 2024 could be approximately 28% higher than recorded in August 2024. That will result in an ADT of 4,500 vpd.

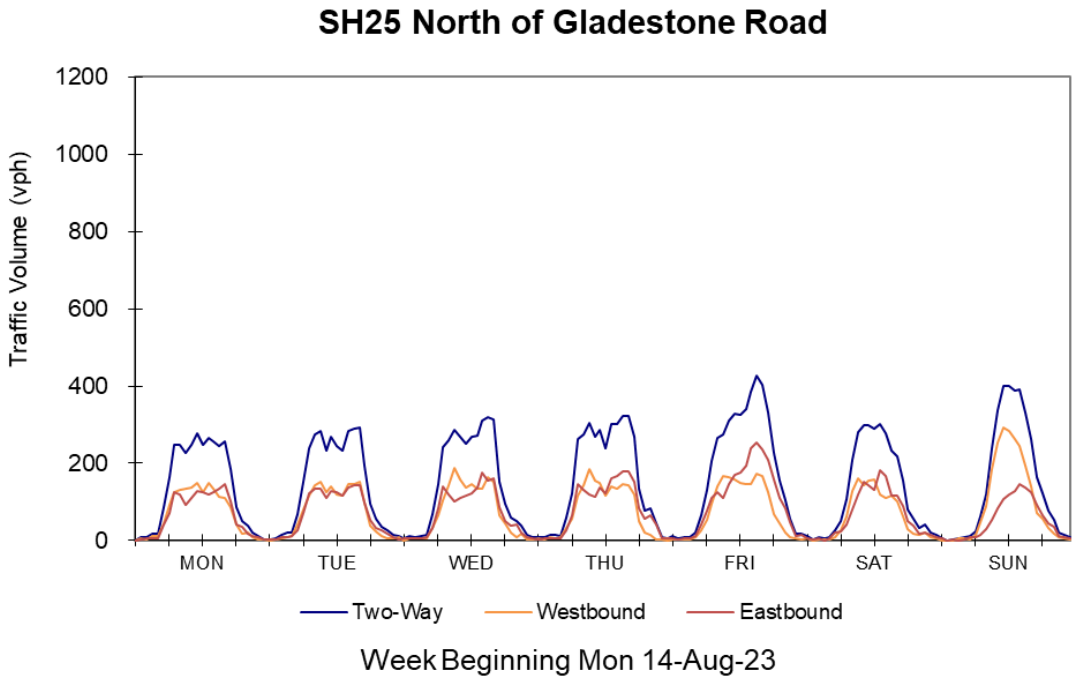

Figure 9-13: Hourly Traffic Flows on SH25 bv Day of Week

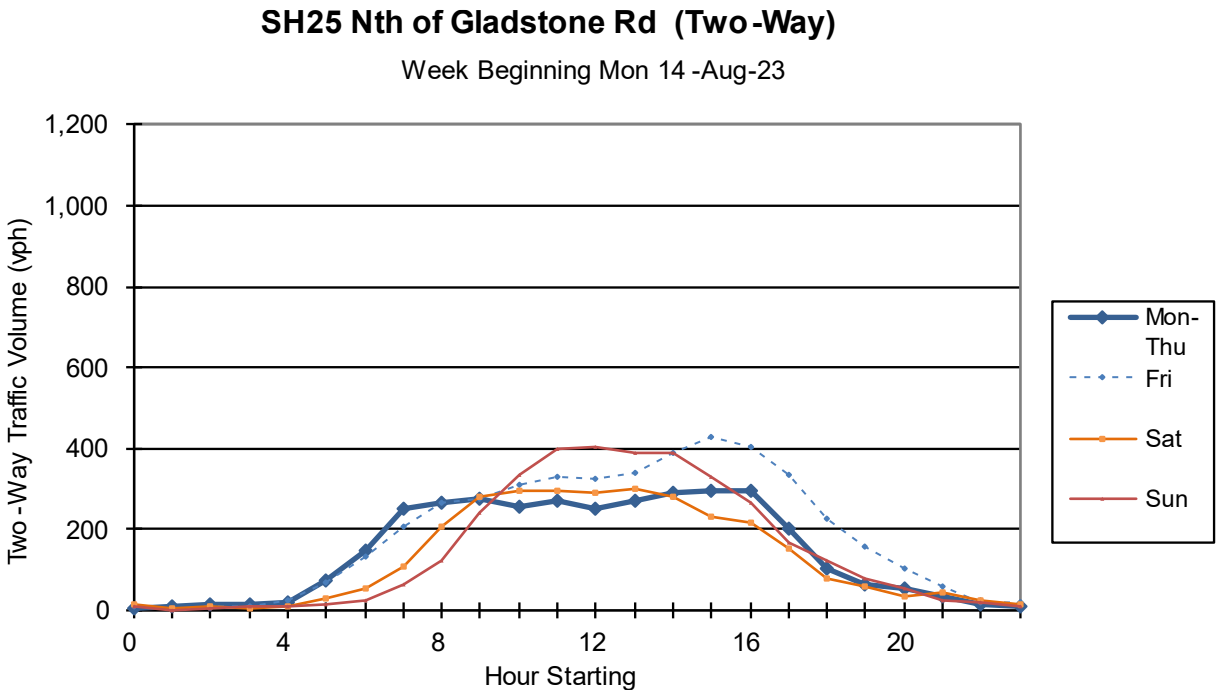

Figure 9-14: Typical Hourly Traffic Flows on SH25

The data depicted in Figure 9-13 indicates that the busiest times on this part of the highway are Friday and Sunday afternoons, with two-way flows of around 430 vph and 400 vph respectively (and the Friday evening peak is similar to the midday peak). Typical daytime two-way flows during the rest of the week are in the 250 to 300 vpd range.

When considered against the mine shift changeover times around 7 am and 7 pm, typical weekday traffic volumes are less with 150 vph recorded in the morning hour starting 6 am and 100 vph recorded in the evening hour starting 6 pm. The volumes are lower still for the hour starting 7 pm.

9.4 Road Safety Records

NZTA maintains a Crash Analysis System (CAS) database of all reported road crashes in New Zealand. The database has been searched to identify all reported crashes which occurred during the most recent five-year period from October 2019 to September 2024 inclusive of the principal access roads and the associated intersections with state highways.

The search area included:

- Willows Road and within the functional zone of the intersection of Willows Road and SH25;

The search identified two crashes, both of which were minor injury as depicted in Figure 9-15, and detailed as follows:

- There were no recorded crashes on Willows Road. However, there were two minor injury crashes near the intersection of Willows Road and SH25 (within 250 m of the intersection).

- A minor injury crash occurred approximately 20 m north of Willows Road and SH25 intersection due to a distracted driver losing control of their vehicle.
- A minor injury crash occurred approximately 170 m north of Willows Road and SH25 intersection when coming around the steep road and 45 km/h corner and sliding off the road. The driver was under the influence.

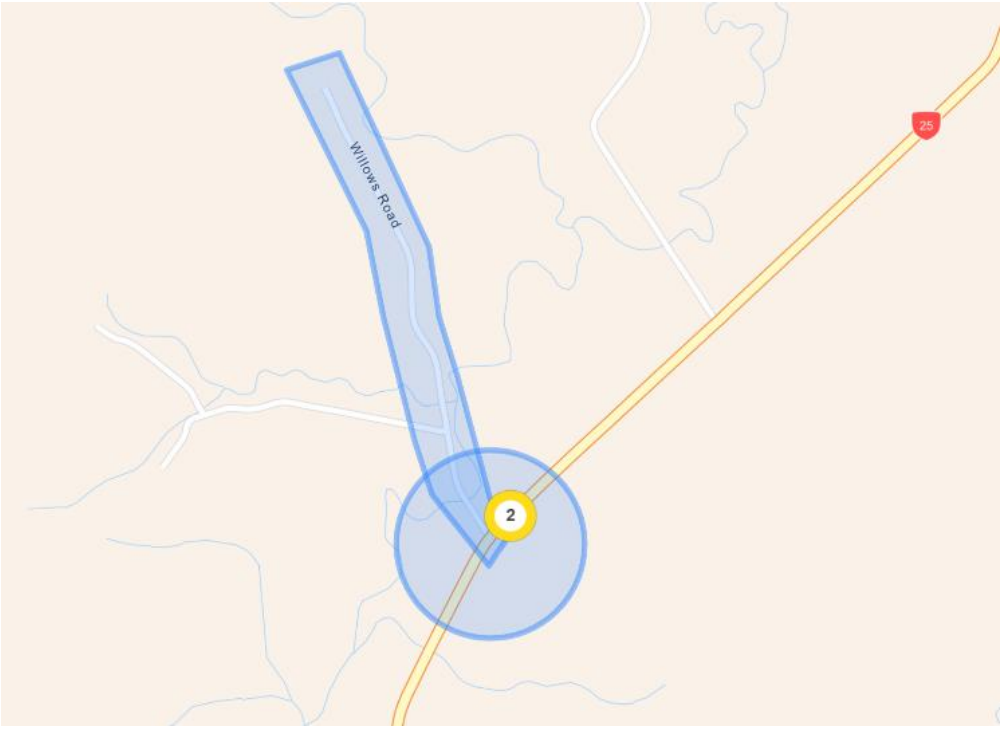

Figure 9-15: Willows Road Search Area and Crash Record

10 WNP Willows Road

10.1 WNP - Willows Road Facilities

The proposed WUG is situated on farmland at the end of Willows Road. OGNZL is proposing to construct an access tunnel system to undertake mining of the Wharekirauponga resource. An access portal and surface infrastructure to service the construction of the access tunnels and the subsequent mine is to be located on farmland at the end of Willows Road.

Access to the site is proposed by way of private roads totalling around 2.5 km in length to be constructed off the end of Willows Road with spur connections to main site infrastructure, including the first aid room/gatehouse, office/change house, workshop and magazine. It is understood these roads will be all weather roads and sealed to a width of 6 m for the main trafficked section, with the balance constructed of gravel. Ore and rock will not be transported on public roads. All ore and rock handling will be undertaken on private roads with the movement of material between WUG and Waihi processing facilities utilising the tunnel connection to the proposed WUG portal.

Service vehicles will also utilise the connecting tunnels from the WUG portal at the processing plant to access the tunnel system and mining operations as well as general operational access between the mine and the Processing Plant.

A 12.2 m wide dual lane haul road constructed of rock base with crushed rock surfacing will run from the portal to the rock storage pads, with an 8 m wide single lane connection to the workshop and wash pad.

The project will comprise the following key elements as further described in the Project Description as part of the AEE:

- Tunnel access portals being:
  - An initial main access portal for tunnelling at Willows Road farm (the Willows Portal) will serve as the only access to the orebody during the exploration phases. Once the interconnecting plant tunnel is established, the Willows Road main access portal will continue to serve as a rock transport route and for transport of personnel, mobile equipment, and consumables in and out of the mine. Rock that is stockpiled at Willows Road during tunnelling will also be transported back into the mine for backfill through this portal; and
  - A materials handling portal located near the Processing Plant (the WUG Portal), that will be utilised for transport of ore out of the mine and rock back into the mine for stope backfilling.
- Establishment of a new Surface Facilities Area (SFA) near the Willows Road portal will be required to support the tunnelling and subsequent mining at Wharekirauponga, including:
- Office, crib room and change house; First aid room and gatehouse (remotely monitored); Small service workshop and wash down bay;
- Lay down area for storage of tunnelling consumables such as poly pipe, vent bag and rock bolts/mesh;
- Development ore, rock (NAF/PAF) and topsoil stockpiles;
- Rock storage pad,

- Private road connection to Willows Rd and site connecting roads;
- Other civil work including sumps and ponds, sewage plant, compressor, explosives magazine, etc.;
- A parking area for all anticipated on-site vehicles (including buses).
- Power, communications and other utilities supply: A buried services trench connecting the Willows Road farm to the existing Waihi plant that will carry 33 kv power, fibre optic for communications, and several waste and clean water services. It is understood these lines will be buried in a trench on OGNZL land and then follow the Willows Road and SH25 corridors to the west of the Ohinemuri River bridge (approximately 1 km south of Willows Road intersection), then overland to reach the Waihi Processing Plant. Work within the road corridor is subject to separate Corridor Access approvals to be sought when the details of construction are better understood. Any work in the corridor will be subject to a Construction Traffic Management Plan.
- Willows Road extension between the end of the existing formed road and the entrance to the WUG follows the existing paper road alignment and will be formed to a 6 m sealed carriageway width with design and construction to meet the HDC Engineering Manual.

Figure 10-1 depicts the proposed site infrastructure layout showing buildings, access layout, parking, rock pads and other civil work.

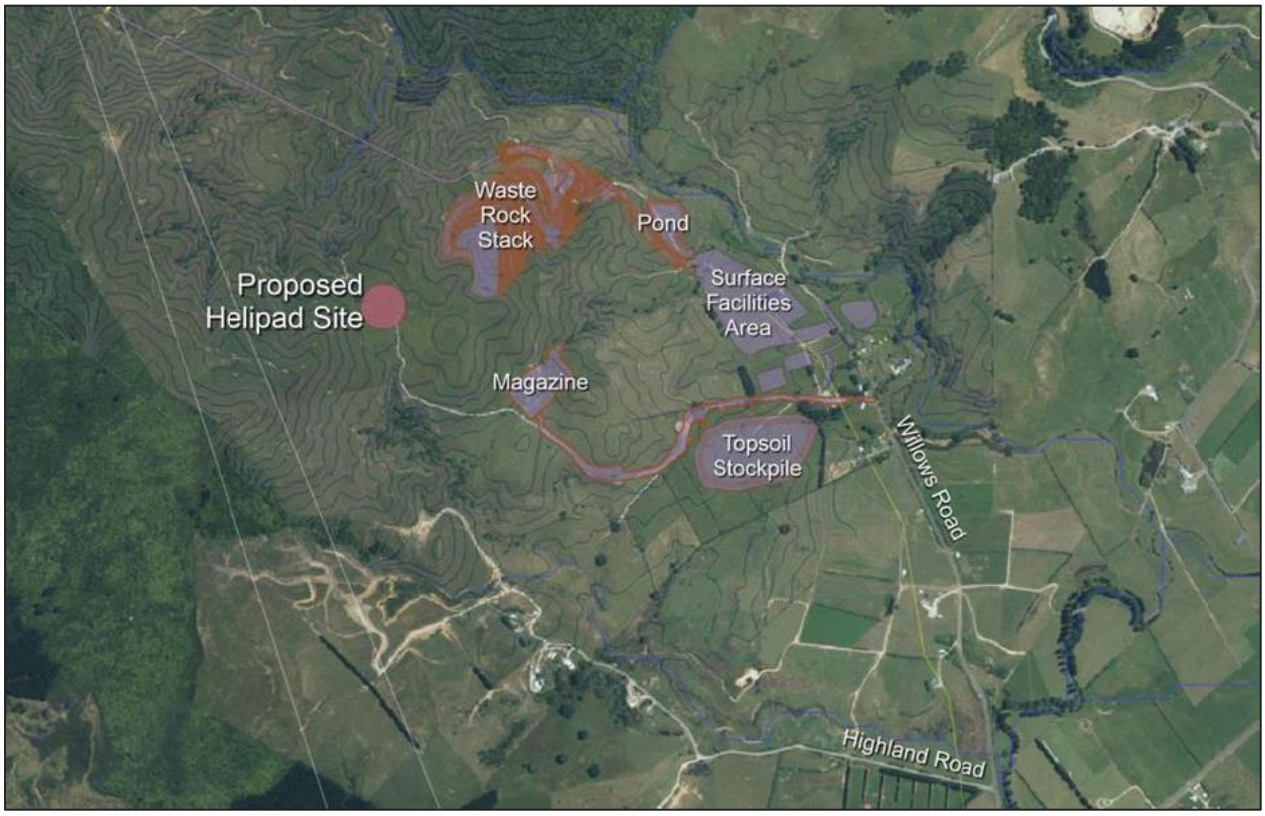

Figure 10-1: Proposed Surface Infrastructure Layout

To enable assessment of traffic related effects, the staging of activity is based on the economic model that output the derived labour forecasts set out earlier in Section 5.2.

An anticipated programme and staging of activity have been considered with the precise staging programme depending on a range of factors. For this transport assessment purpose, the project is expected to proceed over five phases generally as set out in the indicative programme in Table 10-1.

Table 10-1: Indicative WUG Phasing

Phase	Duration	Indicative Years
Bulk earthworks and planting	2 years	Year 1-2
Surface infrastructure development	1 year	Year 2
Tunnelling	4 years	Years 2-5
Exploration	10 years	Years 3-13
Mining	10+ years	Years 6 – 15+
Site rehabilitation and closure	1 year, 2+ years	Year 11, Years 15-17

10.2 Workforce and Working Hours

Traffic generation patterns of the site will relate to the project phase, working hours, shift patterns, employee numbers, and travel mode. Some of the key considerations relating to working times are described below as is currently anticipated:

- Initial works to establish surface infrastructure (including earthworks) will be undertaken on a day shift basis, 6 days per week.
- As tunnelling commences, work will progress on a 24 hours per day, 7 days per week basis. In this phase three rotating shift crews (12-hour shifts - to provide 24 hour/day, 7-day coverage) will typically be involved (1 Crew Day Shift, 1 Crew Night Shift, 1 Crew on Leave).
- Routine maintenance work will occur on dayshift only. Typically, the dayshift is expected to end between 3.30 pm and 5 pm whilst the night shift commences at 7 pm.
- OGNZL Waihi management, technical support and administration, will nominally be working day shift 5 days per week.
- Underground mining will be carried out 24 hours per day, 7 days per week, including equipment maintenance conducted in the underground workshop.
- Most other work at the Willows SFA will be during the dayshift, although the likes of ore transport to the Processing Plant and rock return (following depletion of the Willows Rock Stack) from the NRS and GOP via the WUG portal at the Processing Plant and the tunnel system will continue 24 hours per day, 7 days a week.

10.3 Supplies and Consumables

Supplies and consumable items will be brought to the site via public roads using conventional vehicles and delivery systems. The workshop will incorporate a store to house adequate quantities of high turnover items.

Main consumables will include:

- Diesel;
- Oils and greases;
- Explosives;
- Rock bolts and mesh;
- Drill bits and steels;
- Equipment parts including critical spares;
- Poly pipe and fittings;
- Ventilation ducting; and
- Personal Protective Equipment (PPE) and safety items

10.4 WUG Trip Generation

The traffic movements expected to be generated in association with the WUG project are primarily related to the transportation of the workforce and the delivery of materials and plant for construction and exploration.

10.4.1 Workforce Transportation

The majority of the mine workforce (that is shift workers associated with construction and mining) will be required to travel to the site by bus from the Kenny Street access adjacent to the Martha Pit. The existing carpark within the Martha Pit area will be extended to provide a staging facility or “park and ride” between Kenny Street access and the WUG site. This significantly decreases traffic movement at Willows Road compared to a scenario of all workers travelling to Willows Road independently.

For the purpose of assessment, a bus for typical staff is assumed to be a 20-seater carrying 18 workers, and for construction a 12-seater carrying 10 workers (or part thereof). A conservative ratio of 10% of the workers are expected to share travel to Kenny Street. Empty buses are expected to leave the Willows site in the morning, and return in the evening to support the different levels of staff working day and night shift using the park and ride service.

An assessment of the Park n Ride element of traffic generation is set out in the graphs in Figure 10-2 below, with consideration of the arrival of workers for their shift, the movement of buses, and the departure of the other workers completing their shift. Activity will be focussed on shift start and end times i.e. 7 am and 7 pm, which is a time that the road network is not busy. Movement will be strongly directional in each peak period, i.e. workers all arriving, followed by workers all departing. There will be an initial peak early in the construction process of the WUG, with a more sustained peak of approximately 200 vph once the WUG is fully operating.

Figure 10-2: Kenny Street Park n Ride Traffic Generation

For Willows Road access the traffic movements associated with the WUG workforce (including buses associated with the park and ride) is based on labour forecasts and summarised in Figure 10-3 for the busiest morning peak period. The peak level of morning (approximately 70 vph) and evening movement (approximately 30 vph) at Year 3 is associated with construction activity. Total morning peak movements are then typically less than 50 vph with a strong inbound directionality. As operational maintenance staff are likely to leave earlier than the shift change over time, the evening shift changeover time has a reduced level of activity as indicated by Figure 10-4, with less than 20 vph typical after Year 3.

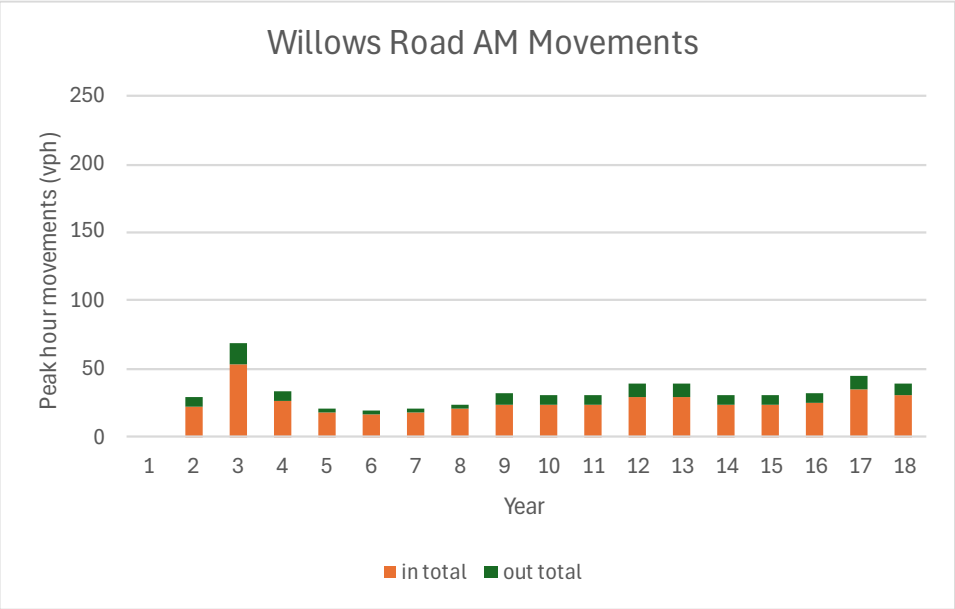

Figure 10-3: Willows Road AM shift changeover movements

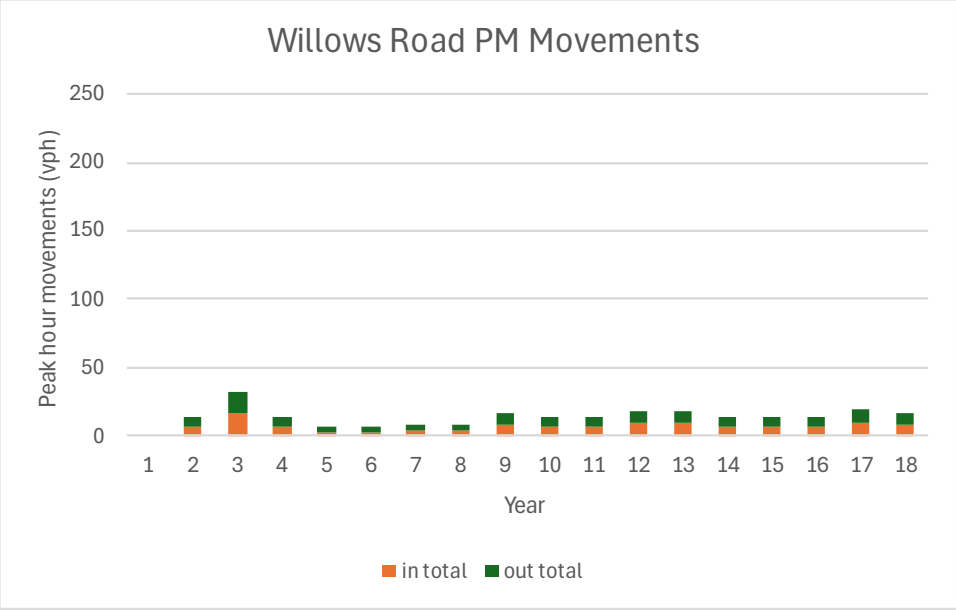

Figure 10-4: Willows Road PM shift changeover movements

10.4.2 Heavy Vehicle Movement Generation

As the site is established, there will be reliance on Willows Road for heavy vehicle movements for construction related activity. Over time, the volume of heavy vehicles will reduce as the mine becomes operational. Heavy vehicle movements on a daily basis through the construction and operation of the site have been forecast by OGNZL on a quarterly basis and are presented in Figure 10-5.

The peak of heavy vehicle movements is expected over the first year of the project. For the balance of the project (from 2025), daily truck movements are expected to total less than 50 vpd spread over the full 7-hour day between 9 am and 4 pm (i.e. average around 7 vph).

It is noted that the assessment of heavy vehicle movements through construction phases assumes coincidence of peak deliveries for different activities on the same day. In practice many of the activities only require sporadic movement, and there is likely to be opportunity to manage the level of coincident activity with traffic management planning. For example, based on quantities the average heavy vehicle movements over a two-year period for Phase 1 is likely to be approximately 50-60 movements per week, whereas the coincident peak assessment generates a "peak" activity of 110 movements per day. In that respect the assessment of heavy vehicle movement is considered particularly conservative.

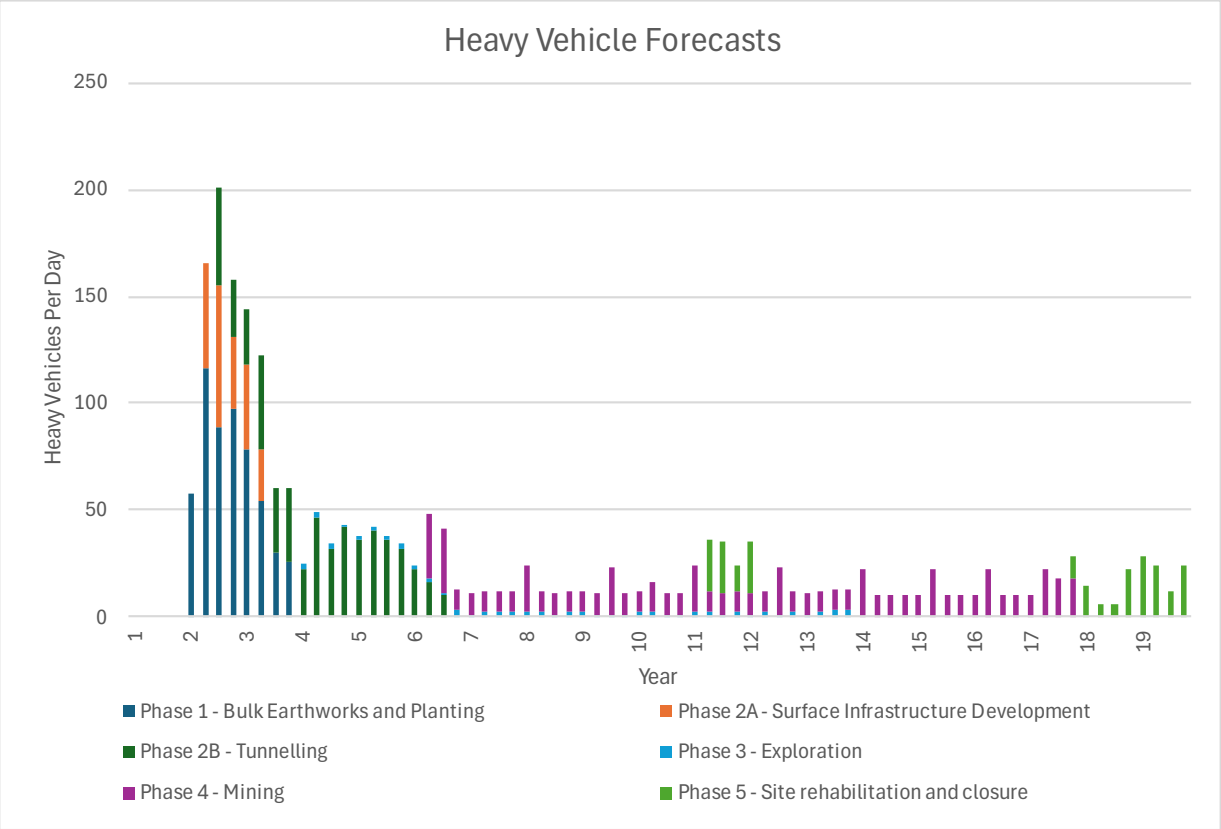

Figure 10-5: Willows Road Indicative Heavy Vehicle Volumes

Weekends are expected to be substantially reduced levels of activity, at approximately 50% of the weekday activity.

It is possible that a few of the site deliveries and transport of equipment, particularly in the site development phases, will result in oversize loads. If over-dimension and / or over-weight loads are required, then the transport of these items will be subject to obtaining the necessary permits from NZTA and the associated traffic management of those loads. This can be considered within a Project Traffic Management Plan (PTMP) which is recommended herein.

Some imported material is anticipated for the project development phase such as the importation of the (yet to be confirmed) rock pad liner. For the purpose of this assessment, it has been assumed that all material imports will be sourced from legally established and consented sources of supply and therefore no additional assessment of the transport of those materials is necessary from the point of supply to the state highway network.

10.4.3 Daily Trip Generation

The combination of the heavy vehicle movements, workforce buses and minivans, and light vehicles (including additional allowance for general movement through the day) results in an indicative forecast of total vehicle movements on Willows Road over the project timeframe. The weekday daily heavy volume is average for each year, with the forecast shown in Figure 10-6.

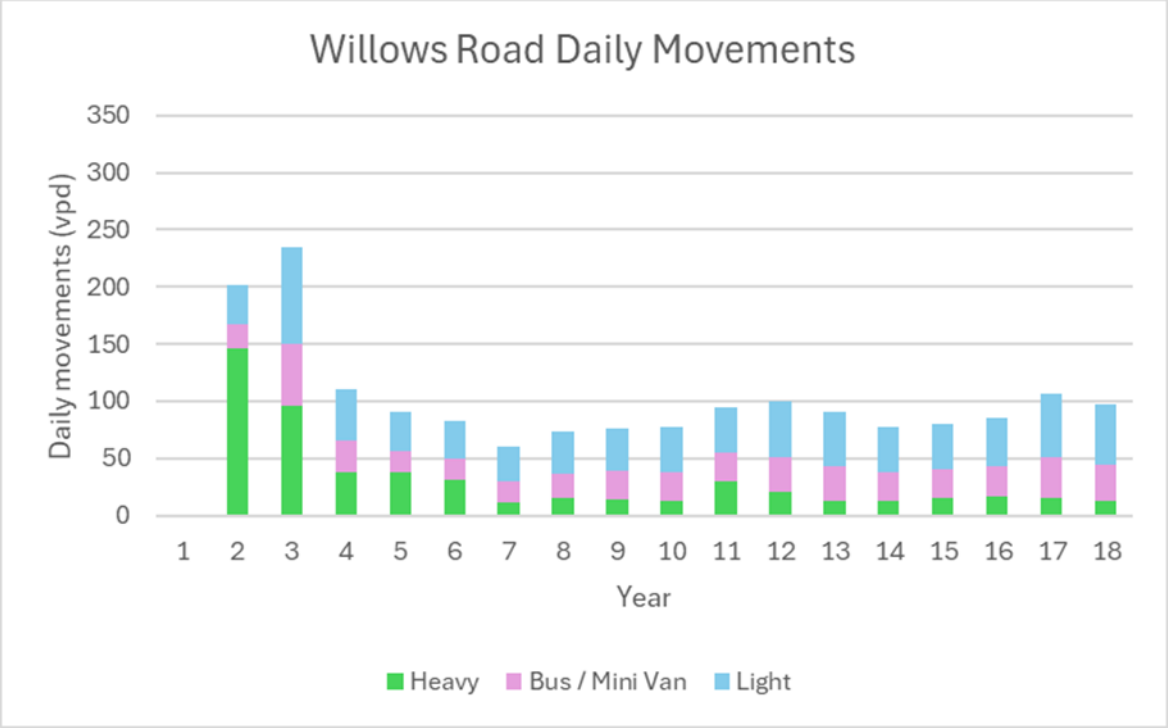

Figure 10-6: Willows Road Daily Traffic Generation (weekdays)

The associated peak daily movements of approximately 200-250 vpd occur when there is an overlap of project phases in the early years at a time when the workforce is near peak. Traffic volumes then reduce to a traffic volume typically forecast to between 60 vpd and 100 vpd.

11 WUG Traffic Effects

11.1 Existing Formed Willows Road

The current formed two-way section of Willows Road varies in width from 5.5 m to 7.2 m (with the exception of short, isolated sections including the one lane bridge), and carries approximately 100 vpd. The HDC Engineering Manual sets out the following requirements for rural roads:

- Sealed width of 6 m for roads carrying up to 300 vpd (with minimum of 5 m subject to approval)
- Sealed width of 7 m for roads carrying 300 vpd to 700 vpd (with minimum of 6.5 m subject to approval)

As depicted in Figure 10-6, and with allowance for the additional 100 vpd base flow, the road is likely to carry approximately 300-350 vpd over a short period during the initial construction phase. The total traffic volume on the road will then drop to a volume of approximately 160-200 vpd. Therefore, for the most part[6] a road width of 5-6 m width is appropriate in terms of the Engineering Manual.

Generally, with the exception of the single lane bridge and the existing Armco culvert crossing (at distance 0.4 km), Willows Road has a sealed carriageway width of 5.7 m or greater. However, it is acknowledged that a road carrying heavy vehicles should desirably be wider to safely and efficiently cater for two-way traffic and the associated tracking paths (minimum width 6.1 m based on 2.5 m legal width plus mirrors and clearance between opposing vehicles of 0.6 m).

As described at Section 10.4.2, the expected number of truck movements over the majority of the project is in the order of 10 to 30 vpd, and potentially peaking at approximately 200 vpd for a short period over the initial period of construction.

Where there is frequent use of the access roads by trucks in both directions of travel resulting in trucks passing in opposing lanes, a sealed carriageway width of 7.0 m is generally recommended with a reduced standard to be considered on an isolated basis where speeds are low.

The existing single lane bridge at approximately 110 m from SH25 imposes a constraint and will add some delays in peak times. While a single lane bridge will typically cater for daily traffic volumes around those expected it is acknowledged that the traffic patterns are heavily peaked around the workforce shift times. As the bridge is already signposted (but with little marking) with priority for northbound traffic (away from SH25) there is little concern that any queues would form back to SH25. Further, the proposed busing of majority of the construction and mine workforce reduces the private vehicle trips associated with the start and end of shifts. Irrespective, it is recommended that the actual performance of traffic flows on the single lane bridge is monitored and if any unacceptable queuing occurs, then additional traffic management considered.

[6] Also acknowledging that the background traffic volumes on Willows Road decrease with distance from SH25

While the daily volume of heavy vehicles is not prolonged nor particularly high, over the life of the project the change from existing levels of heavy traffic is large. This may have an impact of the existing road pavement depending on the age and strength of the existing pavement. There are two mechanisms for addressing potential impacts: either calculate the effect of the proposed truck movements on pavement life in terms of a financial contribution to HDC or, enter into a maintenance agreement for the road with HDC to cover an appropriate share of pavement deterioration over the life of this project. (It is noted that OGNZL has a similar agreement already in place with HDC related to the existing Project Martha and Baxter Road.).

There are several areas where the road batter and/or shoulder have steepened as a result of slips / erosion primarily at culvert headwalls as described in Section 9.2.2. The majority are minor changes in height, but the three more significant drop-offs are:

- **Culvert at 0.4 km:** This culvert has a rock rip rap style headwall at each end. The headwall itself appears to be intact with nominally 900 mm shoulders at a slope of 10%, but on the east side of the road the shoulder has slipped over a short section resulting in a steep shoulder of around 70%. Shoulder repairs are routinely undertaken as part of road maintenance by the road controlling authority (HDC).
  - The slip is located on a straight section of road with good sightlines which reduces the likelihood of an errant vehicle leaving the road at this location.
  - The expected increase in traffic resulting from this project (approximately 250 vpd during the busiest year) does not significantly change the crash exposure risk at this site. With reference to the Safe System audit guidelines (NZTA 2022) scoring system the difference between the base volume and the proposed traffic volume does not change the exposure score rating.
  - However, it is acknowledged that the road is narrower adjacent to the shoulder slip (around 5.5 m seal width) which is tight for two opposing trucks to pass in opposing direction. As noted further below a Project Traffic Management Plan (PTMP) is proposed which will set out appropriate driver protocols with respect to behaviour including speeds. As part of the PTMP the applicant will monitor the safety performance and driver behaviour of movements on Willows Road and address any issues that may arise with respect to any narrow sections of road.
  - Several potential measures are available to address any safety concerns across the culvert at 0.4 km distance including repair of slipped shoulder, widening the carriageway, installation of a barrier, or the installation of warning signage. While the detailed design of measures will be developed in the design phase, to provide certainty that this particular zone will be appropriately addressed, it is recommended that an additional condition of consent require: a roadside barrier system designed by a suitably qualified road barrier designer shall be installed on both sides of the road at the culvert (labelled no. 40) or alternatively other safety measures installed to the satisfaction of the Hauraki District Council's Transportation Manager.
- **Culvert at 0.65 km**: At this culvert outlet the embankment above the culvert outlet has eroded creating a steep drop off and it is likely that the sight rail was installed at the time of the slippage. Slip repairs are routinely undertaken as part of road maintenance by the road controlling authority (HDC).
  - The slip is located on the inside of a curve which reduces the likelihood of an errant vehicle leaving the road on the inside of the curve.
  - Again, the expected increase in traffic resulting from this project (approximately 250 vpd additional during the busiest construction year) does not significantly change the crash exposure risk at this site.
  - However, it is acknowledged that the road is narrower adjacent to the slip (around 5.6 m seal width with additional width due to proximity of a private property entrance)

which is tight for two opposing trucks to pass in opposing directions. It is recommended that Willows Road is widened on curves (including the curve adjacent to this culvert) and marked with a centreline to ensure the design vehicle is able to negotiate the road in each direction of travel within its own lane. Based on a semi-trailer truck this will result in some carriageway widening of the curve adjacent to this slip and any widening will require either some form of retaining with barrier or movement of the road alignment to the west.

  - Additionally, the transport assessment recommends preparation and implementation of a Project Traffic Management Plan which will set out appropriate driver protocols with respect to behaviour including speeds.
  - Having regard to the proposed widening mitigation it is considered that the safety of vehicles using Willows Road at this location will be adequately catered for.

- **Steep Berm at 0.62 km**: The steep berm located around 0.62 km on the east side of the road is around 30 m south of the culvert at 0.65 km described above and within the same horizontal curve.
  - While it is recommended that detailed swept path analysis is undertaken for all curves on Willows Road, as the existing carriageway width at this location is already 6 m wide the widening required (if any) will likely be of a minor nature.
  - As noted above, as the steep batter is located on the inside of a curve, the likelihood of an errant vehicle leaving the road on the inside of the curve is reduced and providing two-way travel is achievable no additional widening considered necessary as a result of the proposed change in traffic movements (but noting that some physical work may be required in the vicinity anyway to achieve the recommended two-way travel for heavy vehicles.

For this project, with consideration to the existing pavement widths, the short period of construction (which will be subject to traffic management plans), the volume of HCV expected and the finite length of the project overall, it is assessed that the existing carriageway width is able to safely cater for this volume of traffic subject to the following recommendations:

- Mark a road centreline on the road (except at the single lane bridge) particularly to address those sections with limited forward visibility i.e., at curves in the alignment;
- Design and construct curve seal widening where necessary to ensure the design vehicle is able to negotiate all curves within its lane. As a minimum curve widening is recommended for the curve at distance 0.65 km. The extents of widening required will be determined following detailed design. It is recommended that a condition of consent is proffered that requires the approval of the HDC Transportation Manager to the design plans.
- A roadside barrier system to be designed and installed by a suitably qualified road barrier designer on both sides of the road at the culvert (labelled no. 40) or, alternatively, other safety measures installed to the satisfaction of the Hauraki District Council's Transportation Manager.
- Upgrade the single lane bridge approaches in accordance with the Manual of Traffic Signs and Markings (MOTSAM) for single lane bridge approaches and controls (which will require some minor widening).
- Prepare and implement a Project Traffic Management Plan which will include protocols for drivers on Willows Road to meet (e.g. with respect to speed, queuing and courtesy).
- Monitor the pavement performance over the project duration and maintain as necessary (this recommendation is intended to monitor both pavement deterioration due to the heavy vehicle loading and any edge break due to isolated areas of narrow seal width).

11.2 Willows Road Extension

An extension of Willows Road is proposed from the current end of the two-way section (adjacent the entrance to No. 122 Willows Road) to the proposed site access. The first 100 m of this extension is currently formed and sealed to a single lane access standard. Either a turning head will need to be provided at the existing extent of two-lane work, or one added near the proposed access location to enable the public to turn around.

It is recommended a minimum 6.0 m sealed width will be adequate for the Willows Road extension on the basis of the mitigation measures outlined for Willows Road in 11.1 above. A 6 m width will also generally meet the requirements of the HDC Engineering Manual for the expected volume of traffic.

11.3 Site Access/ Layout

The location of the proposed site access on Willows Road is indicatively shown on Figure 10-1 as forming a right-angled intersection with Willows Road. If this arrangement is retained, then the access layout is recommended to be designed and constructed to the HDC Engineering Manual requirements for an access but with consideration to the tracking paths of heavy vehicles.

However, unless there is an expectation, on completion of the project and closure, that the Willows Road extension will be used by the general public, then the use of the access will be solely for the project, which would allow for the access to be designed as a curve in the alignment i.e. not an intersection as currently proposed, and thereby providing a continuous route for all site traffic. This approach will require further discussion with HDC and will depend on the proposed use of the corridor following closure.

11.4 Willows Road and SH 25 Intersection

11.4.1 Intersection Performance – Capacity

The assessed peak hour traffic movements as described in Section 10.4 have been modelled in SIDRA Intersection software for the intersection of Willows Road and SH25 based on a layout that incorporates facility for a right turn bay (as is proposed).

A range of scenarios can apply, however the most critical from a capacity perspective is when the right turn from Willows Road onto SH25 is busiest. That will be immediately before and after staff changeover in the evening peak, when SH25 traffic volumes are well below peak. The busiest expected period of traffic generation will occur in approximately year 3, estimated to be 2028.

Peak hour movements have been assessed based on:

- SH25 volumes for the peak morning hour ended 7.30 am and evening hour ending 7 pm factored for growth and seasonally adjusted. These periods are slightly conservative;
- Peak traffic assumptions as follows:
    - AM peak 53 vph arrivals and 16 vph departures in the AM peak

  - PM peak 16 vph departures and 53 vph departures (conservatively assumes all staff leave in the peak hour, whereas some leave earlier)
  - 90% to / from the west
- All buses or minivans treated as a heavy vehicle
- Background traffic flows of 8 vph on Willows Road;
- All modelling to SIDRA default values, except for allowance in peaking of arrival and departure flows (which generates the "demand arrival flows" for a busiest 15 minutes).

The morning and evening peak periods are included in Table 11-1 and Table 11-2 below[7].

Table 11-1: SIDRA Modelled SH25/ Willows Road intersection 2032 AM with Project traffic

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	[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
East: SH25 (north)															
5	T1	All MCs	168	10.0	168	10.0	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	95.0
6	R2	All MCs	7	0.0	7	0.0	0.005	7.9	LOS A	0.0	0.1	0.31	0.59	0.31	59.9
Approach			176	9.6	176	9.6	0.091	0.3	NA	0.0	0.1	0.01	0.02	0.01	92.7
North: Willows Road															
7	L2	All MCs	5	0.0	5	0.0	0.101	6.0	LOS A	0.4	4.5	0.51	0.72	0.51	56.8
9	R2	All MCs	48	84.2	48	84.2	0.101	11.3	LOS B	0.4	4.5	0.51	0.72	0.51	41.3
Approach			53	76.2	53	76.2	0.101	10.8	LOS B	0.4	4.5	0.51	0.72	0.51	42.4
West: SH25 (south)															
10	L2	All MCs	73	31.4	73	31.4	0.122	8.4	LOS A	0.0	0.0	0.00	0.23	0.00	67.8
11	T1	All MCs	138	9.9	138	9.9	0.122	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	89.8
Approach			211	17.3	211	17.3	0.122	2.9	NA	0.0	0.0	0.00	0.23	0.00	80.8
All Vehicles			439	21.3	439	21.3	0.122	2.8	NA	0.4	4.5	0.07	0.21	0.07	76.4

[7] "Demand Arrival Flows" and performance outputs in all SIDRA Intersection movement outputs reflect a calculated flow rate allowing for peaking of activity within the busiest hour, and the performance at that busiest time.

Table 11-2: SIDRA Modelled SH25/ Willows Road intersection 2032 PM with Project traffic

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
East: SH25 (north)															
5	T1	All MCs	84	10.0	84	10.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	95.0
6	R2	All MCs	3	0.0	3	0.0	0.002	7.5	LOS A	0.0	0.1	0.21	0.59	0.21	60.3
Approach			87	9.7	87	9.7	0.046	0.3	NA	0.0	0.1	0.01	0.02	0.01	93.2
North: Willows Road															
7	L2	All MCs	13	0.0	13	0.0	0.161	5.8	LOS A	0.7	5.9	0.34	0.61	0.34	59.6
9	R2	All MCs	128	31.4	128	31.4	0.161	7.3	LOS A	0.7	5.9	0.34	0.61	0.34	51.9
Approach			140	28.6	140	28.6	0.161	7.2	LOS A	0.7	5.9	0.34	0.61	0.34	52.5
West: SH25 (south)															
10	L2	All MCs	27	84.2	27	84.2	0.060	9.7	LOS A	0.0	0.0	0.00	0.19	0.00	54.8
11	T1	All MCs	68	10.8	68	10.8	0.060	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	93.7
Approach			96	31.6	96	31.6	0.060	2.8	NA	0.0	0.0	0.00	0.19	0.00	78.0
All Vehicles			323	24.4	323	24.4	0.161	4.0	NA	0.7	5.9	0.15	0.32	0.15	66.9

The analysis shows that the low traffic volume environment expected on both Willows Road and SH25 result in no expected operational issues at the intersection with the maximum delay to vehicles exiting from Willows Road around 11 seconds which is considered a high level of service (LOS B).

As a sensitivity check, the performance of the intersection has been assessed with peak road volumes, as well as peak activity volumes. This also demonstrates very good levels of service, with negligible change in delay with the highest delay to the morning peak right turn out being 13 seconds per vehicle.

A further “design life” sensitivity assessment has been carried out allowing for up to 30 years growth at 2% per annum on highway through movements. This shows that under all scenarios the worst turning movement still remains within acceptable levels of service with peak activity levels, and peak hour on the road network. The largest delay at year 30, is approximately 20 seconds per vehicle for the right turn out.

Overall, it is concluded that there is no capacity issue with the intersection with the inclusion of traffic generated by this project.

11.4.2 SH25 Intersection Layout/ Safety

The existing intersection layout has limited shoulder widening for right or left turning traffic. As reference only, the minimum NZTA layouts for an access with low to moderate use by heavy vehicles and up to 100 vpd requires a Diagram E layout[8] of the Planning Policy Manual (PPM) which would require a widened shoulder on the east side of SH25 over 180 m and over 90 m for left turn in traffic. A similar scale of widening, but of reduced length, would result from the use of Austroads minimum

[8] Diagram E of PPM for more than one truck per week and 100 equivalent car movements (ecm) for a private access

right turn provisions at an intersection as set out by the Basic right turn (BAR) at Figure A28 of "Austroads Guide to Road Design (GRD) Part 4 Intersections and Crossings" (Austroads).

The majority of traffic associated with the project is expected to travel to and from the south and therefore the volume of right turn movements into Willows Road is expected to be minimal. In the morning arrivals period (around 7 am) the expected traffic volume on SH25, together with the likely low volume of right turning traffic into Willow Road, does not meet the Austroads warrant for a right turn bay with design speed less than 100 km/h (Figure 3.25 of Guide to Traffic Management Intersections Part 6: Intersections, Interchanges and Crossings Management) at any time over the project life. If the warrant for a 100 km/h plus design speed is applied, the traffic volumes would still not meet the warrants.

However, at other times of the day SH25 traffic volumes are around 400 vph which would meet the threshold for a right turn bay with as few as 5 vph right turn in vehicles. Unless right turn in movements are able to be managed within acceptable thresholds (which vary by time of day) then it is recommended that a right turn bay is provided on SH25 with a layout meeting the minimum requirements of the NZTA Manual of Traffic Signs and Markings Figure 3.25. While the right turn bay is expected to have low demands, OGNZL has adopted the prudent approach of planning to upgrade the intersection at the outset rather than waiting for issues to develop which would then require additional work.

The existing intersection of SH25 and Willows Road currently has appropriate intersection sight lines in each direction of travel for the expected operating speed of vehicles on each approach (see discussion in Section 9.3.1). It is acknowledged that the forward sight distance (for which Austroads standard requires 155 m for the 96 km/h operating speed) is marginal around the inside of the curve adjacent to the intersection as a result of vegetation / embankment directly opposite the intersection (for southbound traffic). While this is an existing issue with the highway, it is acknowledged that southbound drivers have similarly restricted visibility to right turning vehicles from Willows Road as they accelerate to the south of the intersection. This is more of a concern for slow moving and hence slow to accelerate vehicles such as laden trucks. It is recommended that the forward sight distance requirements are considered in combination with the recommended other improvements below.

The tracking path of a truck and trailer (19.2 m long) has been plotted on available aerial photography as shown in Figure 11-1, which demonstrates that a truck and trailer is able to make the right turn out and left turn in based on the current layout whilst remaining within the correct lane.

Reference to the Austroads warrants shows that the left turn lane warrant for a design speed less than 100 km/h is not met within the project life. Applying a more conservative warrant for a 100 km/h plus design speed the warrant is still not met.

The safety benefits of widening an intersection shoulder to provide a left turn lane, as opposed to a through vehicle being forced to slow for a turning vehicle, are widely debated and any solution needs to be site specific. Being located on the outside of a bend a left turn lane can generate some additional sightline related risks with left turn vehicles visually obstructing a following vehicle from those turning from Willows Road.

These options were discussed with NZTA as part of preliminary consultation, and it has been agreed that as the operation was for a finite period a full left turn lane is not required[9].

In summary for this development, with consideration to the expected demand for the right turn in traffic movement, good sightlines in each direction from the side road but limited forward sight distance around the curve, the following measures are recommended, subject to final consultation with NZTA:

- Provide a right turn bay on SH25 meeting the minimum requirements of the NZTA Manual of Traffic Signs and Markings Figure 3.25 and meeting NZTA requirements for forward visibility.
- Include a left turn 2.5 m wide shoulder in accordance with Diagram E in the NZTA Planning Policy Manual.
- Street lighting to meet the requirements of NZTA M30.

The upgrade should be completed prior to commencement of the substantive construction phase.

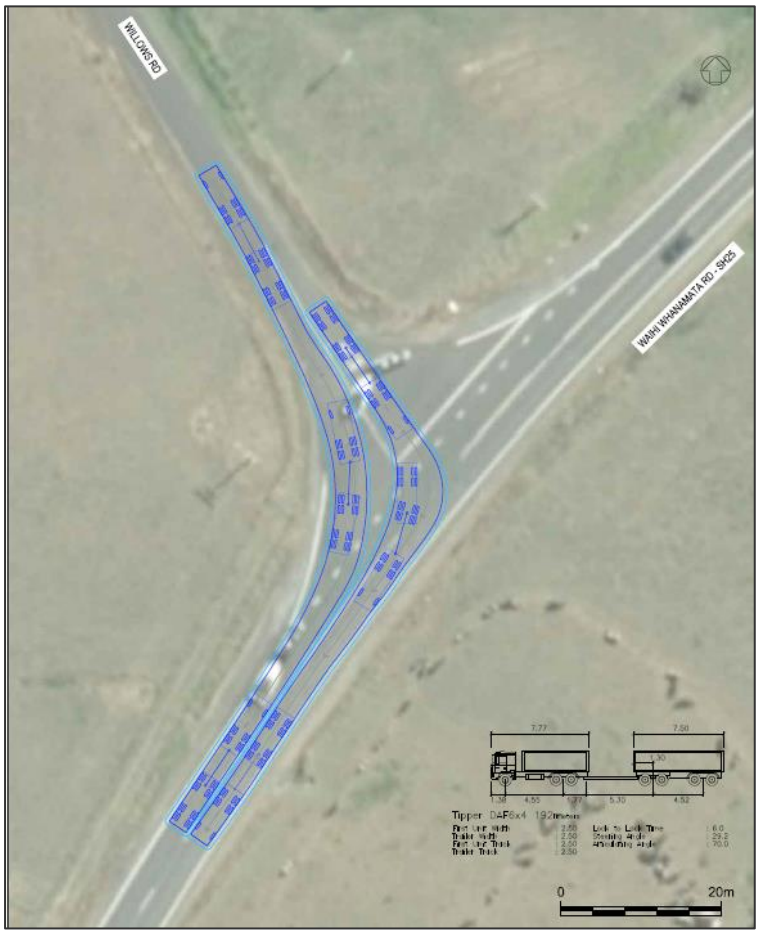

Figure 11-1: Tracking Path of Truck and Trailer at Willows Road / SH25 Intersection

[9] NZTA preliminary feedback suggests a left turn 2.5 m wide shoulder in accordance with Diagram E in the NZTA Planning Policy Manual is supported. Additionally, streetlighting to be considered in the design.

11.5 SH25 (Kenny Street) Access

The assessed peak hour traffic movements as described in Section 7.3 and Section 10.4.1 have been modelled at the Kenny Street access on SH25 based on the current intersection layout for the morning and evening peak hour period.

The intersection performance has been modelled for the busiest expected traffic generation period, which is near the end of the project (year 17) as previously indicated. That will represent a year of approximately 2042.

Peak hour movements have been assessed based on:

- SH25 volumes being 20% higher than north of Gladstone Road count site, with seasonally adjusted ADT in 2024 being 5,400 vpd, increased by 34% to obtain 2042 volume.
- SH25 morning peak hour ending 7.30 am (8% of weekday daily volume), and peak evening hour ending 7.30 pm (3% of weekday daily volume). Conservatively these periods will include all of the traffic associated with shift changeover, including bus movements, assumes a high proportion of movements occur in a short time.
- Directional split of traffic at 80% to/from the south and 20% to/from the north; and

The intersection has been modelled using SIDRA Intersection analysis software and the resultant intersection modelled flows and movement performance is summarised in Table 11-3 for the morning peak and Table 11-4 for the evening peak.

Table 11-3: Kenny Street Access AM Peak 2040 Intersection Performance

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total	HV]	Arrival Flows [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: SH25															
5	T1	All MCs	336	10.0	336	10.0	0.183	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
6	R2	All MCs	80	25.0	80	25.0	0.086	7.4	LOS A	0.3	2.9	0.53	0.70	0.53	43.9
Approach			416	12.9	416	12.9	0.183	1.5	NA	0.3	2.9	0.10	0.13	0.10	48.6
North: Barry Rd															
7	L2	All MCs	56	35.7	56	35.7	0.348	7.3	LOS A	1.7	13.0	0.66	0.86	0.83	42.1
9	R2	All MCs	148	0.0	148	0.0	0.348	12.5	LOS B	1.7	13.0	0.66	0.86	0.83	42.3
Approach			204	9.8	204	9.8	0.348	11.1	LOS B	1.7	13.0	0.66	0.86	0.83	42.3
West: SH25															
10	L2	All MCs	236	0.0	236	0.0	0.277	4.6	LOS A	0.0	0.0	0.00	0.25	0.00	47.2
11	T1	All MCs	275	10.0	275	10.0	0.277	0.1	LOS A	0.0	0.0	0.00	0.25	0.00	48.4
Approach			511	5.4	511	5.4	0.277	2.2	NA	0.0	0.0	0.00	0.25	0.00	47.9
All Vehicles			1131	8.9	1131	8.9	0.348	3.5	NA	1.7	13.0	0.16	0.32	0.19	47.0

Table 11-4: Kenny Street Access PM Peak 2040 Intersection Performance

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows [Total	HV]	Arrival Flows [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: SH25															
5	T1	All MCs	103	10.2	103	10.2	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
6	R2	All MCs	56	35.7	56	35.7	0.048	6.2	LOS A	0.2	1.9	0.39	0.58	0.39	44.4
Approach			159	19.2	159	19.2	0.056	2.2	NA	0.2	1.9	0.14	0.20	0.14	47.9
North: Barry Rd															
7	L2	All MCs	80	25.0	80	25.0	0.347	5.5	LOS A	1.7	12.9	0.48	0.63	0.49	44.3
9	R2	All MCs	236	0.0	236	0.0	0.347	7.5	LOS A	1.7	12.9	0.48	0.63	0.49	44.4
Approach			316	6.3	316	6.3	0.347	7.0	LOS A	1.7	12.9	0.48	0.63	0.49	44.4
West: SH25															
10	L2	All MCs	148	0.0	148	0.0	0.149	4.6	LOS A	0.0	0.0	0.00	0.29	0.00	47.1
11	T1	All MCs	126	10.0	126	10.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	48.2
Approach			274	4.6	274	4.6	0.149	2.5	NA	0.0	0.0	0.00	0.29	0.00	47.6
All Vehicles			749	8.4	749	8.4	0.347	4.3	NA	1.7	12.9	0.23	0.42	0.24	46.2

The resultant outputs for the modelled year 2042 indicate that the access on Kenny Street in both periods of activity associated with shift changeover is expected to operate with minimal delays or queues for all movements, which is to be expected given the relatively low flows at the access and low ADT and peak flows on SH25.

Part D – Other Matters

12 Parking

The expected car parking demands associated with the Project have been developed from the proposed travel arrangements described at Section 3. As the parking demands rely on this method of transport, it is recommended that suitable conditions of consent are developed to ensure the parking demands are catered for on-site with consideration to the peak operational workforce demands, the type of transport provided by the employer and management by contractors themselves.

It is recommended that all parking is provided for on-site at the respective demand locations which includes at the Baxter Road facilities (around 260 spaces), the Willows Road facilities (around 40 – 50 spaces), and at the Kenny Street access (around 150 spaces for the first 9 years, before increasing to potentially 200-240 spaces). The number of spaces, as well as bus/mini-bus parking will be confirmed at the time of detailed design and a condition with respect to this requirement is appropriate.

Parking demands at the offices on Moresby Avenue are expected to be similar to existing traffic patterns with no significant changes in demand.

It is recommended that sufficient parking areas are provided to cater for all expected vehicles on site, and from an on-site operational perspective that the parking areas are separate from heavy vehicle routes. There is space on site to accommodate to enable this to be achieved.

13 Project Traffic Management Plan (PTMP)

Several traffic elements of the WNP have been identified herein as being appropriately managed by a PTMP at the time of construction. A Traffic Management Plan (TMP) that focuses on construction is common for projects of this size and are prepared with the involvement of the road controlling authorities and the contractors prior to construction.

For this project, while the focus is also on the construction period, the TMP will cover the full project period and therefore is appropriately labelled a Project Traffic Management Plan (PTMP). The PTMP will be required to be submitted to the HDC before physical works begin.

The objective of the PTMP will be to ensure the various recommendations with respect to management of traffic recommended in this report are implemented and the effects of construction traffic appropriately managed to minimise effects on other road users. The PTMP shall, as a minimum, address the following:

a) Ensure all specific legislative requirements and consent conditions in relation to construction traffic are adhered to.

b) Construction programme, traffic volumes and routes for each phase of work.

c) Encourage a culture of road safety awareness and commitment.

d) Outline driver protocols (e.g. with respect to speed, queuing and courtesy).

e) Over-weight and over-dimension loads and permits as required.

f) Management of potential effects on farm operations (including stock crossings).

g) School bus routes and timetables and driver protocols to support safe driving near school buses and school bus stops.

h) Measures to inform emergency responders of activities that may impact access routes (such as a result of temporary traffic management during construction activities), and contingencies to support emergency access movement through any work site.

i) Monitoring (including road pavement).

j) Communication arrangements (keep the local community informed of construction operations and encourage participation in maximising safety and minimising disruption); Provide stakeholders with a clear understanding of the confirmed construction programme, traffic volumes during each stage, the road improvements to be undertaken, and the management measures being implemented.

k) Temporary traffic management required to:

    a. Manage existing road users with respect to construction traffic associated with work in the road corridor (e.g. trenching on road corridors for power and communications supply - to be separately permitted).
    b. Manage proposed road upgrades at the intersection of SH25 and Willows Road.
    c. Manage the delivery of oversize loads (if any).
    d. Manage the haulage of large volumes of aggregate if the aggregate haul route includes the use of Crean Road and Baxter Road together (and provide to the Hauraki District Council a TMP for certification at least 30 working days prior to the haulage of aggregate first occurring).
    e. During the construction phase of the Baxter Road Facilities:

i. Manage the end of the day shift time for traffic associated with construction work (for clarity not operational traffic) using Baxter Road gate to ensure traffic is spread over a minimum of an hour (i.e. have a minimum of three end of shift times at 20 minute separation of equal numbers).
ii. Manage heavy vehicle movements associated with construction (including materials deliveries and logging trucks) to occur substantially outside of peak hours i.e. occur between 9 am to 4 pm.
iii. Prepare and implement an adaptive approach to construction traffic management with the ability to make changes to reflect any issues that may arise related to transportation.

l) Monitor the performance of traffic flows on the one lane bridge on Willows Road and if any unacceptable queuing occurs, then implement additional traffic management.

m) Management of arrivals and departures over the construction period including both the workforce (using staggered shift times) and heavy vehicles.

n) Management of aggregate cartage routes, including any necessary measures relating to the use of Crean Road by heavy vehicles travelling to and from the Mine Site via Baxter Road.

o) Confirmation and monitoring of traffic distribution and performance at the intersection of Willows Road with SH25, and Baxter Road with SH2 for the identified periods.

p) Identification and provision of adequate on-site parking for project duration (at Baxter Road and Kenny Street gates).

q) Measures to manage the bussing of shift workers to Willow Road Surface Area Facilities.

r) Management of deliveries to site.

s) Monitor the effects of any traffic diversion to secondary accesses due to flood events and implement temporary traffic management on those occasions should the need arise.

14 District Plans Objectives and Policies

The site and local roads to be used for access to the site operations are predominantly within the Rural Zone of the HDP. In relation to transport matters the relevant objectives and policies of the Rural and Transport sections of the HDP have been considered as set out in Table 14-1.

In summary, the project is designed to be managed in a complementary manner to each of the operative District Plan's objectives and policies relating to transport.

Table 14-1: HDP Relevant Transport Provisions of Rural and Transport Sections

Hauraki District Plan **Section 5.1 Rural Zone** **Rural Permitted Activity Performance Standard**	**Comments**
5.1.2 Objectives and Policies **(4) OBJECTIVE 4** To ensure that adverse effects of a land use activity on the environment or on the amenities of neighbours are avoided, remedied or mitigated. (a) Policies Objective 4 will be achieved by implementation of the following policies:	
(ii) Ensure the implications of land use activities for the safety and efficiency of the roading network (especially through the integration of land uses with the roading network) are properly addressed.	Safety and efficiency of the roading network between the site and for the point of entry to the state highway network have been assessed and addressed in this report
(iii) Other adverse effects (eg noise, smell, glare, vibration, visual) on the environment and amenity of the District (particularly where they are near to residential or other sensitive activities) should where practicable be avoided, or remedied or mitigated.	To be addressed by other experts
5.1.7 ASSESSMENT CRITERIA FOR DISCRETIONARY ACTIVITIES When assessing any application for a Discretionary Activity, Council shall have regard to the relevant development standards, activity specific standards, environmental results and assessment criteria for Permitted, Controlled and Restricted Discretionary Activities in Rules 5.1.4 to 5.1.6, and the relevant General and Activity Specific assessment criteria below, and any other matters it considers appropriate. **5.1.7.1 GENERAL ASSESSMENT CRITERIA** (4) Whether traffic movements resulting from the activity will have any significant impact on the safe and efficient operation of any road. Pertinent matters for consideration in this regard are:	
(a) the carrying capacity, standard and status in the roading hierarchy of the road concerned;	Assessed in this report.
(b) the ability of the site to accommodate the activity requirements for on-site parking, loading and manoeuvring areas;	Can and recommended to comply.
(c) the means by which any likely adverse traffic effects can be avoided, remedied or mitigated;	Recommendations included in report.

Hauraki District Plan **Section 5.1 Rural Zone** **Rural Permitted Activity Performance Standard**	**Comments**
(d) the access, parking and loading standards for Permitted Activities which shall be used as a guideline in assessing applications for Discretionary Activities;	Can comply with HDP standards.
(e) the comments of New Zealand Transport Agency on the possible adverse effects on the safe and efficient operation of the state highway network.	Preliminary consultation has been undertaken and NZTA feedback to date considered in this report.
(5) The degree to which the activity will cause demands for the uneconomic or premature upgrading or extension of public services, including roading, which are not in the interests of the Region, the District or locality.	Recommendations included pertaining to evaluation of the potential for pavement deterioration
(7) The degree to which the location of buildings is such as to retain clear visibility along rural roads and to provide space for vehicle access and loading on the site clear of the road.	NA – all buildings clear of the proposed access. All loading on site
(18) Whether the hours of operation are appropriate having regard to those persons likely to be affected by the activity	Hours of operation have been considered as part of the transport assessment
Section 7.9 – Transport Network **7.9.3 – Objectives and Policies**	
(1) OBJECTIVE 1 Provide and maintain a safe and efficient transport network that will meet current and planned future demands with minimal effects on the environment and adjoining land uses. **(2) OBJECTIVE 2** Ensure the adverse effects of activities outside the road reserve on the safety and efficiency of the transport network are avoided, remedied or mitigated**.** **(a) Policies** Objectives 1 and 2 will be achieved by implementation of the following policies:	Objectives have been considered and will be achieved by implementation of the following policies.
(i) Establish and maintain a hierarchy of roads and streets and require the design and formation of the roads and streets according to their traffic and access functions and road user (including pedestrians and cyclists) requirements appropriate to the location.	Mitigation recommendations consider the appropriate standards for the road classifications
(ii) Develop an Asset Management Plan, Hauraki Long Term Plan and Annual Plan process to match funding with the required standard of District Road or street construction appropriate to the status of the road or street in the hierarchy.	Not applicable to project – although depending on the contribution regime to be agreed with HDC there may be a need in include pavement maintenance in the Annual Plan.
(iii) Develop financial and/or development contributions strategies to ensure that roads and streets are upgraded and formed to match the demands that specific subdivision and development activities will place upon them.	Recommendations on appropriate strategies have been included and will be discussed with HDC.
(iv) Recognise that the function of the transport network may have a detrimental effect on adjacent land use activities and manage the development of adjoining land accordingly.	Development of land adjoining Willows Road and Baxter Road will not be limited by the proposal.
(v) Manage land use, vehicle access and traffic management to maintain the safe and efficient operation of the transport network, especially the regionally significant roading infrastructure.	Effects on Willows Road, Baxter Road and points of access to state highway network have been assessed herein.

15 Summary and Conclusion

The current Waihi life of mine plan, authorised by existing consents including Project Martha, ceases production at the end of 2030. The Waihi North Project (WNP), as proposed by OGNZL, seeks to extend the life of the mine operation through to approximately 2042) with rehabilitation in ensuing years.

The WNP includes a new underground mine (WUG) to be located on farmland at Willows Road and with underground access to the existing Processing Plant at Waihi; a new open pit (GOP) near the existing Processing Plant; and the upgrading of Processing Plant and associated facilities.

WNP will operate concurrently with the existing consented operations including Project Martha including the operations at Martha Underground.

Traffic movements generated by the activity have been assessed based on a proposed work and labour schedule for an 18 year work programme through to approximately 2042.

The effects of development traffic on the local roads and their points of access to the arterial state highway network have been examined and recommendations have been made to mitigate any potential adverse effects including:

- Upgrade of sections of Willows Road including at curves, culverts, and its intersection with SH25.
- At Baxter Road access, ensure the day shift time associated with construction workers is well dispersed.
- Monitor the workforce travel patterns and associated effect on the adjacent road network and adapt management of traffic to suit, where identified as required.
- Provide adequate parking within the site(s).
- Upgrade secondary accesses on Golden Valley Road to include sealed vehicle crossing.
- Prepare and implement a PTMP.

In summary, based on the recommendations and associated mitigation measures described herein, it is assessed that the potential adverse transportation-related effects of vehicular access and traffic movement associated with the project, during construction and over the longer term, will be avoided or mitigated to an acceptable level.

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Stantec New Zealand
Level 3, 2 Hazeldean Road
Addington, Christchurch 8024
Mail to: PO Box 13052, Christchurch 8140
Stantec.com