REPORT

Tonkin+Taylor

Mount Munro Windfarm - Traffic and Transportation Effects Assessment

Prepared for
Meridian Energy Limited
Prepared by
Tonkin & Taylor Ltd
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1 Background and scope

1.1 Background

Tonkin & Taylor Ltd (T+T) was commissioned by Meridian Energy Limited (Meridian) to undertake an Integrated Transport Assessment (ITA) of the effects of a proposed wind farm (Mount Munro) in the Wairarapa. Meridian propose to construct a 20-turbine (90 MW) wind farm on an 8.9 km^2 site. The site is located east of State Highway 2 (SH2), approximately 35 km north of Masterton and 4 km south of Eketahuna. The site location is shown in Figure 1.1 below.

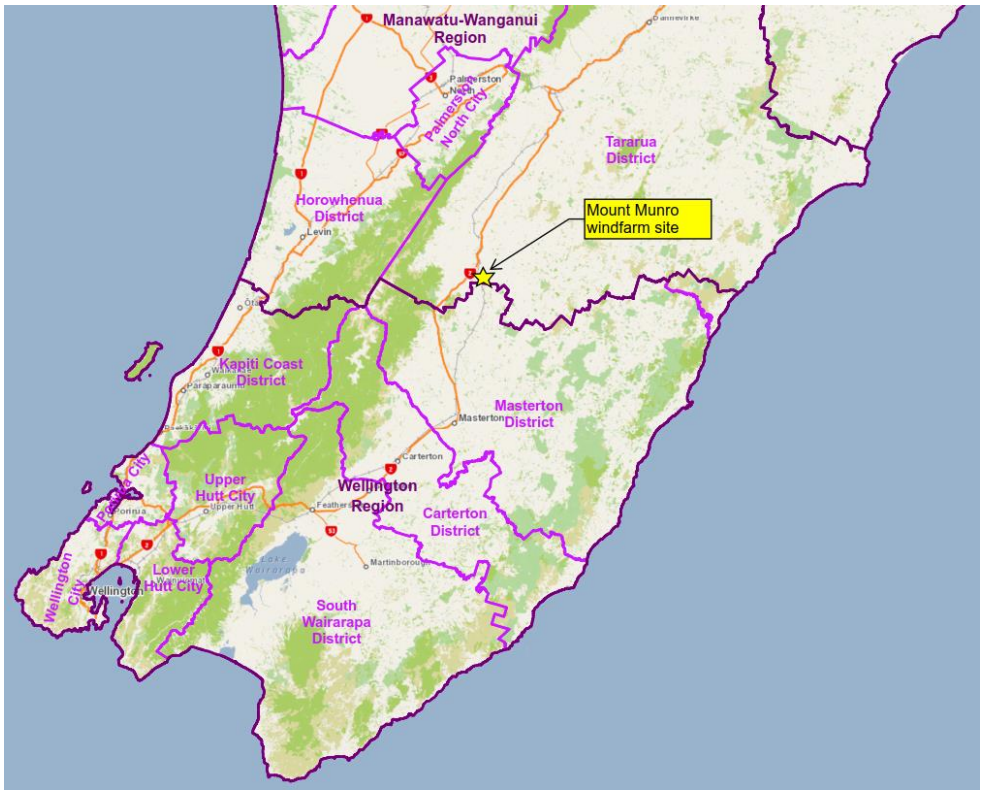


Figure 1.1: Site Location of Mount Munro Windfarm

The purpose of this document is to assess the potential effects of the project on the external road network during construction and operation. It also includes appraisal of port-to-site considerations for the transport of large turbine components and the local road access in terms of safety and functionality.

This work has been undertaken by T+T at the request of Meridian as outlined in our offer of service dated 11 October 2021.

1.2 Intended use for this ITA

This report is intended to support the Resource Consent application process for Mount Munro as outlined above, and has been prepared with the guidance specified in the following:

- Integrated Transport Assessment (ITA) Guidelines – Research Report 422, published by Waka Kotahi NZ Transport Agency (Waka Kotahi) November 2010;
- NZS4404:2010 – Standard for Land Development and Subdivision Infrastructure, October 2010;
- Austroads Guide to Road Design Part 3: Geometric Design, April 2020 (AGRD03-16);
- Austroads Part 4A: Unsignalised and Signalised Intersections, June 2017 (AGRD04A-17);
- Tararua District Council Operative District Plan (Tararua District Plan); and
- Operative Wairarapa Combined District Plan (Wairarapa Combined District Plan).

1.3 Report scope

This ITA identifies the intended travel routes during the construction and operation of the proposed wind farm. This includes the quarry routes and the transit routes. Quarry routes are considered in this assessment, due to the high volumes of heavy vehicles along the route between potential quarries and the site during construction. Transit routes are assessed due to the heavy and oversized vehicles required along these routes for the delivery of all the wind turbine components (including all necessary machinery and plant). The report also documents the effects of construction traffic on the local roads identified as a result of the construction activities and the operation and maintenance of the wind farm.

The objective of this report is to provide:

- A description of the site and the surrounding transport environment;
- The forecast trip generation associated with the proposed wind farm;
- The transport routes for turbine components from port to site;
- Estimates of the traffic flows generated by construction activities and operation of the wind farm;
- Road Safety and traffic effects of the wind farm construction and operation; and
- Proposed mitigation measures.

A two-day site visit was undertaken by T+T engineers on Monday 13 December and Tuesday 14 December 2021. Observations and photos from this site visit have been included in this report. However, all inspections were completed from the public road reserve and will need to be confirmed prior to commencement of this project.

1.4 Report structure

This report is presented as follows:

- Background and scope;
- Existing site data – a description of the site and locality and the surrounding transport network;
- Proposal details – a description of proposed project with specific focus on the transport aspects;
- Appraisal of transport effects – an assessment of the effects of the anticipated trips on the surrounding road network during construction and operation of the wind farm including any necessary mitigation measures required;
- Construction traffic management – a summary of assessment findings to be addressed within a construction traffic management plan; and
- Compliance with policy – an assessment of the proposal with relevant transport rules of the two relevant District Plans.

2 Existing site data

2.1 Site location

The proposed wind farm site of the Mount Munro project is in the Wairarapa, approximately 4 km south of Eketahuna and 35 km north of Masterton. The approximately 8.9 km^2 site covers private farmland. The surrounding district is mostly rural, with pastoral farming on the site itself and on the land to the east and south.

The site is located across two district and regional council borders. The jurisdiction of the site is Horizons Manawatu-Wanganui and Greater Wellington Regional Council, and Tararua and Masterton District Councils. Refer to Figure 1.1 for the site location.

No consideration has been given in this transport assessment to the internal site access roads beyond the public road network. It is assumed that such accesses will be provided and maintained to an appropriate standard.

2.1.1 Surrounding road environment

The proposed wind farm site, relative to the surrounding road network, is shown in Figure 2.1.

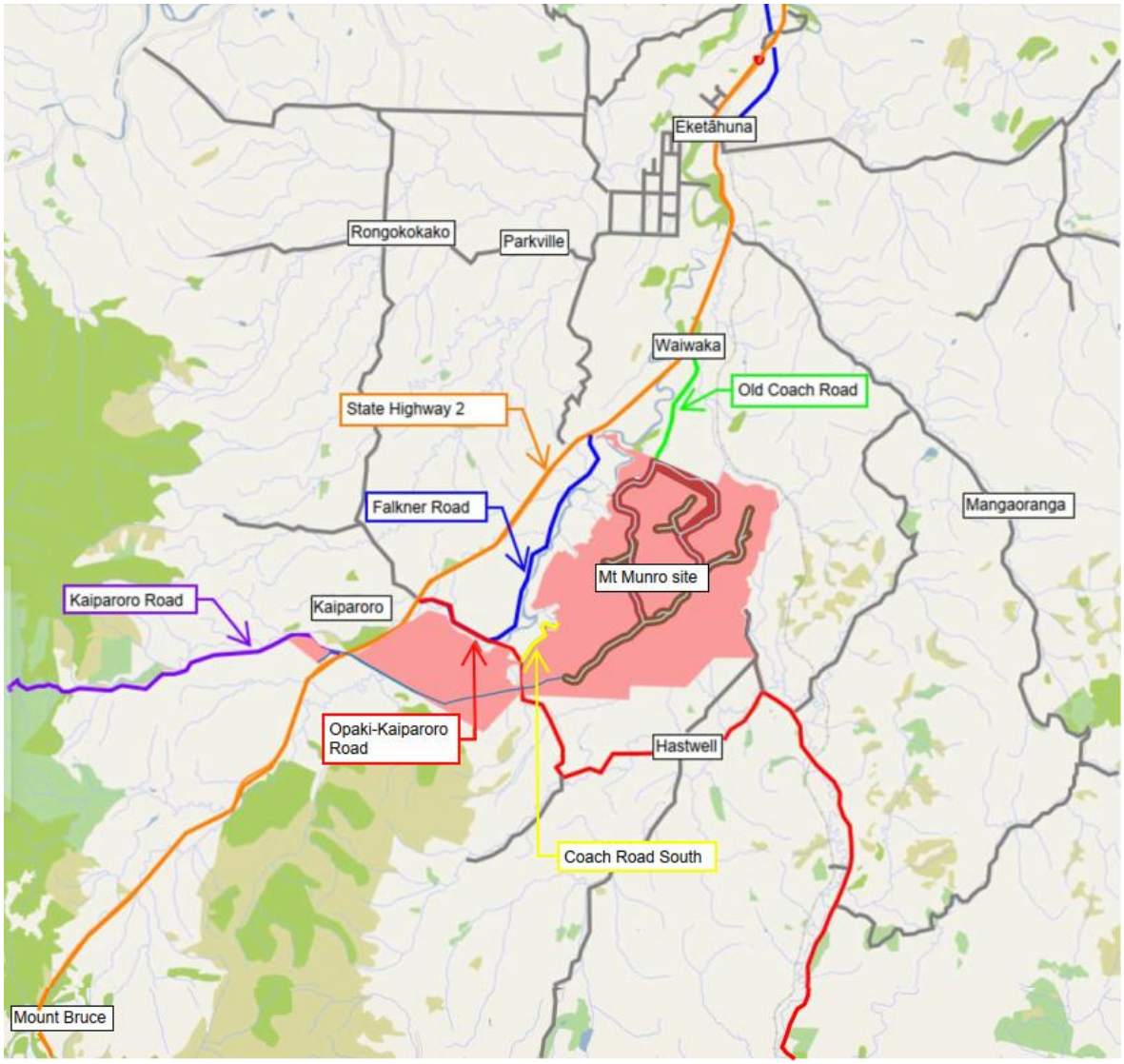


Figure 2.1: Site location

2.1.2 Old Coach Road

The approach to SH2 from Old Coach Road is shown in Figure 2.2 below.

Figure 2.2: Old Coach Road intersection with SH2

Old Coach Road is generally a narrow, low standard road. It operates as a one-way road, with vehicles pulling over onto the verge to pass. Old Coach Road is relatively flat and well graded, and generally consists of a 3.5 m wide unsealed carriageway, as shown in Figure 2.3, apart from the first 100 m, which is sealed to a width of 3 m.

Figure 2.3: Main site access road (Old Coach Road)

There are seven properties along Old Coach Road, four of which have permanent dwellings with accesses onto Old Coach Road. At the time of the site visit (December 2021), the site at 168 Old Coach Road appeared to be under development.

Old Coach Road has a generous road reserve of between 25 m and 40 m. However, in many locations, this appears to have been absorbed into private farmland, marked by fencing. There are also power poles located within the road reserve, in some places within 3 m of the edge of the road. Along Old Coach Road, the drainage consists of surface water channels and culverts.

2.1.3 Falkner Road

Falkner Road intersects SH2 approximately 1.6 km south of Old Coach Road. It is a sealed, two-lane local road, as shown in Figure 2.4 below. The intersection between Falkner Road and SH2 is shown in Figure 2.5. Falkner Road extends from SH2 southeast for approximately 3.3 km. It terminates at the intersection with Opaki-Kaiparoro Road.

Figure 2.4: Falkner Road

Figure 2.5: Intersection between Falkner Road and SH2

To the west of the Mount Munro project site, there is an existing quarry located on Falkner Road (Figure 2.6). The location of the quarry relative to the project extent is shown in Figure 2.7 below.

Figure 2.6: Existing quarry on Falkner Road

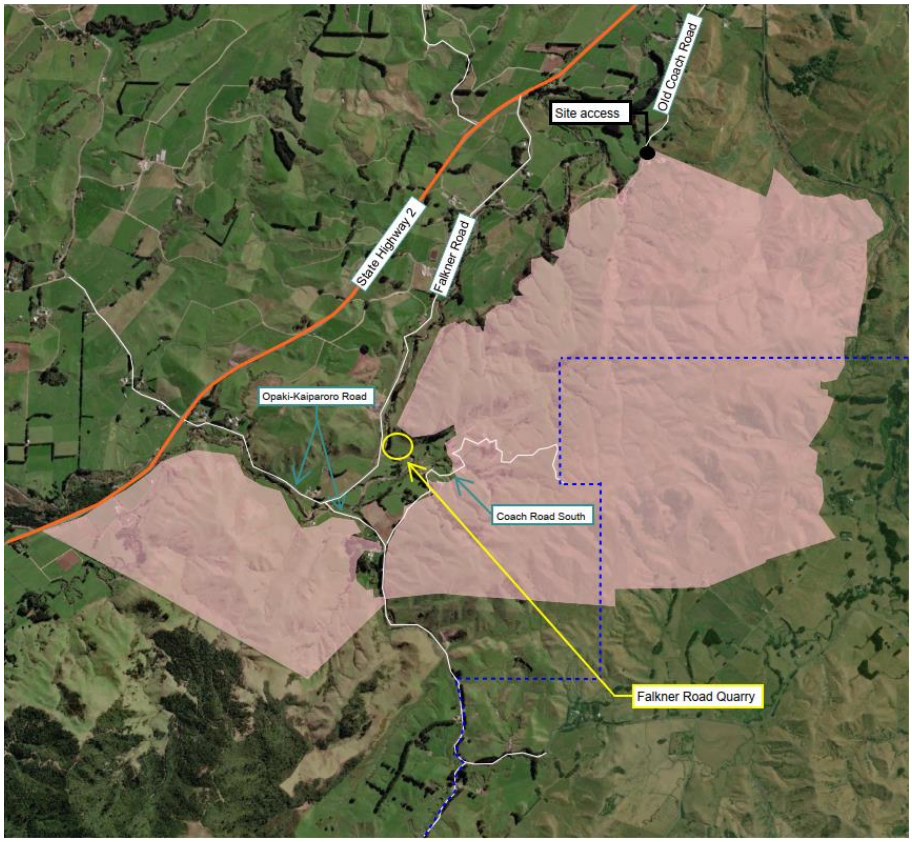


Figure 2.7: Location of existing quarry on Falkner Road

2.1.4 Opaki-Kaipararoro Road

Opaki-Kaipararoro intersects SH2 approximately 4.8 km south of Old Coach Road. It is a sealed, two-lane local road. The intersection between Opaki-Kaipararoro Road and SH2 is shown in Figure 2.8.

Figure 2.8: Opaki-Kaipararoro Road

Opaki-Kaipararoro Road extends 29 km, travelling through Mauriceville. It connects back to SH2, approximately 7 km north of Masterton.

Just east of the intersection with Falkner Road, there is a bridge crossing Makakahi River (Figure 2.9). The bridge is approximately 15 m long and 7 m wide.

Figure 2.9: Existing bridge on Opaki-Kaipararoro Road

South of the Mount Munro project site, there is an existing quarry on Opaki-Kaipararoro Road (refer Figure 2.10). The location of this existing quarry is shown in Figure 2.11 below.

Figure 2.10: Existing quarry on Opaki-Kaiparoro Road

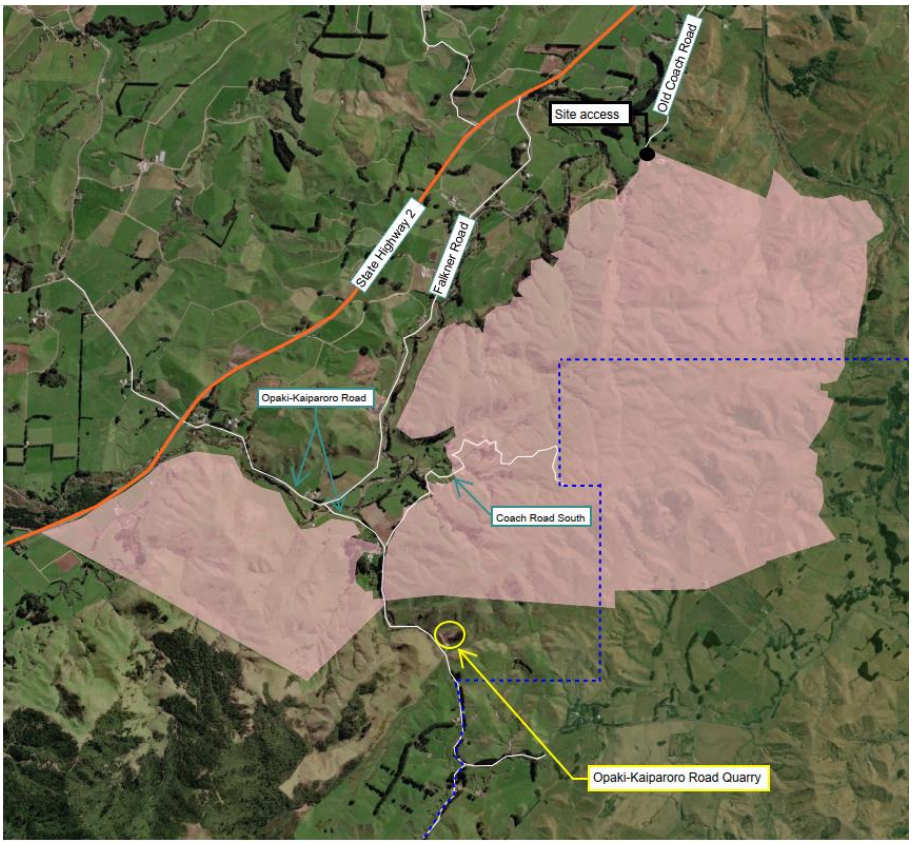


Figure 2.11: Location of existing quarry on Opaki-Kaiparoro Road

2.1.5 Coach Road South

Coach Road South is a local road, extending from Opaki-Kaiparoro Road, into the hills of the site. It is understood that, historically, a track ran between Coach Road South and Old Coach Road.

Coach Road South operates as a single lane road, with little space for passing. The road is steep (Figure 2.12), winding (Figure 2.13), poorly graded (Figure 2.14) and narrow (Figure 2.15).

Figure 2.12: Example of steep terrain on Coach Road South

Figure 2.13: Example of a tight bend on Coach Road South

Figure 2.14: Example of poor grading on Coach Road South

Figure 2.15: Example of a narrow section on Coach Road South, where the road narrows to approximately 3 m

Significant upgrades to the road would be required to allow for access to the site. Due to the considerable constraints, transport of oversize or heavy vehicles along this road is unlikely to be viable. As such, no access to the site is proposed along this route except in an emergency.

2.1.6 Kaiparoro Road

Kaiparoro Road is a low volume local road, located south of the site. The road is predominantly unsealed (Figure 2.16), except for the intersection with SH2 (Figure 2.17and Figure 2.18).

Figure 2.16: Looking from SH2 down Kaiparoro Road

Figure 2.17: Intersection between Kaiparoro Road and SH2

Figure 2.18: Kaiparoro Road

2.1.7 State Highway 2 (SH2)

State Highway 2 (SH 2) runs through eastern parts of the North Island of New Zealand. SH2 runs from south of Auckland to Wellington, through Tauranga, Gisborne, Napier, Hastings and Masterton. The site is located west of the section of road between Eketahuna and Masterton.

SH2 runs approximately 2 km to the west of the site. At this location, as shown in Figure 2.19 below, it is a two-lane road.

Figure 2.19: SH2, looking south from Old Coach Road

2.1.8 Road Classification

As shown in Figure 2.20, all the roads surrounding the Mount Munro wind farm site sit within the Tararua District.

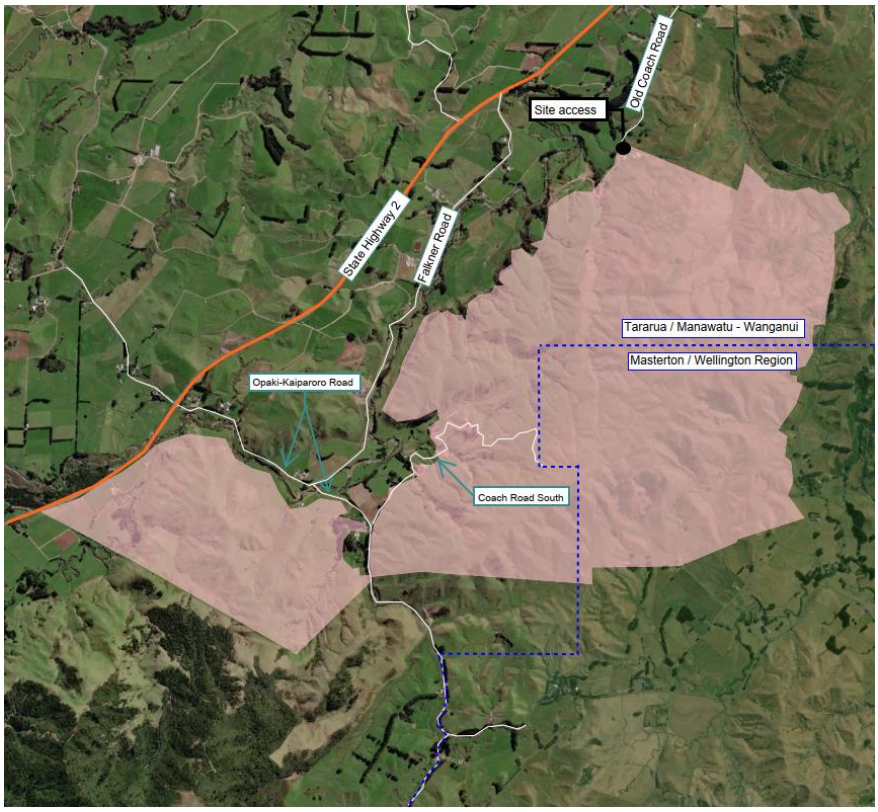


Figure 2.20: Regional context of surrounding roads

The purpose and function of roads within the Tararua District are defined in the Tararua District Plan. In Section 5.3.11 of the Tararua District Plan, it is stated that: "*By giving roads the status of designations and providing for road activities "as of right" with the designation, there is a statutory authorisation that recognises the importance of roads to the functioning of the District."*

A summary of the surrounding roads, their road classification and purpose, is provided in Table 2.1 *below. This is based on the classifications provided in Section 5.3.1.2 of the Tararua District Plan.*

Table 2.1: Road hierarchy

	Primary purpose	***Roads***
Primary Arterial	Strategic arterial roads of national or regional importance. These routes predominantly carry through traffic. It is important to maintain a high level of user service.	State Highway 2
Secondary (District) Arterials	Roads which carry traffic between major areas within the District and as alternative routes to neighbouring	N/A

	Primary purpose	*Roads*
	Districts. Traffic movement is the main function, but they often also serve as local roads.	
Collector Roads	Roads which collect and distribute traffic to and from the arterial road network. These roads complement arterial roads in that through traffic is an important function but property access is also important.	N/A
Local Roads	All other roads that have the provision of access to properties as their primary purpose. Through traffic is generally to be discouraged.	Old Coach Road, Falkner Road, Opaki-Kaiparoro Road, Coach Road South, Kaiparoro Road

2.2 Traffic volumes

All surrounding roads carry relatively low volumes of traffic. The traffic volumes along the surrounding roads are summarised in Table 2.2 below, shown as vehicles per day (vpd).

Table 2.2: Traffic Volumes

Road	Average Daily Traffic (vpd)	% Heavy Vehicles
Old Coach Road	60	6
Falkner Road	131	31
Opaki-Kaiparoro Road	129	11.4
Coach Road South	13	7.7
Kaiparoro Road	6	-
State Highway 2 at Mt Bruce	3500	13.8

The local road traffic volumes are current data taken from the Mobile Road website. The SH2 traffic count was sourced from the Waka Kotahi NZTA website. The closest traffic count location to the site is at Mount Bruce. This is a virtual traffic count site.

The traffic volumes for the surrounding road network are shown visually in Figure 2.21 below.

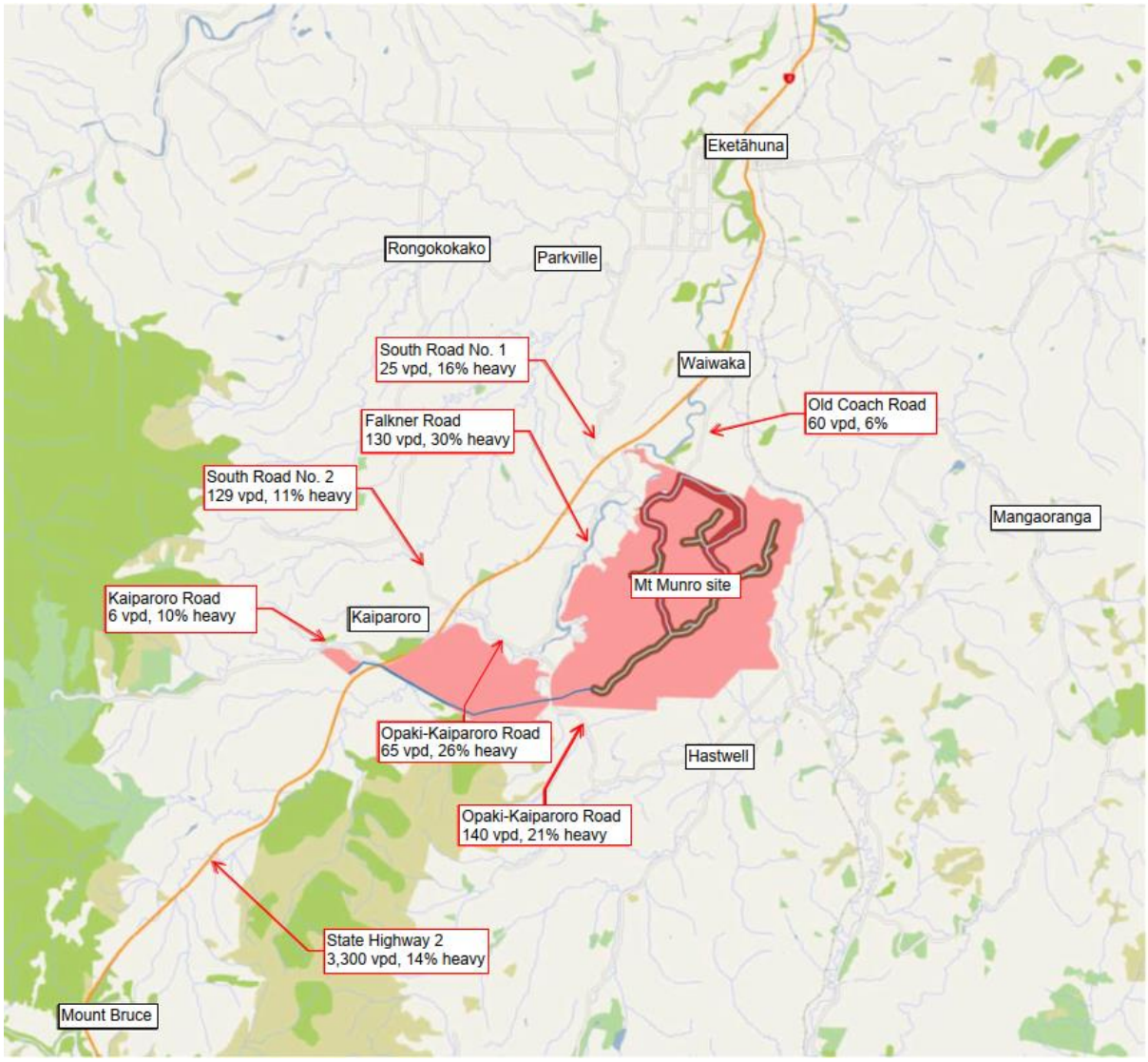


Figure 2.21: Traffic volumes on the surrounding road network

2.3 Road safety

During the ten-year period 2012 to 2021[1] there were 21 crashes in the area around the site. All of these crashes occurred on SH2.

The area is shown in Figure 2.22 below and included:

- SH2 between Old Coach Road and Kaiparoro Road;
- Old Coach Road;
- Falkner Road; and
- Opaki-Kaiparoro Road.

[1] Crash records were obtained in January 2022 from the Waka Kotahi NZTA Crash Analysis System (CAS) database

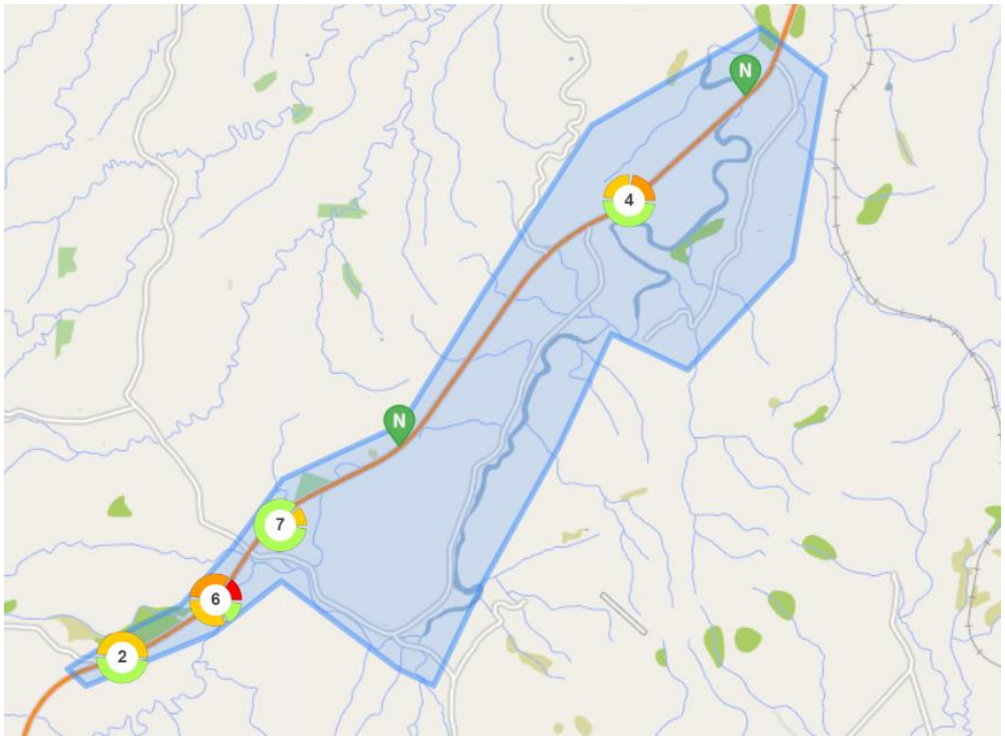


Figure 2.22: Crash assessment area

The most common type of crash (75%) was loss of control on bends. A breakdown of the crash severity can be found in Table 2.3 below. The full crash information is attached in Appendix A.

Table 2.3: Crash severity by year

Year	Severity				Total
	Fatal	Serious	Minor	Non-Injury	
2021	0	0	0	1	1
2020	0	0	1	0	1
2019	0	0	0	2	2
2018	0	2	0	2	4
2017	1	0	0	2	3
2016	0	1	0	1	2
2015	0	0	2	1	3
2014	0	0	0	1	1
2013	0	0	1	1	2
2012	0	0	1	1	2
Total	**1**	**3**	**5**	**12**	**21**

One crash occurred at the intersection between SH2 and Opaki-Kaiparoro Road. All other crashes occurred mid-block. Of the 21 crashes reported:

- 95% of crashes were a result of driver only factors; and
- 76% of crashes occurred involved one vehicle.

The fatal crash occurred in 2017 when a vehicle travelling north lost control and collided head on with a vehicle travelling south. A passenger in the northbound vehicle died at the scene.

From the above review of crashes, it is observed that a significant portion of the crashes involved single vehicles and resulted from driver error and loss of control or concentration.

2.4 Walking and cycling access

The area surrounding the site is a rural area characterised by pastoral farmlands. There are no footpaths along the local roads around the site. There is no dedicated cycling infrastructure in the surrounding area.

The NZ Cycle Trail identifies parts of Opaki-Kaiparoro Road and Faulkner Road (one of the roads adjacent the site) form part of the Tour Aotearoa cycle network. As shown in Figure 2.23, these roads form part of the Tararua Traverse and Route 52 cycle rides. Both classified as 'Heartland Rides', which are mostly on-road cycle routes through scenic landscapes and small towns. There is also a Connector Ride along Pa Valley Road, approximately 20 km north of the site. .

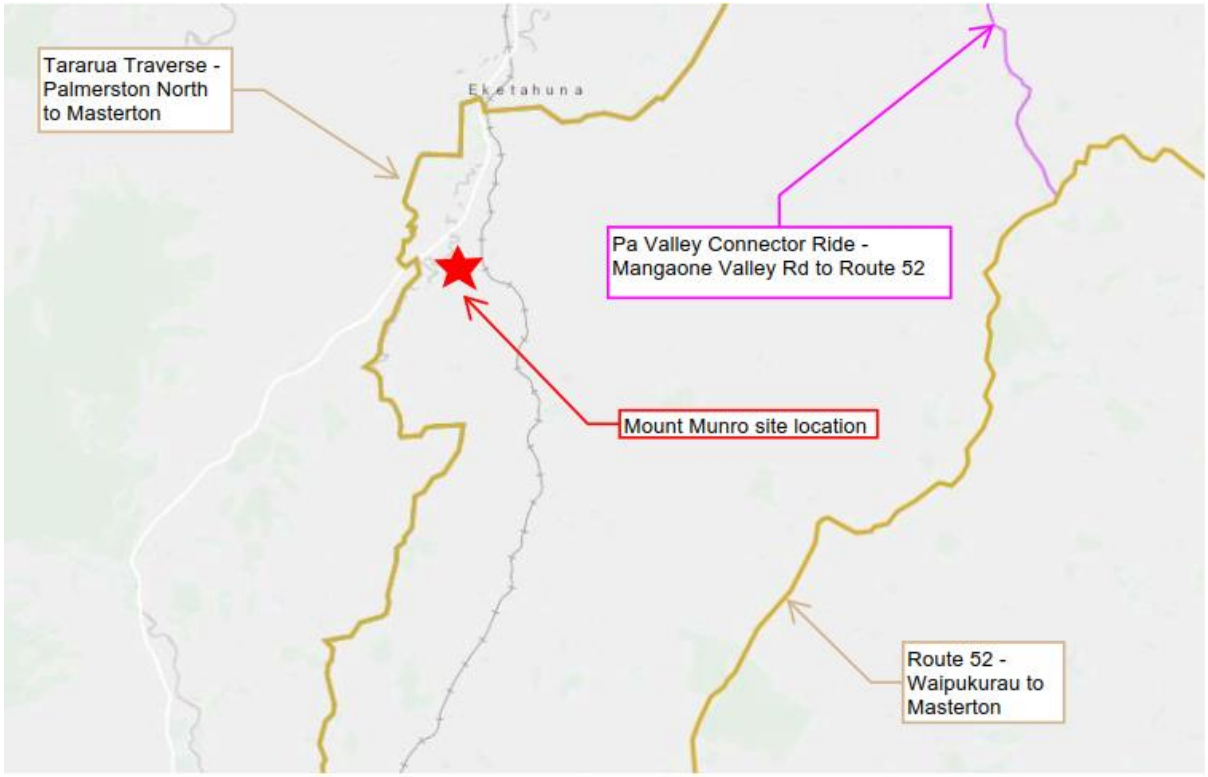


Figure 2.23: Cycle routes near the site

2.4.1 Bus routes

Tranzit operates a bus service between Palmerston North and Masterton, along SH2. The service operates Tuesday, Friday and Sunday with one bus in each direction.

There are no school buses operating along any of the roads identified in Section 2.1.1 of the report. Eketahuna School is a primary school located 4 km from the proposed site main access. 121 students were enrolled as of June 2020 (as per the Education Review Office).

Neither Horizons nor Greater Wellington Regional Council's operate a bus service in proximity of the wind farm site.

2.4.2 Train lines

There are currently no public trains operating through or near the site.

The historic Wairarapa train line runs to the east of the site (Figure 2.24). While KiwiRail does not currently operate any freight or passenger trains on the Masterton to Pahiatua section of the Wairarapa Railway line, it is maintained to an operational standard. There may be an opportunity for Meridian to utilise the proximity of the railway line to the Mt Munro site. Discussion with KiwiRail will be required to determine the status of the line and its ability to provide transport for equipment.

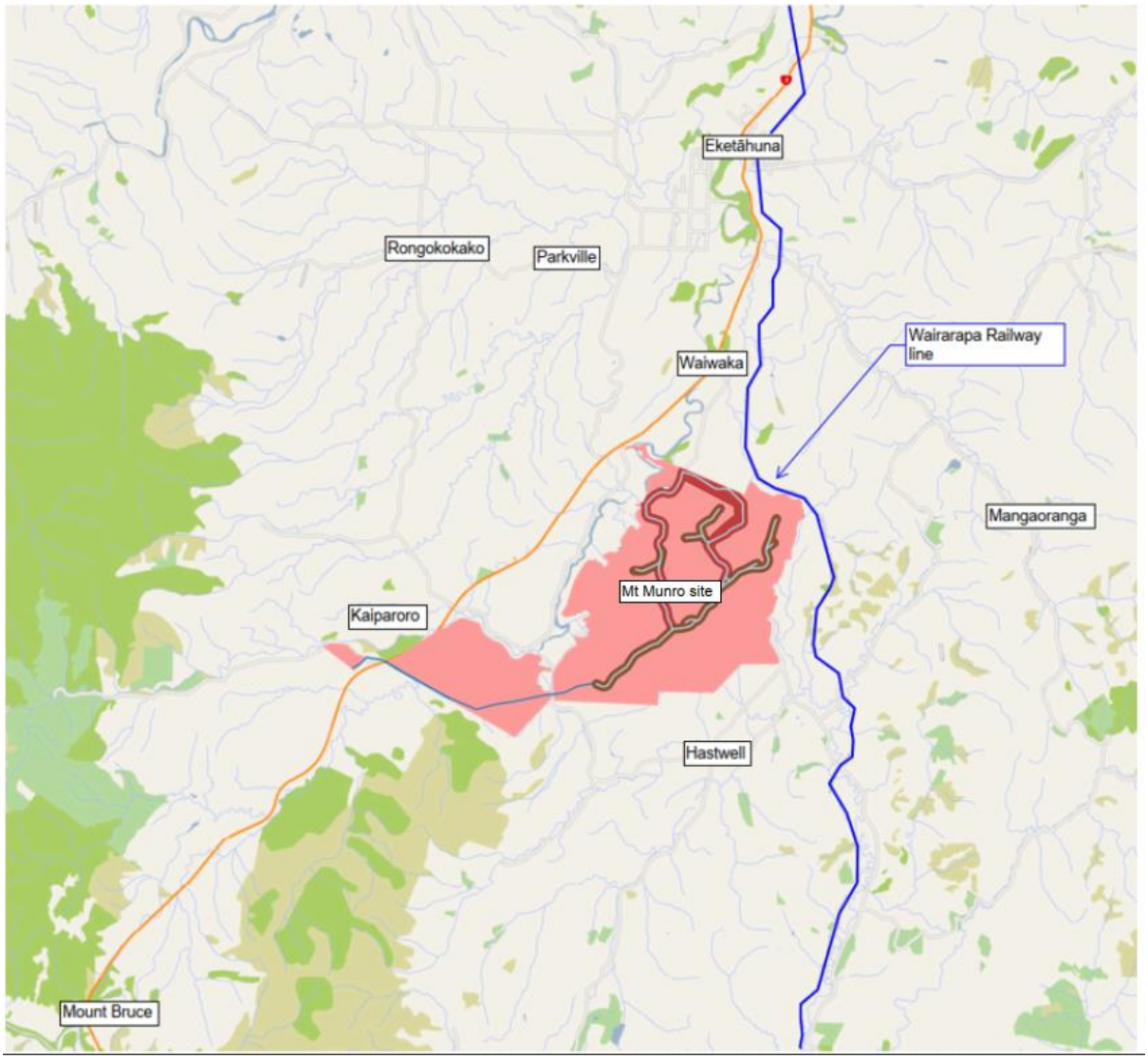


Figure 2.24: Proximity of the historic Wairarapa railway line to the site

The disused part of the line extends north from Masterton to Woodville. The Wairarapa passenger train line terminates in Masterton, approximately 37 km south of the site.

The Napier to Wellington freight train runs from Napier, across the Manawatu gorge to Palmerston North, then continues south to Wellington. Freight trains operate between Palmerston North and Pahiatua. The Pahiatua station is operational, however trains are limited to freight from the neighbouring dairy farms and historic operations.

3 Proposal details

3.1 Project details

3.1.1 Wind turbines

Meridian proposes to construct, operate and maintain a wind farm over three privately owned pastoral farms in the lower North Island. The proposal is for up to 20 wind turbines and associated works.

Up to 14 closely spaced turbines will be located on the main ridge, with two further groups, each of 3 turbines on lower hills to the northwest of the main ridge.

For the purposes of the consent conditions, the turbine make and model will not be specified. This is to allow for flexibility in the consent conditions. The capacity of each wind turbine will be approximately 4.5 MW. For the purposes of this assessment, the following turbine dimensions have been allowed for:

- Blade diameter of up to 136 m;
- Maximum height above ground level of 160 m; and
- Hub height of 92 m.

Depending on the final turbine type selected for this development during the detailed design phase, the potential generation capacity for the project will be up to approximately 90 MW.

Each turbine will require a foundation, crane pad and blade laydown area onto which the turbine can be erected.

3.1.2 Internal roading

The project will include construction of a 10.7 km internal road network. The network will consist of:

- Approximately 6.0 km of wind farm ridge roads. These roads have widths of between 8 m and 11 m; and
- Approximately 5.5 km of access roads. These roads have widths of between 6 m and 8 m.

The road grade is up to 16% in some sections, requiring suitable surfacing to enable heavy components to be safely transported.

3.1.3 Terminal substation

The connecting substation for the wind farm will be located at the bottom of the hill, on the western side of the corner of Kaiparoro Road and SH2. This location has been chosen to be near the existing 110 kV Transpower line. The terminal substation will take the Internal Transmission Line from the windfarm and house all the electrical protection equipment to enable connection into the National Grid. The main transformer (33 kV to 110 kV) will be housed here.

3.1.4 Internal Substation and Internal Transmission Network

The internal wind farm 33 kV network will run underground from the turbines to a point near the southwest most turbine on the main ridge, to the Internal Substation.

The internal network between turbines will be buried under access roads wherever possible.

3.1.5 Transmission Connection between Substations

The Terminal Substation will be connected to the Internal Substation by a 33 kV, dual circuit 33 kV, or 110 kV line of approximately 3.5 km in length. The poles for the transmission line could be concrete or steel, with a height of up to 20 m.

3.1.6 Turbine Unit Transformers

The transformers that step the voltage up at each turbine generator to the internal network voltage of 33 kV will be located either inside the tower's base or outside the tower (in a kiosk or mounted on a pad).

3.1.7 Wind monitoring tower

The site will require a single wind meteorological monitoring masts up to 92 m in height. The location of this mast will depend on the final location of the wind turbines

3.1.8 Services and Operation and Maintenance building

A permanent services and operations and maintenance building will be located near the site entrance, or near the substation at the corner of Kaiparoro Road and SH2. The building will house a workshop, control room (for managing turbines) and amenities, and will manage services for electricity, fibre, water, sewerage and stormwater. The building will be approximately 35 m by 20 m and approximately 6.5 m high.

3.1.9 Portacom buildings

Temporary portacom buildings are proposed within the site entrance area, off Old Coach Road. These will be used as offices, security and staff facilities.

All portacom structures will be single storey temporary buildings. These will be removed upon completion of the construction phase of works.

3.1.10 Fuel Storage

A 30,000 litre diesel tank is proposed to be located near the site entrance. The tank will be a steel tank which is designed with integral secondary containment and footings.

3.1.11 Water supply

Water supply to the site is required for production of concrete, managing dust suppression, construction of pavements and other construction activities. Water supply requirements for the project are outlined in the *Mount Munro Water Take Assessment November 2022*. It is estimated that up to 340 m^3 per day may be required for construction purposes. This is an upper end scenario, which coincides with pouring concrete for a turbine foundation.

The supply of the water to the site is still being confirmed. Although the water resource near Mt Munro is limited, the use of a storage pond may act as a buffer enabling construction water to be stored. Water supply may be achieved by purchasing water from elsewhere and delivering it to site by tankers.

3.1.12 Aggregate supply

Quarry routes are considered in this assessment, due to the high volumes of heavy vehicles along this route during construction. The location of the quarry influences capacity and safety

considerations of the roads around the site as in our experience trips to obtain aggregate can be one of the key trip generators during construction.

Quarried rock (aggregate) is required for construction, including for access roads, turbine platforms and to batch the concrete on site.

A summary of the estimated aggregate required for construction is provided in Table 3.1. For this transport assessment, aggregate quantities were provided in the *Mount Munro Aggregate Supply Assessment Memo Report May 2023*. Note that the reported aggregate quantity data is a maximum. This is a conservative assumption, representing the upper end of likely traffic movements. The aggregate volumes could reduce significantly especially considering whether both or only one of the internal access roads are constructed. The reported traffic movement data also depends on the timing of activities that utilise this aggregate, and the 32-month program presented is a maximum duration. The traffic volumes may be spread over a longer period, with resulting reduced peak traffic volumes.

Table 3.1: Aggregate quantities

Material	Units	Quantity	Programme Month of 32 Month Programme
Total sand (dry) (m^3)	m^3	9,000	20-26
Total aggregates (dry) (m^3)	m^3	18,000	20-26
Total cement (dry) (m^3)	m^3	6,000	20-26
GAP40 - loose (m^3)	m^3	48,000	1-23
AP65 - loose (m^3)	m^3	50,000	1-23
Backfill material (crusher dust) - loose (m^3)	m^3	4,000	17-21

As outlined in the *Mount Munro Aggregate Supply Assessment Memo Report May 2023*, the preferred quarry to supply this aggregate is yet to be confirmed. However, the two most likely quarries are shown in Figure 3.1 below.

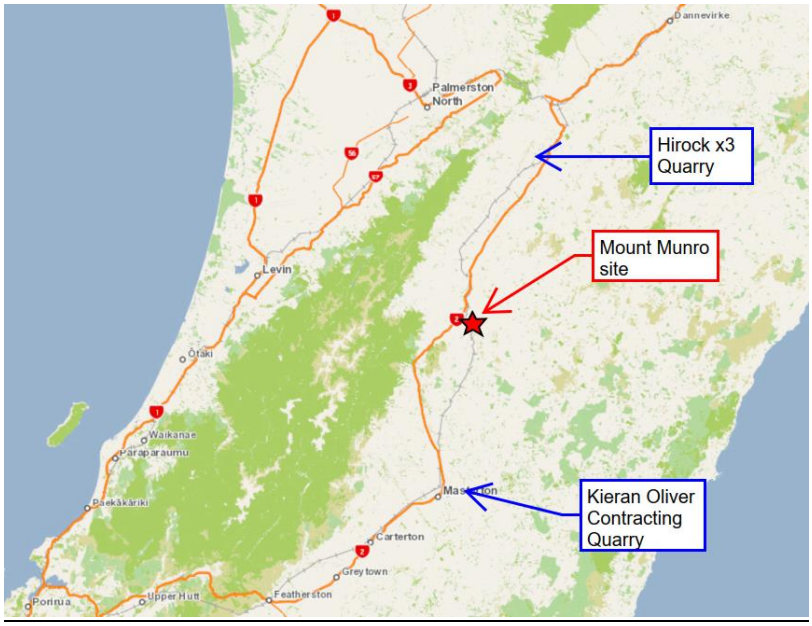


Figure 3.1: Preferred quarry locations for aggregate supply

3.1.13 Concrete batching plant

The site will include a concrete batching plant, consisting of:

- Control room and storage building;
- Prefabricated office and amenities structure;
- Mobile batching plant unit;
- Additional cement silo;
- Water tank;
- Aggregate stockpile area; and
- Generator.

3.2 Transportation requirements

Transportation is a key consideration in the establishment of a wind farm. The transportation task involved in Project Mount Munro includes:

- Initial delivery of earthmoving machinery and ongoing service and maintenance visits;
- Importing aggregate for road basecourse and concrete production, as described later in this report;
- Importing water, principally for concrete production and dust control. With the installation of a water storage pond, transport of water to the site can be smoothed to reduce peak traffic flow;
- Delivery of equipment, including transformers, for the off-site substation and cables;
- Delivery of other construction materials and consumables to the wind farm site, including reinforcing steel, ;
- Delivery of electricity circulation and transmission infrastructure including the conductors for the on-site underground cabling and poles for the 4 km line between the site and the substation;
- Transport of over-dimension and overweight turbine components; and

- Regular movement of personnel on site during construction.

3.3 Proposed site accesses

During construction, site accesses are proposed on the following roads:

- Old Coach Road – main site access during construction and operation
- Kaiparoro Road – access for the construction and maintenance of the off-site substation
- Opaki-Kaiparoro Road – access for the construction and maintenance of the transmission line

All site accesses will be designed in accordance with the Tararua District Plan, which, under standard 5.3.3.2 requires:

- That the first 6 m of the access will be 1:8 or flatter;
- Unobstructed 6 m x 6 m visibility triangles; and
- Geometric layouts (Appendices 12.1 and 12. 2) that include a 7 m radius and a 5 m connecting width.

Coach Road South is an existing road that runs through a section of the site. No access is proposed along this road.

3.3.1 Old Coach Road

The site access is located on Old Coach Road, about 1.7 km from SH2.

Figure 3.2 shows the proposed location of the access to the site at the end of Old Coach Road.

Figure 3.2: Looking south down Old Coach Road, with the proposed site location on the left hand side of the image

The proposed site access is approximately 20 m before the end of Old Coach Road, Old Coach Road terminates at a private access (see Figure 3.3 below). The site entrance will need to be designed to ensure adequate sight distance to the end of the road.

Figure 3.3: Termination of Old Coach Road

During construction, the Old Coach Road site access will house the construction village. This will include temporary site offices, amenities, security, parking and a laydown area for delivery of turbine components and for holding these until delivery up to the final turbine locations. This will be the base for up to 100 to 150 staff during construction.

The Old Coach Road access will need to be wider than that required by the Tararua District Plan in order to accommodate the over-dimension turbine component transporters. This approach will need to be discussed with Council. With the access located at the end of a low speed, low volume road, the extra width will not adversely affect the safety of passing vehicles.

3.3.2 Kaiparoro Road

Access to the substation site will be off Kaiparoro Road. The proposed location of the substation and services building off Kaiparoro Road is shown in Figure 3.4 below.

Figure 3.4: Proposed location of the substation and services building. Photo is taken from just off SH2, looking North-East towards Kaiparoro Road.

3.3.3 Opaki-Kaiparoro Road

Access from Opaki-Kaiparoro Road will be required for construction of the transmission line. The proposed location of the access point from Opaki-Kaiporo Road is shown in Figure 3.5 below.

Figure 3.5: Proposed access for the transmission line construction, to the right, after the bridge.

3.4 Details of internal site accesses

Internal accesses and parking areas will be formed and metalled to an all-weather standard. The siteentrances will be sealed to 20 m from the road edge to further minimise the tracking of material out onto the legal road. The site entrance will be fenced and gated to ensure vehicles entering or leaving the site only use the approved vehicle access crossing points.

3.5 Trip generation

3.5.1 Staff

3.5.1.1 Construction

During construction, it is estimated that 100 to 150 staff will be required on site. This number will vary depending on the specific activities being undertaken. Meridian will implement ride-sharing and minibuses to minimise light traffic. Meridian has successfully implemented such strategies on Harapaki Windfarm. For this assessment, it is assumed that three staff will travel to site per vehicle. As such, staff are assumed to travel three per vehicle to the site. All staff are expected to access the site from Old Coach Road.

During the mobilisation, civils and post-civils construction stages of the project the majority of staff working on the project are expected to stay in Eketahuna or Masterton. Other staff may stay locally or travel from further away depending on accommodation and site requirements. Meridian intend to implement a workplace travel plan to encourage construction staff to share transport where practical.

During the operation stage site staff are expected to live locally. Specialist staff including contractors may also attend site either staying locally or travelling from other centres.

This corresponds to an expected trip generation of 100 trips per day during construction. It is assumed that 80% of these are towards the site during the morning peak, and away from site in the evening.

3.5.1.2 Operation

It is estimated that the project will require four to eight full time staff to manage the maintenance and operational aspects of the wind farm. This does not include any additional staff requirements that would be associated with major maintenance activities such as mid-life refurbishments or ongoing transmission, substation, communications and road maintenance.

3.5.2 Aggregate

An estimate of the traffic movements required to transport aggregate is provided in *Mount Munro Aggregate Supply Assessment Memo Report May 2023*. The factors that determine the aggregate volumes, and traffic volumes, include:

- Final aggregate volume. Dependant on a range of factors, including size of platforms, depth of pavement required, number of and dimensions of internal access roads.
- Heavy vehicle type
- Programme, including programme length and sequencing of works.
- Heavy vehicle operation, including time of day and number of days heavy traffic is allowed to operate.

The report identifies the following assumptions were made in order to estimate traffic movements:

- The required material can be supplied from the local quarries detailed in Section 3.1.12
- For this assessment, the programme has been estimated at 32 months. This could lengthen to up to 48 months.
- Modelling has assumed that heavy vehicles operate five days per week, although in reality heavy vehicles could operate up to seven days per week. Operation over five days has been assumed in this assessment, to provide a worst-case assessment of daily traffic movements.
- Options for use of either trucks or truck and trailer have been provided
- Capacity of a 6-wheel truck is 10 tonnes
- Capacity of truck and trailer is 25 tonnes

The traffic movements for aggregate supply are summarised in Table 3.2 below.

Table 3.2: Peak Truck movements for supply of aggregate

Month No.	17	18	19	20	21	22	23	24
Supply Rate (m^3/month)								
GAP40	5,714	5,714	5,714	5,714	5,714	5,714	5,714	
AP65	4,714	4,714	4,714	4,714	4,714	4,714	4,714	
Sand (dry)				1,286	1,286	1,286	1,286	1,286
Aggregates (dry)				2,571	2,571	2,571	2,571	2,571
Backfill material (crusher dust)	667	667	667	667	667			
Cement				857	857	857	857	857
Total volume per month (m^3)	**11,095**	**11,095**	**11,095**	**15,810**	**15,810**	**15,143**	**15,143**	**4,714**
Truck return trips per month on Old Coach Road								
Truck (10 tonne)	1,511	1,511	1,511	2,190	2,190	2,087	2,087	679
Truck and Trailer (25 tonne)	604	604	604	876	876	835	835	272
Truck return trips per day on Old Coach Road								
Truck (10 tonne)	70	70	70	101	101	96	96	31
Truck and Trailer (25 tonne)	28	28	28	40	40	38	38	13
Note 1: Trip generations are based on conservative assumptions and could reduce by up to 40%.								

Use of larger trucks will reduce the number of trips. For this effects assessment, it is conservatively assumed that exclusively 10-tonne trucks will be used. Use of a 25-tonne truck and trailer will reduce traffic generation from the site. For this assessment, we have assumed that all vehicles carrying aggregate will be directed to travel to the site via SH2 and Old Coach Road, unless destined for the substation or transmission line access road.

3.5.3 Equipment & materials

Equipment and materials will be routinely delivered to site throughout the project to facilitate the turbine construction. Typical deliveries include;

- Earth moving machinery (excavators, dump trucks, compactors, etc);
- Cement for on-site concrete batching;
- Miscellaneous materials (incl. fencing, turbine formwork);
- Reinforcing steel;
- Electrical infrastructure materials; and
- Site offices.

Materials will be ideally sourced from around the lower North Island such as Masterton and Palmerston North.

3.5.4 Turbine components

Components for the 20 turbines proposed will be transported direct from a North Island port to the site for the turbine construction. Turbine component transport will primarily occur during the post-civils stage of the project. Turbine installation is summarised in Table 3.3 below. This is based on a 32-month construction schedule.

Table 3.3: Schedule for turbine supply and installation, based on a 32-month construction schedule

Phase	Turbine Installation								
Month No.	24	25	26	27	28	29	30	31	32

Transport of turbine components is expected to occur over the same timeframe. It is estimated that approximately 200 vehicle movements will occur to transport the large turbine components, including;

- Blades with a length of up to 67m (three per turbine);
- Hubs;
- Nacelles;
- Towers sections; and
- Transformer with weight up to 120 tons.

For this assessment, it has been assumed that two pilot vehicles per transporter will be required.

It is assumed that cranes required for site mobilisation will arrive on site and remain on site for the duration of the turbine installation works.

3.5.5 Water supply

Although the water resource near Mt Munro is limited, the use of a storage pond could act as a buffer enabling construction water to be stored, and to reduce peak traffic flow. However, to be conservative, it has been assumed that all water will be transported to the site and no water storage on-site has been included in this assessment.

Assuming 4,000 litres (4 m^3) per water tanker, it is estimated that up to 60 truckloads will be required per day. Since the direction of travel is not known, a 50/50 directional split has been assumed.

3.6 Construction staging

The construction program is still being confirmed. At this stage, the program assumptions are based around a 32-month program. The program could extend to 48 months, subject to sequencing and weather conditions. Indicative construction staging is summarised in Table 3.4 below. This includes staff and Heavy Commercial Vehicles (HCV) generated by the site.

Table 3.4 Indicative works staging, based on a 32-month construction program

Phase	Month No.	Works description	Peak traffic to/from site on Old Coach Road (vehicles per day)	
			Trip generation	Summary
Public Road Upgrade	1-6	• Upgrade and widening of Old Coach Road	• Staff (20 light vehicles) • Aggregate (3 HCV) • Equipment & materials (50 HCV)	• 20 light vehicles • 53 HCV Total: 73 vehicles per day (146 movements per day)
Site Establishment & Bulk Earthworks	7-16	• Site enabling • Mobilisation of earth-moving machinery • Start Import of base course for Laydown area and internal roads • Import of drainage materials • Mobilisation of site offices • Set up of on-site concrete batching plant	• Staff (33 light vehicles) • Aggregate (17 HCV) • Equipment & materials (100 HCV)	• 33 light vehicles • 117 HCV Total: 150 vehicles per day (300 movements per day)
Civils	17-23	• Import of drainage materials • Import of miscellaneous materials (incl. fencing, turbine formwork) • Import reinforcing steel • Import of electrical infrastructure materials • Set up of on-site concrete batching plant • Import vehicles and materials for concrete batching	• Staff (50 light vehicles) • Aggregate (101 HCV) • Equipment & materials (100 HCV) • Water supply (60 HCV)	• 50 light vehicles • 261 HCV Total: 311 vehicles per day (622 movements per day)
Turbine Installation	24-32	• Import materials for commissioning wind turbines • Substation construction • Demobilise machinery • Demobilise site offices	• Staff (33 light vehicles) • Aggregate (31 HCV) • Equipment & materials (100 HCV) • Turbine components (1 HCV, 2 light vehicles) • Water supply (60 HCV)	• 35 light vehicles • 192 HCV Total: 227 vehicles per day (454 movements per day)
Operational	33-onwards	• Technicians and manager for turbine and plant maintenance.	• Staff (4 light vehicles) • General plant for maintenance (typically none, up to 20 HCV during maintenance periods)	• 4 light vehicles • 20 HCV Total: 24 vehicles per day (48 movements per day)

3.7 Transport along State Highway routes

A port to site assessment for the project was completed in July 2021. Transport of turbine components from five ports were considered. Port of Napier and Centreport in Wellington were considered to be the most feasible options. All options assessed considered transport from the port to the site along the state highway network, with access from Old Coach Road. For further information, refer to the T+T report *Mount Munro Windfarm Port to Site Routes Assessment July 2021 v2.*

3.8 Upgrades along Old Coach Road

Changes to Old Coach Road need to be made to gain access to the site. Throughout construction, access to existing properties will need to be retained.

Old Coach Road will likely need to be widened to accommodate the traffic associated with the delivery of materials and personnel required to build the roads, internal electricity circulation and turbines. There are several options for how Meridian may choose maintain access to existing properties:

- Free flowing, with frequent passing bays; and/or;
- Traffic management; and/or
- Widening of road to allow for two-way travel.

An agreement between the Council will be required to determine widening and sealing requirements of Old Coach Road. The details will be confirmed once traffic generated to the site is confirmed and discussed with Council.

Widening of the road can be completed within the road reserve. Old Coach Road has a generous road reserve of between 25 m and 40 m, which is sufficient to allow for widening works to be completed.

As stated in Section 2.1.2, activities from private landowners are currently occurring within the road reserve. In most parts of the road, adjoining landowners have made use of the road reserve land. Where road reserve is being used by adjoining landowners it has mostly been absorbed into adjoining paddocks, but in several isolated locations stock yards and gardens are in the road reserve. This may provide constraints around where the road can be widened.

In most locations, there is still a width of greater than 10 m between fences. It is likely that there is enough width to allow for the existing road to be widened sufficiently to allow for heavy vehicles to pass.

Other isolated upgrades along Old Coach Road will likely be required between the SH2 intersection and the site access. Along the 1.7 km section of road, the following key upgrades will be required:

- Removal of vegetation;
- Relocation of power poles located alongside the carriageway, and possible relocation of power lines that currently go over the road, to go underground;
- While the works can be likely be contained within the road reserve, fencing to private property is located within the road reserve and will need to be relocated. Consultation with Tararua District Council and local landowners will be required; and
- Consideration will need to be made for the drainage, which consists of surface water channels and culverts. It is expected that extension of three culverts will be required, and depending on the condition of these culverts, they may need to be replaced. The site visit did not involve access to private property, therefore it was difficult to assess culverts from the road. Inspection of these is recommended for the next phase of this project.

From the SH2 intersection to the site access, the identified constraints are detailed in Table 3.5 below.

Table 3.5: Upgrades required along Old Coach Road

Distance from SH2 (m) heading south	Description	Photo (direction to site indicated by yellow arrow)
0	To allow for heavy vehicles to turn into Old Coach Road, seal widening of approximately 250 m^2 at the northeast corner will be required. This work all sits within the road reserve, with no requirements to cross private property. However, a swale and street signage on the northeast corner may need to be relocated.	
100 to 1700	Old Coach Road is unsealed.	
350	Vegetation on outside bend, from the intersection with SH2 will likely need to be removed. This work can occur within the road reserve.	

Distance from SH2 (m) heading south	Description	Photo (direction to site indicated by yellow arrow)
750 to 1100	Power poles located within 3 to 4 m of the carriageway. It is estimated that four to five power poles may need to be relocated.	
1000	Bank cutting and vegetation removal may be required.	

Distance from SH2 (m) heading south	Description	Photo (direction to site indicated by yellow arrow)
1300	There is a culvert under the road that will need to be extended.	
1400	There is a culvert under the road that will need to be extended.	

Distance from SH2 (m) heading south	Description	Photo (direction to site indicated by yellow arrow)
1500	Change in vertical grade may need to be reduced to improve sight distances and in turn allow for safe transport of tower blades.	
1600	There may be a culvert under the road that will need to be extended. Photo shows culvert outflow.	

Distance from SH2 (m) heading south	Description	Photo (direction to site indicated by yellow arrow)
1650	There is an open channel on the eastern side of the road for approximately 30 m. Consideration for this will be required if the road is widened.	
1700	Proposed site entrance. Turning into the entrance is tight, and with the current road width some equipment such as the turbine blade tails may extend over private farmland. Road may need to be widened up to four metres on the western side (behind camera) of the road.	

4 Appraisal of transport effects

4.1 Road and intersection capacity

4.1.1 Trip generation and travel routes

4.1.1.1 Construction (light vehicles)

As noted in Table 3.4, peak light vehicle traffic volumes are expected to occur during the construction, when up to 150 staff will travel to site. The use of ridesharing and minibuses should result in corresponding light traffic volumes to be around 50 vehicles per day (100 trips per day).

An even split of staff travelling from the north and the south is expected. Approximately 50% of staff are expected to travel to site from the south (Masterton, Carterton, South Wairarapa, etc) using SH2 and turning right onto Old Coach Road. The remaining 50% of staff are expected to travel to site from the north (Eketahuna, Palmerston North, etc.) via SH2 turning left onto Old Coach Road.

4.1.1.2 Construction (heavy vehicles)

As noted in Table 3.4, peak heavy vehicle traffic volumes are expected to occur towards the end of the Civils stage when up to 311 vehicles (excluding staff) are expected to arrive and leave site during the day. Trips are expected to be spread evenly throughout the day and vary from day to day based on site requirements. Up to 26 HCV (52 trips) could occur during a peak hour for construction activity.

All heavy vehicles will be directed to travel to site from SH2 via Old Coach Road, unless required for the transmission line and substation.

4.1.1.3 Operation (all vehicles)

As noted in Table 3.4, number of trips to and from the site will be typically low with higher periods from time to time when specific maintenance is required. During periods of maintenance, up to 24 vehicles are expected to arrive and leave site during the day. Up to 6 vehicles (12 trips) could occur during a peak hour. This will be a mix of staff (light) vehicles and heavy vehicles. All heavy vehicles will be directed to travel to site from SH2 via Old Coach Road, unless required for the transmission line and substation.

4.2 Capacity assessment

The following assumptions have informed this assessment:

- A peak hour traffic volume of 10% of the ADT has been assumed to occur during the morning and evening peak periods. This is a conservative estimate, supported by site observations, where no specific peak hour traffic effects were observed;
- An off-peak hour traffic volume of 8% of the ADT has been assumed, which allows for the majority of the traffic to pass over the day with only minor amounts of traffic overnight and no significant peak hour. This matches general site observations;
- Based on our experience, where the anticipated number of peak hour trips at an intersection is low (i.e. less than 600 vehicles per hour or 10 vehicles per minute), queuing is unlikely and therefore no capacity assessment is undertaken; and

- Where the anticipated number of peak hour trips at an intersection exceeds 600 vehicles per hour, intersection modelling would be undertaken in SIDRA[2] to assess the Level of Service (LOS) of the intersection. No intersections in this assessment exceed this threshold.

For this assessment, we have assumed that all access to the site will be via Old Coach Road. This is a conservative assessment.

Table 4.1: Road and intersection capacity

Intersection	Existing peak hour traffic volumes	Generated peak hour traffic volumes	Total	Capacity
SH2 / Old Coach Road	Peak hour: 330 vehicles (46 HCV) Off peak hour: 280 vehicles (39 HCV)	**Construction:** Peak hour: 102 vehicles (52 HCV) Off peak hour: 42 vehicles (all HCV) **Operation:** Peak hour: 8 vehicles (4 HCV) Off peak hour: 3 vehicles (all HCV)	**Construction:** Peak hour: 432 vehicles (98 HCV) Off peak hour: 332 vehicles (81 HCV) **Operation:** Peak hour: 338 vehicles (50 HCV) Off peak hour: 283 vehicles (42 HCV)	Capacity is not anticipated to be an issue due to the low volumes expected to travel through this intersection during the peak hour (maximum of 600 veh/hr).
SH2 / Falkner Road	Peak hour: 330 vehicles (46 HCV) Off peak hour: 280 vehicles (39 HCV)	**Construction:** Peak hour: 41 vehicles (16 HCV) Off-peak hour: 16 vehicles (all HCV) **Operation:** Peak hour: 4 vehicles (1 HCV) Off-peak hour: 1 vehicle (all HCV)	**Construction:** Peak hour: 371 vehicles (62 HCV) Off peak hour: 296 vehicles 55 HCV) **Operation:** Peak hour: 333 vehicles (47 HCV) Off peak hour: 281 vehicles (40 HCV)	Capacity is not anticipated to be an issue due to the low volumes expected to travel through this intersection during the peak hour (less than 600 veh/hr).
SH2 / Kaiparoro Road	Peak hour: 330 vehicles (46 HCV) Off peak hour: 280 vehicles (39 HCV)	**Construction:** Peak hour: 41 vehicles (16 HCV) Off-peak hour: 16 vehicles (all HCV) **Operation:** Peak hour: 4 vehicles (1 HCV) Off-peak hour: 1 vehicle (all HCV)	**Construction:** Peak hour: 371 vehicles (62 HCV) Off peak hour: 296 vehicles 55 HCV) **Operation:** Peak hour: 333 vehicles (47 HCV)	Capacity is not anticipated to be an issue due to the low volumes expected to travel through this intersection during the peak hour (less than 600 veh/hr).

[2]SIDRA Intersection Version 8.0, Ackelik and Associates, 2018

Intersection	Existing peak hour traffic volumes	Generated peak hour traffic volumes	Total	Capacity
			Off peak hour: 281 vehicles (40 HCV)	

In all cases, the expected traffic volumes are low. All traffic volumes are expected to remain at 600 vehicles per hour or fewer during construction and operation. Capacity of the intersections is not likely to be an issue.

4.3 Effect on residents of Old Coach Road

Construction traffic will increase traffic on Old Coach Road from 13 vehicles per day to an estimated 640 vehicles per day. The new traffic volume is within the carrying capacity of the existing road. As detailed in section 5.3, a Construction Traffic Management Plan (CTMP) for the project will be required. The CTMP will address any access and safety issues on Old Coach Road.

Access for residents on Old Coach Road will be maintained at all times. When this access may be interrupted, appropriate communications with residents will be required. The CTMP will manage safe access for all vehicles including residents, visitors and staff. Note that limited access will likely be only for very large loads rather than aggregate trucks.

4.4 Intersection safety

4.4.1 Sight distance

The available sight distance plays an important role in a driver determining whether it is safe for vehicles to enter or exit a side road or access roads. Intersection safety is largely dependent upon adequate sight distance in relation to both horizontal and vertical geometry.

Sight distance has been calculated and measured in accordance with Austroads guidance[3]. The sight distances assessed at each intersection are detailed in Table 4.2 below.

Table 4.2: Types of sight distances assessed

Sight distance	Definition
Approach sight distance (ASD)	Minimum level of sight distance on minor road approaches to all intersections to ensure drivers are aware of the presence of an intersection.
Safe intersection sight distance (SISD)	Minimum sight distance which should be provided on the major road at any intersection. Provides a sufficient distance for a driver of a vehicle on SH2 to observe and respond to a hazard at the intersection. Examples include a vehicle moving into a potential collision zone or a vehicle waiting to turn right.
Minimum gap sight distance (MGSD)	Minimum sight distance corresponding to the critical acceptance gap required to perform turning movements.

[3] Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2021) and Guide to Road Design Part 3: Geometric Design (2021)

Areas within the visibility envelope are to be kept clear of obstructions. The intersection sight distances have been assessed on site and using available aerial imagery. A summary of the available sight distance at the four surrounding intersections is shown in Table 4.3 below.

Table 4.3: Sight distance assessment

Intersection	Approach	Sight Distance	Distance (m)	Satisfies Austroads guidance
SH2 / Old Coach Road	SH2 - North	SISD	297	✓
		MGSD	122	✓
	SH2 – South	SISD	267	✓
	Old Coach Road	ASD	131	✓
SH2 / Falkner Road	SH2 - North	SISD	304	✓
		MGSD	122	✓
	SH2 – South	SISD	261	✓
	Falkner Road	ASD	131	✓
SH2 / Opaki-Kaiparoro Road	SH2 - North	SISD	280	Vegetation removal will be required to increase available sight distance. It is anticipated that this can be completed within the road reserve
		MGSD	122	✓
	SH2 – South	SISD	278	✓
	Opaki-Kaiparoro Road	ASD	131	✓
SH2 / Kaiparoro Road	SH2 – North	SISD	281	✓
	SH2 – South	SISD	244	✓
		MGSD	122	✓
	Kaiparoro Road	ASD	131	✓

Notes:

1 Vehicle speeds along SH2 were measured on site. On all approach roads, a vehicle speed of 60km/hr has been assumed.

If the Opaki-Kaiparoro Road is used for construction, it is expected that vegetation removal will be required to increase available sight distance. It is anticipated that this can be completed within the road reserve.

Further detail on each intersection is provided in sections 4.4.2.

4.4.2 SH2 / Old Coach Road intersection

SH2, viewed from the intersection with Old Coach Road, looking north and south are shown in Figure 4.1 and Figure 4.2 respectively.

Figure 4.1: Sight distance looking north from Old Coach Road along SH2

Figure 4.2: Sight distance looking south from Old Coach Road along SH2

At the Old Coach Road/SH2 intersection, the road has a 6% slope, with northbound vehicles travelling uphill. Through the intersection, there is a single lane in each direction, with a wide shoulder on the northbound side. The SH2/Old Coach Road intersection is a basic right-turn treatment, with no right-turn bay provided at the intersection. Austroads[4] sets out requirements for channelised turning treatments for various main road and side road peak hour traffic volumes. Austroads recommends a short channelised right turn bay based on peak hourly flows of 432 vehicles on SH2 and 16 vehicles turning right into Old Coach Road. The bay is shorter in that it has a shorter deceleration length. The traffic volumes have been assumed based on the assumptions outlined in section 3.5. The estimate of right turning traffic is likely on the high side due to

[4] Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management, 2020

assumptions such as the need to import water. Further work is required to understand whether a turn treatment is required including consideration of the origin of vehicles accessing the site (ie from the north or south), staging of the site work (e.g., when watercutting and aggregate delivery occurs). Engagement with Waka Kotahi and Council will occur within the consent process to consider safe site access to Old Coach Road from SH2.

As outlined in section 4.4.1, there is sufficient available sight distance for an approaching vehicle to see a turning vehicle. During construction, there are a few options to improve the sight distance:

- Temporarily decrease speeds; and
- Warn vehicles of turning trucks and construction vehicles on approach to intersection.

The Construction Traffic Management Plan process will consider options and confirm the required option.

4.4.3 SH2 / Falkner Road intersection

SH2, viewed from the intersection with Falkner Road, looking north and south, is shown in Figure 4.3 and Figure 4.4 below. The sight distance in both directions is satisfactory.

Figure 4.3: Sight distance from Falkner Road, looking north

Figure 4.4: Sight distance from Falkner Road, looking south

4.4.4 SH2 / Opaki-Kaiparoro Road intersection

SH2, viewed from the intersection with Opaki-Kaiparoro Road, looking north and south is shown in Figure 4.5 and Figure 4.6 below. If this route is used for transport, it is expected that vegetation removal will be required to increase available sight distance in the north direction. It is anticipated that this can be completed within the road reserve.

Figure 4.5: Sight distance from Opaki-Kaiparoro Road, looking north

Figure 4.6: Sight distance from Opaki-Kaiparoro Road, looking south

4.4.5 SH2 / Kaiparoro Road intersection

SH2, viewed from the intersection with Kaiparoro Road, looking north and south, is shown in Figure 4.7 and Figure 4.8 below. The sight distance in both directions is satisfactory.

Figure 4.7: Sight distance from Kaiparoro Road, looking north

Figure 4.8: Sight distance from Kaiparoro Road, looking south

4.5 Pavement and surfacing

The proposed metalled surface for the accesses and parking areas is expected to provide a suitable standard for all weather access in this rural environment. Periodic inspections and maintenance will be required to maintain the track surfaces and profiles free of potholes, ponding areas and frittered soil from adjacent slopes, as typical for such tracks in the rural environment.

The proposed sealed site entrances are expected to adequately minimise the tracking of material out on to the road surface. This will also mitigate the risk of edge break and other damage to the existing surfacing along the legal roads.

5 Construction traffic management

5.1 Overweight and Over-Dimension Permits

As described in Section 3.5.4, transport of a number of large and/or heavy components will be required. This includes blades, tower sections, nacelles and transformers. Vehicles transporting these components are expected to exceed the weights and dimensions set out in the Vehicle Dimensions and Mass Rule 2016 (VDAM). These are defined as Overweight Vehicles or Over-Dimension Vehicles and require a special permit.

Overweight and Over-Dimension permits will be required from both Waka Kotahi and Tararua District Council. The preferred route and required approvals will be dependent on selection of the port. Permits will be required from these authorities prior to transport of overweight or oversize components.

5.2 Access

As described in Section 3.3, there is a single site access on Old Coach Road proposed for this development. There is an additional access to the substation site on Kaiparoro Road. These accesses will be formed in the initial stage of works to a suitable standard for the expected construction vehicle activities as assessed in Section 3.5.

Temporary traffic management will be required while construction of these accesses is underway within the Road Reserve. This will require Corridor Access Request (CAR) and Site Specific Temporary Traffic Management Plan (SSTMP) approvals from Tararua District Council to undertake this work.

Once the accesses are formed site traffic is expected to be able to enter and exit site safely without the need for ongoing temporary traffic management at these access locations.

5.3 Construction Traffic Management Plan

All traffic associated with construction of the wind farm site will be subject to a Construction Traffic Management Plan (CTMP), to be prepared at the time of detailed construction planning.

A CTMP is a key component of the management of traffic effects from a construction project of this nature. It provides the overarching principles, methodologies, and procedures for managing the effects of the Works to achieve the transport outcomes and performance standards required by the project.

For a site of this size and location, we recommend that the CTMP is a section within the overall Site Management Plan (SMP), rather than a standalone document.

A detailed CTMP should be prepared and approved by Tararua District Council and Waka Kotahi prior to construction. The CTMP should demonstrate how construction traffic will be safely and efficiently managed to and from site. In particular, the CTMP should include the following specific management controls noted for this site;

- Construction programme;
- Overweight and over-dimension permit restrictions;
- Briefing of workers and bulk good suppliers of the site;
- Briefing of HCV drivers of;
  - School bus routes and times to ensure that they take additional care when there is an increased likelihood to children on or around the roads; and

  - The New Zealand Cycle Trail routes to ensure that they are aware of an increased likelihood of cyclists along the roads passing sites and correct procedures for passing.
- Site specific traffic management proposed, including;
  - Signs warning of turning construction traffic to be placed on SH2 in advance of the Old Coach Road intersection for the duration of the construction period;
  - Temporary signs to be mounted warning of turning construction traffic on Old Coach Road and main construction accesses for the duration of the construction period;
  - Mounting of 'caution wide vehicles' supplementary plates to road narrowing signs between Eketahuna and Masterton for the duration of the construction period; and
- Monitoring and communication requirements with stakeholders;
- Procedures to monitor sightseeing numbers (if any) once the wind farm is operational to assess the need for measures to mitigate visitor traffic;
- Ensure appropriate access is provided to accommodate any required turning circles of site vehicles and accommodate any required truck movements; and
- Ensure adequate sight distances are provided at each access point to ensure safety on the road network.

6 Compliance with policy

6.1 Tararua District Council

Most of the wind farm site and all of the local roads to be used for access are within the Tararua District Council area. As such, the focus of this transport assessment has been on the Tararua District Plan, rather than the Combined Wairarapa District Plan. The site and access roads are within the area zoned Rural in the Operative Tararua District Plan.

6.1.1 Tararua District Plan

Construction of the wind farm is a discretionary activity. A discretionary activity is an activity which Council may refuse or approve subject to appropriate conditions. This allows for the benefits both in terms of the national interest, and in terms of renewable electricity generation can be considered with regard to local adverse effects and amenity values (Section 2.3.1.2).

Wind farms have the potential to cause significant adverse effects on the environment, including on traffic (Section 2.8.4.2 (b)). As such, applicants are required "to remedy, mitigate, or avoid, where possible, the actual and potential adverse effects on the environment of wind farms and other renewable electricity generation facilities." The adverse effects of the proposed wind farm on the surrounding transport network have been considered in this assessment. This report assesses the potential adverse effects of the proposed wind farm on the surrounding transport network.

In rural management areas, desired characteristics include: "safe and efficient vehicular access and movement throughout the District" (Section 3.2.1 (m)).

The recommendations made in this report are aimed at contributing to this desired characteristic.

The District Plan also includes specific environmental standards relating to infrastructure in Chapter 5.3. Those relating to transport and whether the proposed wind farm complies with them, are summarised in Table 6.1 below.

Table 6.1: Compliance with the Operative Tararua District Plan

Reference	Standard	Proposed	Compliance
5.3.2.3	One on-site loading space	Loading areas at each turbine, as well as general laydown areas, and one loading area at substation.	Complies
5.3.3.2(e)(ii)/Appendix 12.1	Access radii to be 7 m, connecting into width of 5 m.	Old Coach Road accesses will exceed specified dimensions, to accommodate over-dimension vehicles.	Exceeds specified dimensions
5.3.3.2(e)(iii)	First 6 m of access to be flatter than 1:8.	Oversize loads require a vertical grade flatter than 1:8.	Complies
5.3.3.2(g)	Unobstructed 6 m x 6 m visibility triangles at accessways		Complies
Appendix 10.1	Performance standards for the physical distance (spacing) between accesses and intersections, and sight distance from accesses (primary arterial roads)	All site accesses are required to be located a minimum of 60m from the State Highway intersection.	Site access on Old Coach Road and Kaiparoro Road comply.

7 Conclusion and recommendations

7.1 Conclusions

This Transportation Assessment report has been prepared to assess the anticipated transportation effects of a proposed 20 turbine wind farm near Eketahuna in the Wairarapa. The site will include accesses to the surrounding road network, internal tracks suitable for construction and maintenance, and various turbine and electricity infrastructure. Access to the project site during construction and operation will be via SH2 and Old Coach Road.

Based on the assessment of transportation effects undertaken within this report, the following provides a summary of the key findings of this assessment:

- The majority of the intersections off SH2 achieve the recommended sight distances, with the exception of Opaki-Kaiparoro Road and Kaiparoro Road. Vegetation removal within the road reserve is recommended to increase sight distance. Appropriate sight distance at the proposed site entrances should be achievable. Based on this assessment and subject to the mitigation proposed, the proposed accesses and intersections are expected to operate safely for site traffic and existing road users;
- The site entrances will be sealed, minimising the tracking of material and edge break along the existing road surfacing;
- Indicative port to site assessment has concluded that equipment can be transported to site from multiple North Island ports with some temporary removal of roadside infrastructure (signs, barriers, etc.) and upgrades to some structures. Specific liaison with the relevant road controlling authorities regrading transport of these components will be subject to the port selection process;
- The traffic volumes in this area are low. Construction traffic is unlikely to result in significant delays for road users on the surrounding road network. Upgrades are likely to be required to Old Coach Road;
- Operational traffic volumes are expected to be much less than during construction, and are not expected to result in any significant delay to other road users;
- During construction the traffic volumes on Old Coach and Kaiparoro Roads will increase significantly. Depending on use of local quarries and volume of aggregate sourced, traffic volumes during construction may also increase significantly for Opaki-Kaiparoro and Falkner Roads. Temporary traffic signs are proposed on these roads and on the SH2 approach to Old Coach Road to warn approaching drivers of the increased traffic on these roads during construction;
- No specific control measures are proposed during operation; and
- Departures from the relevant transport rules in the Tararua District Council District Plans have been assessed with no issues noted from a transport perspective.

The proposal is considered to meet the general expectations of the Tararua District Plan provisions. The proposal is also in general accordance with New Zealand and international design guidelines.

Accordingly, on the basis of the preceding assessment of the transportation effects of the proposed development and with the recommendations detailed below, the proposed development can be undertaken safely and without significantly impacting the level of service for other road users and can be supported from a transport perspective.

7.2 Recommendations

Refer Section 3.8

Prior to commencement of works, upgrades to Old Coach Road will be required to maintain private access and allow for heavy vehicles to pass. Works to be discussed with Tararua District Council and local landowners prior to decision of a preferred approach.

Refer Section 4.1.1.2

Should transport of aggregate through the SH2/Opaki-Kaiparoro Road intersection be required, removal of vegetation to achieve the Safe Intersection Sight Distance should be completed.

Refer Section 4.5

Periodic inspections and maintenance will be required to maintain the site's access track surfaces and profiles free of potholes, ponding areas and frittered soil from adjacent slopes.

Refer Section 5.1

Overweight and Over-Dimension permits will be required from both Waka Kotahi and Tararua District Council. Approved permits will be required from these authorities prior to transport of overweight or oversize components.

Refer Section 5.3

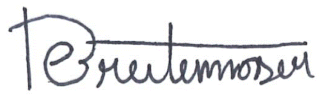
A detailed CTMP should be prepared and approved by Tararua District Council and Waka Kotahi prior to construction. The CTMP should demonstrate how construction traffic will be safely and efficiently managed to and from site. Specific management controls to be included in this CTMP are listed in Section 5.3.

8 Applicability

This report has been prepared for the exclusive use of our client Meridian Energy Limited, with respect to the particular brief given to us. We also understand and agree that our client will submit this report as part of an application for resource consent and that Tararua District Council, Masterton District Council, Greater Wellington Regional Council and Greater Wellington Regional Council as the consenting authorities will use this report for the purpose of assessing that application. This report may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Report prepared by:



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Tess Breitenmoser

Transport Engineer

Reviewed by:

.....

Sam Wilkie

Senior Transport Engineer

Authorised for Tonkin & Taylor Ltd by:

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Bruce Symmans

Project Director

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Appendix A: CAS Analysis Reports

- **Plain English Reports**
- **Site Summary Report**

1016884 Mount Munro - wider area

Saved sites

1016884 - Mt Munro - wider area

Crash date

01/11/2011 — 31/10/2021

Plain English report

21 results from your query.

Showing 20 100 results at once.

1-20 of 21

Site Centre: Midpoint	Crash road	Side road	Feature	Distance from side road/feature	Direction	Reference station	Route position	Easting	Northing	Longitude	Latitude	ID	Date	Day of week	Time	Description of events	Crash factors	Surface condition	Natural light	Weather	Junction	Control	Casualty count fatal	Casualty count serious	Casualty count minor	Social cost $/m
1823779-5490225	**SH 2**	KAIPARORO ROAD			I			1823785	5490226	175.649109	-40.708500	201831544	17/01/2018	Wed	17:25	Car/Wagon1 EDB on State highway 2 lost control; went off road to right, Car/Wagon1 hit non specific fence	CAR/WAGON1, alcohol test below limit, fatigue due to lack of sleep, too far right	Dry	Overcast	Fine	T Junction	Give way	0	0	0	0.04
1824107-5490549	**SH 2**	KAIPARORO ROAD		300m	N			1824066	5490331	175.652390	-40.707478	201515539	27/07/2015	Mon	17:20	Car/Wagon1 SDB on SH 2 lost control turning right	CAR/WAGON1, lost control when turning, ENV: slippery road due to rain	Wet	Overcast	Light rain	Nil (Default)	Unknown	0	0	1	0.12
1824359-5490509	**SH 2**		MAKAKAHI STM BR	340m	S			1824366	5490512	175.655884	-40.705769	201840565	02/06/2018	Sat	14:09	Car/Wagon1 SDB on SH 2, EKETAHUNA, TARARUA lost control; went off road to left, Car/Wagon1 hit non specific tree	CAR/WAGON1, too far left	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	0	0.04
1824599-5490720	**SH 2**		MAKAKAHI STM BR	130m	S			1824540	5490630	175.657898	-40.704659	201617482	12/11/2016	Sat	15:15	Motorcycle1 SDB on SH2 Eketahuna lost control turning right	MOTORCYCLE1, other lost control, too far left	Wet	Overcast	Light rain	Nil (Default)	Unknown	0	1	0	0.87
1824599-5490720	**SH 2**		MAKAKAHI STM BR	30m	S			1824602	5490708	175.658600	-40.703938	201700026	27/01/2017	Fri	07:44	Car/Wagon1 NDB on SH2 lost control on straight and hit Van2 head on, Car/Wagon1 hit non specific guard rail	CAR/WAGON1, alcohol test below limit, lost control - road conditions, ENV: road slippery (oil/diesel/fuel)	Wet	Overcast	Light rain	Nil (Default)	Unknown	1	1	1	5.50
1824599-5490720	**SH 2**		MAKAKAHI STM BR	180m	S			1824499	5490601	175.657425	-40.704929	201811700	04/03/2018	Sun	03:31	Car/Wagon1 SDB on SH2 Eketahuna lost control turning right	CAR/WAGON1, alcohol suspected, lost control - vehicle fault, other tyres, speed entering corner/curve	Dry	Dark	Fine	Nil (Default)	Unknown	0	2	1	0.80
1824611-5490726	**SH 2**		MAKAKAHI STM BR	0m				1824619	5490733	175.658798	-40.703709	201312218	06/07/2013	Sat	11:20	Car/Wagon1 SDB on SH 2 lost control but did not leave the road	CAR/WAGON1, jack-knifed or uneven braking, other lost control, ENV: heavy rain, strong wind	Wet	Overcast	Heavy rain	Nil (Default)	Nil	0	0	1	0.12
1824626-5490750	**SH 2**	KAIPARORO ROAD		1000m	N			1824623	5490740	175.658844	-40.703644	201510365	20/01/2015	Tue	12:45	Van1 SDB on SH 2 hit rear of Van2 SDB on SH 2 turning right from left side	VAN2, other visibility limited, turned from incorrect position on road, ENV: entering or leaving private house / farm, visibility limited by curve	Dry	Bright sun	Fine	Driveway	Unknown	0	0	2	0.12
1824655-5490796	**SH 2**	SOUTH ROAD NO 2		140m	S			1824702	5490858	175.659729	-40.702560	201742045	10/06/2017	Sat	19:15	Car/Wagon1 SDB on State Highway 2, Eketahuna lost control; went off road to right, Car/Wagon1 hit non specific fence	CAR/WAGON1, speed on straight, too far right	Dry	Dark	Fine	Nil (Default)	Unknown	0	0	0	0.04
1824776-5490982	**SH 2**	SOUTH ROAD NO 2		1230m	N			1825772	5491669	175.672089	-40.694973	201552045	28/12/2015	Mon	13:02	Car/Wagon1 NDB on SH 2 lost control turning left	CAR/WAGON1, lost control when turning	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.04
1824776-5490982	**SH 2**	OPAKI KAIPARORO ROAD		400m	N			1825048	5491266	175.663666	-40.698795	201447580	29/10/2014	Wed	09:00	load or trailer from SUV1 NDB on SH 2 hit VEHB	SUV1, other lost control, ENV: strong wind	Dry	Overcast	Fine	Nil (Default)	Unknown	0	0	0	0.04
1824776-5490982	**SH 2**	SOUTH ROAD NO 2		15m	S			1824771	5490961	175.660507	-40.701618	201745483	24/06/2017	Sat	13:57	Van1 NDB on Sh 2 hit rear end of Car/Wagon2 stop/slow for queue	VAN3, alcohol test below limit VAN1, alcohol test below limit, following too closely	Wet	Overcast	Light rain	Crossroads	Give way	0	0	0	0.04
1824776-5490982	**SH 2**	SOUTH ROAD NO 2		300m	N			1824970	5491204	175.662781	-40.699375	201354211	14/10/2013	Mon	09:55	Truck1 SDB on SH 2 lost control; went off road to left	TRUCK1, lost control - road conditions, ENV: strong wind	Dry	Overcast	Fine	Nil (Default)	Nil	0	0	0	0.04
1824776-5490982	**002-0842**	OPAKI KAIPARORO ROAD		570m	N			1825200	5491359	175.665451	-40.697910	201954278	16/01/2019	Wed	05:17	Car/Wagon1 SDB on SH 2, EKETAHUNA, TARARUA hit obstruction, Car/Wagon1 hit non specific tree	CAR/WAGON1, alcohol test below limit, failed to notice obstruction on roadway, ENV: road obstructed by fallen tree or branch, slippery road due to rain, strong wind	Wet	Dark	Light rain	Nil (Default)	Unknown	0	0	0	0.04
1824776-5490982	**SH 2**	OPAKI KAIPARORO ROAD		683m	N			1825315	5491413	175.666781	-40.697393	202015465 7	12/06/2020	Fri	17:30	Car/Wagon1 SDB on SH 2 lost control; went off road to left, Car/Wagon1 hit tree	CAR/WAGON1, alcohol test below limit, new driver/under instruction, too far left, ENV: strong wind	Dry	Twilight	Fine	Nil (Default)	Nil	0	0	1	0.11
1824776-5490982	**SH 2**	OPAKI KAIPARORO ROAD		75m	N			1824820	5491040	175.661060	-40.700886	202118318 7	01/04/2021	Thu	08:55	load or trailer from Ute1 NDB on SH 2 hit Other2, Ute1 hit bank	UTE1, load not well secured or load moved, other body or chassis	Dry	Overcast	Fine	Nil (Default)	Nil	0	0	0	0.04
1827026-5493148	**002-0842**	FALKNER ROAD		136m	N			1827145	5493210	175.687775	-40.680721	201970198	08/06/2019	Sat	07:20	Car/Wagon1 SDB on 002-0842 lost control; went off road to left, Car/Wagon1 hit fence	CAR/WAGON1, too far left	Wet	Dark	Light rain	Nil (Default)	Unknown	0	0	0	0.04
1827026-5493148	**SH 2**	FALKNER ROAD		200m	N			1827202	5493239	175.688431	-40.680450	201633990	29/02/2016	Mon	10:40	Van1 EDB on SH 2 lost control turning left	VAN1, following too closely, lost control avoiding another party, swerved to avoid vehicle	Dry	Bright sun	Fine	Nil (Default)	Unknown	0	0	0	0.04
1827026-5493148	**SH 2**	COACH ROAD NORTH		1100m	S			1827507	5493479	175.691940	-40.678207	201211512	27/03/2012	Tue	18:20	SUV1 NDB on SH 2 lost control; went off road to right, SUV1 hit non specific fence	SUV1, fatigue due to lack of sleep, other inattentive, other lost control	Dry	Twilight	Fine	Nil (Default)	Nil	0	0	1	0.11
1827026-5493148	**SH 2**	FALKNER ROAD		340m	N			1827321	5493311	175.689804	-40.679771	201811073	09/02/2018	Fri	17:25	SUV1 NDB on SH2 lost control; went off road to left, SUV1 hit non specific cliff, non specific fence	SUV1, too far left	Dry	Overcast	Fine	Nil (Default)	Unknown	0	1	1	0.80

1-20 of 21

1016884 Mount Munro - wider area

Saved sites

1016884 - Mt Munro - wider area

Crash date

01/11/2011 — 31/10/2021

Site details report

Fatal crashes: 1 | **Injury crashes:** 8 | **Non-injury crashes:** 12 | **Total crashes:** 21

Overall crash statistics

Crash severity

Crash severity	Number	%	Social cost $(m)
Fatal	1	4.76	5.50
Serious	3	14.29	2.47
Minor-injury	5	23.81	0.58
Non-injury	12	57.14	0.49
TOTAL	21	100	9.04

Crash numbers

Year	Fatal	Serious	Minor	Non-injury
2017	1	0	0	2
2018	0	2	0	2
2019	0	0	0	2
2020	0	0	1	0
2021	0	0	0	1
TOTAL	1	2	1	7
Percent	9.09	18.18	9.09	63.63

Note: Last 5 years of crashes shown.

Crash type and cause statistics

Crash type

Crash type	Crash numbers	% All crashes
Overtaking crashes	0	0
Straight road lost control/head on	10	47.62
Bend - lost control/Head on	6	28.57
Rear end/obstruction	2	9.52
Crossing/turning	1	4.76
Pedestrian crashes	0	0
Miscellaneous crashes	2	9.52
TOTAL	21	100

Crash factors

Crash factors	Crash numbers	% All crashes
#N/A	6	28.57
Alcohol	1	4.76
Disabled, old age or illness	0	0.00
Failed to give way or stop	0	0.00
Fatigue	2	9.52
Incorrect lanes or position	8	38.10
Miscellaneous factors	1	4.76
Overtaking	0	0.00
Pedestrian factors	0	0.00
Poor handling	7	33.33
Poor judgement	1	4.76
Poor observation	2	9.52
Position on Road	2	9.52
Road factors	6	28.57
Travel Speed	2	9.52
Unknown	0	0.00
Vehicle factors	3	14.29
Weather	5	23.81
TOTAL	46	219.05

Crashes with:

Factor groups	Crash numbers	% All crashes
All road user factors	6	28.57
Driver only factors	20	95.24
Pedestrian factors	0	0.00
Vehicle factors	3	14.29
Road factors	5	23.81
Environment factors	5	23.81
No identifiable factors	0	0.00
Retired codes - no future use	1	4.76
TOTAL	40	190.48

Notes: Factors are counted once against a crash - i.e. two fatigued drivers count as one fatigue crash factor.

Driver/vehicle factors are not available for non-injury crashes for Northland, Auckland, Waikato and Bay of Plenty before 2007. This will influence numbers and percentages.

% represents the % of crashes in which the cause factor appears.

Number of parties in crash

Party type	All crashes	% All crashes
Single party	16	76.19
Multiple party, including pedestrian	0	0.00
Multiple party, excluding pedestrian	5	23.81
TOTAL	21	100

Overall casualty statistics

Injury severity

Injury severity	Number	% all casualties
Fatal	1	6.67
Serious Injured	5	33.33
Minor Injured	9	60.00
TOTAL	15	100.00

Casualty numbers

Year	Fatal	Serious Injured	Minor Injured
2011	0	0	0
2012	0	0	1
2013	0	0	1
2014	0	0	0
2015	0	0	3
2016	0	1	0
2017	1	1	1
2018	0	3	2
2019	0	0	0
2020	0	0	1
2021	0	0	0
TOTAL	1	5	9
Percent	6.67	33.33	60.00

Note: Last 5 years of crashes shown (unless query includes specific date range).

Casualty types

Casualty types	Fatalities	Serious injuries	Minor injuries
Cyclists	0	0	0
Drivers	0	3	6
Motorcycle pillions	0	0	0
Motorcycle riders	0	1	0
Passengers	1	1	3
Pedestrians	0	0	0
Other	0	0	0
TOTAL	1	5	9

Note: Motorcycle stats include Mopeds.

Driver and vehicle statistics

Drivers at fault or part fault in injury crashes - by age

Age	Male	Female	Unknown	Total	Percentage (%)
0-4	0	0	0	0	0.00
5-9	0	0	0	0	0.00
10-14	0	0	0	0	0.00
15-19	1	0	0	1	11.11
20-24	0	0	0	0	0.00
25-29	0	1	0	1	11.11
30-34	0	1	0	1	11.11
35-39	0	0	0	0	0.00
40-44	0	1	0	1	11.11
45-49	1	1	0	2	22.22
50-54	1	0	0	1	11.11
55-59	0	1	0	1	11.11
60-64	0	0	0	0	0.00
65-69	0	0	0	0	0.00
70-74	0	0	0	0	0.00
75-79	1	0	0	1	11.11
80-84	0	0	0	0	0.00
85-89	0	0	0	0	0.00
90-94	0	0	0	0	0.00
95-99	0	0	0	0	0.00
100+	0	0	0	0	0.00
Unknown	0	0	0	0	0.00
TOTAL	4	5	0	9	–
Percent	44.44	55.56	0.00	100.00	–

Note: Driver information is not calculated for non-injury crashes.

Drivers at fault or part fault in injury crashes - by licence

Licence	Male	Female	Unknown	Total	Percentage (%)
Full	4	3	0	7	77.78
Learner	0	0	0	0	0.00
Restricted	0	1	0	1	11.11
Overseas	0	1	0	1	11.11
Wrong class	0	0	0	0	0.00
Never Licensed	0	0	0	0	0.00
Unknown	0	0	0	0	0.00
Forbidden	0	0	0	0	0.00
TOTAL	4	5	0	9	–
Percent	44.44	55.56	0.00	100.00	–

Note: Driver information is not calculated for non-injury crashes.

Vulnerable road users

Crash types	Number	Percentage (%)
Cyclist crashes	0	0.00
Pedestrian crashes	0	0.00
Motorcycle crashes	1	4.76
All other crashes	20	95.24

Note: Some crashes involve more than one vulnerable road user type.

Note: Motorcycle stats include Mopeds.

Road environment statistics

Road type

Road type	State highway	Local road	Unknown	N/A	Total	Percentage (%)
Urban	0	0	0	0	0	0.00
Open	21	0	0	0	21	100.00
Unknown	0	0	0	0	0	0.00
TOTAL	21	0	0	0	21	–
Percent	100.00	0.00	0.00	0.00	100.00	–

Natural light conditions

Conditions	Injury	Non-injury	Total	%
Light/overcast	6	9	15	71.43
Dark/twilight	3	3	6	28.57
Unknown	0	0	0	0.00
TOTAL	9	12	21	100

Conditions

Conditions	Injury	Non-injury	Total	%
Dry	5	8	13	61.90
Ice or Snow	0	1	1	4.76
Wet	4	3	7	33.33
Null	0	0	0	0.00
TOTAL	9	12	21	100

Intersection/midblock

Intersection/mid-block	Total	%
Intersection	6	28.57
Midblock	15	71.43
TOTAL	21	100

Objects struck

Objects struck	Injury crashes	%	Non-injury crashes	%
Crashes w/obj struck	4	19.05	7	33.33

Object struck	Injury crashes	%	Non-injury crashes	%
Animals	0	0.00	0	0.00
Bridges/Tunnels	0	0.00	1	4.76
Cliffs	1	4.76	1	4.76
Debris	0	0.00	0	0.00
Embankments	0	0.00	0	0.00
Fences	2	9.52	3	14.29
Guide/Guard rails	1	4.76	0	0.00
Houses	0	0.00	0	0.00
Traffic Islands	0	0.00	0	0.00
Street Furniture	0	0.00	0	0.00
Kerbing	0	0.00	0	0.00
Landslips	0	0.00	0	0.00
Parked vehicle	0	0.00	0	0.00
Trains	0	0.00	0	0.00
Sight Rails	0	0.00	0	0.00
Poles	0	0.00	0	0.00
Stationary Vehicle	0	0.00	0	0.00
Roadwork	0	0.00	0	0.00
Traffic Sign	0	0.00	0	0.00
Trees	1	4.76	2	9.52
Drainage Structures	0	0.00	0	0.00
Ditches	0	0.00	0	0.00
Other	0	0.00	0	0.00
Thrown or dropped objects	0	0.00	0	0.00
Water	0	0.00	0	0.00
TOTAL	5	–	7	–

Note: % represents the % of crashes in which the object is struck.

Vehicles involved in injury crashes (vehicle count)

Vehicle type	No. of vehicles	% of vehicles in injury crashes
Unknown	0	0.00
Car/Wagon	5	45.45
SUV	2	18.18
Van	3	27.27
Ute	0	0.00
Truck	0	0.00
Truck HPMV	0	0.00
Bus	0	0.00
Motorcycle	1	9.09
Moped	0	0.00
Train	0	0.00
Cycle	0	0.00
Other	0	0.00
Unknown	0	0.00
50 Max	0	0.00
Left scene	0	0.00
Uncoupled towed vehicle	0	0.00
TOTAL	11	100.00

Vehicles involved in injury crashes (crash count)

Vehicle type	Injury crashes	% of injury crashes
Unknown	0	0.00
Car/Wagon	5	55.56
SUV	2	22.22
Van	2	22.22
Ute	0	0.00
Truck	0	0.00
Truck HPMV	0	0.00
Bus	0	0.00
Motorcycle	1	11.11
Moped	0	0.00
Train	0	0.00
Cycle	0	0.00
Other	0	0.00
Unknown	0	0.00
50 Max	0	0.00
Left scene	0	0.00
Uncoupled towed vehicle	0	0.00
TOTAL	10	111.11

Vehicle usage in injury crashes

Vehicle usage	Fatal Crash	Serious Crash	Minor Crash	Total	Percentage (%)
Private	0	0	1	1	9.09
Attenuator Truck	0	0	0	0	0.00
Agricultural	0	0	0	0	0.00
Ambulance	0	0	0	0	0.00
Campervan	0	0	0	0	0.00
Concrete mixer	0	0	0	0	0.00
Fire	0	0	0	0	0.00
Logging truck	0	0	0	0	0.00
Mobile crane	0	0	0	0	0.00
Police	0	0	0	0	0.00
Rental	0	0	0	0	0.00
Road Working	0	0	0	0	0.00
Scheduled service Bus	0	0	0	0	0.00
School bus	0	0	0	0	0.00
Tanker	0	0	0	0	0.00
Taxi	0	0	0	0	0.00
Tour Bus	0	0	0	0	0.00
Trade person	0	0	0	0	0.00
Work travel	0	0	0	0	0.00
Work vehicle	0	0	0	0	0.00
Other	0	0	0	0	0.00
Null	2	3	5	10	90.91
TOTAL	2	3	6	11	–
Percent	18.18	27.27	54.55	100.00	–

Time period statistics

Month by injury/ non-injury crashes

Month	Injury crashes	%	Non-injury crashes	%	Total	%
Jan	2	22.22	2	16.67	4	19
Feb	1	11.11	1	8.33	2	9.52
Mar	2	22.22	0	0	2	9.52
Apr	0	0	1	8.33	1	4.76
May	0	0	0	0	0	0
Jun	1	11.11	5	41.67	6	28.57
Jul	2	22.22	0	0	2	9.52
Aug	0	0	0	0	0	0
Sep	0	0	0	0	0	0
Oct	0	0	2	16.67	2	9.52
Nov	1	11.11	0	0	1	4.76
Dec	0	0	1	8.33	1	4.76
TOTAL	9	100	12	100	21	100

Day/period

Day/Period	All crashes	% All crashes
Weekday	13	61.9
Weekend	8	38.1
TOTAL	21	100

Day/period by hour

Day/Period	00:00 - 02:59	03:00 - 05:59	06:00 - 08:59	09:00 - 11:59	12:00 - 14:59	15:00 - 17:59	18:00 - 20:59	21:00 - 23:59	Total
Weekday	0	1	2	3	2	4	1	0	13
Weekend	0	1	2	1	2	1	1	0	8
TOTAL	0	2	4	4	4	5	2	0	21

Day/period by hour DOW

Day/Period	00:00 - 02:59	03:00 - 05:59	06:00 - 08:59	09:00 - 11:59	12:00 - 14:59	15:00 - 17:59	18:00 - 20:59	21:00 - 23:59	Total
Mon	0	0	0	2	1	1	0	0	4
Tue	0	0	0	0	1	0	1	0	2
Wed	0	1	0	1	0	1	0	0	3
Thu	0	0	1	0	0	0	0	0	1
Fri	0	0	1	0	0	2	0	0	3
Sat	0	0	1	1	2	1	1	0	6
Sun	0	1	1	0	0	0	0	0	2
TOTAL	0	2	4	4	4	5	2	0	21

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