DEVELOPMENT OF THE ST PATRICKS PLAINS WIND FARM

TRAFFIC IMPACT ASSESSMENT

Hubble Traffic

January 2023 Version B

Version	Date	Reason for Issue
Final	May 2022	Assessment report issued to Client
A	20 November 2022	Increased size of turbine foundations from 500m^3 to 700m^3
B	23 January 2023	Updated to the Tasmanian Planning Scheme

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1. Introduction

Hubble Traffic Consulting has been engaged by ERA Planning and Environment on behalf of the developer to undertake an independent Traffic Impact Assessment, to support a development application for the construction of St Patricks Plains Wind Farm, which is situated within the Central Highlands municipality.

This assessment considers the traffic and transport impacts, assuming the maximum traffic impacts will occur during the construction phase, when the highest traffic volumes are expected to be generated, and includes heavy vehicles, over-dimensional and over-mass loads.

This impact assessment assumes the turbine components will be shipped to the Bell Bay port and delivered to the site using over-dimensional road convoys, managed by the Department of State Growth (the Department).

The main over-dimensional route (main route) from the Bell Bay port to the development site was used in 2019 for transporting components to the Cattle Hill Wind Farm, this route was considered successful in managing the significant transport task, with no adverse impacts identified by the road owner (the Department).

While this main over-dimensional route will be used to transport the majority (92 percent) of the turbine components, the base tower component exceeds a loaded height of 5.4 metres and will need to use an alternative over-dimensional route. This alternative over-dimensional route will be referred to as the high tower route in this assessment.

The majority of materials to construct the concrete foundations for the turbines and internal gravel road network, is expected to be sourced from local quarries within the area to reduce the transport task and traffic impact.

It is anticipated that construction staff will stay in accommodation near the development site to reduce their daily transit time.

An extensive route study has been completed for the proposed over-dimensional routes, with consideration to the size and weight of the turbine components.

This assessment has referenced the following documents:

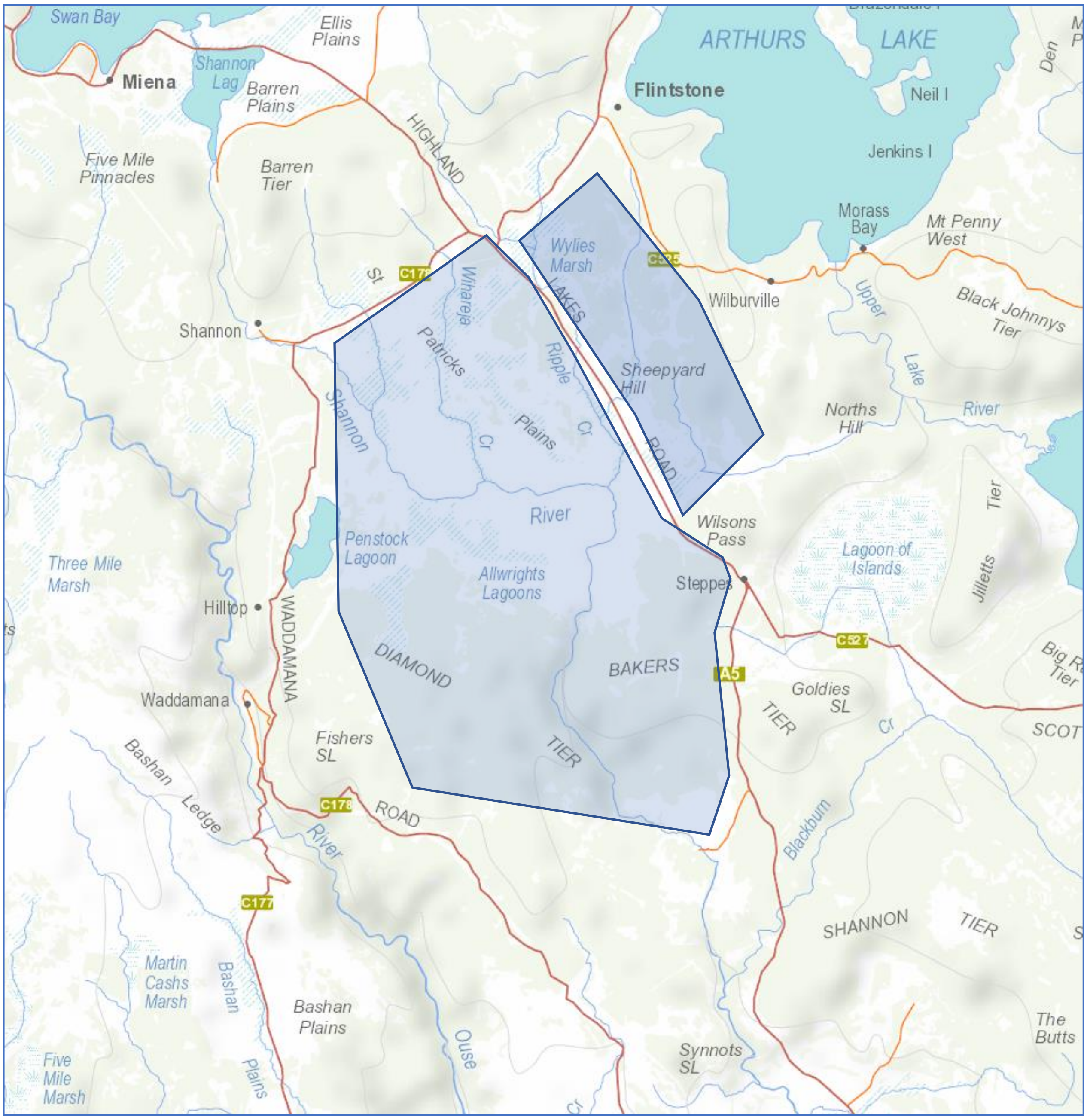
- Route study by a third party
- Department of State Growth traffic volume database
- Department of State Growth reported crash database
- RTA Guide to Traffic Generating developments
- Relevant Austroads guidelines for road design
- Tasmanian Planning scheme (Central Highlands)

2. Development site

The development site for the St Patricks Plains Wind Farm is located in the region known as `Steppes', approximately 25 kilometres northwest of the town of Bothwell, within the Central Highlands municipality.

The developer has advised the development site will be accessed from the Highland Lakes Road, at a minimum of four locations. An extensive internal network of gravel roads/tracks will be necessary, to provide access to the various turbine locations and other infrastructure locations.

Diagram 2.0 – Approximate location of the development site



3. Development proposal

The development proposal is for the installation of 47 wind turbines and associated infrastructure, which includes the establishment of the following:

Internal Road Access

The developer has estimated 47 kilometres of internal access roads will be required for the project. This will require substantial construction works to create a six-metre-wide road network to each of the turbine locations, substation, switch-yard, operation building and warehouse complex. These internal roads will provide access for construction vehicles, and then maintenance vehicles to meet ongoing service requirements.

Temporary Infrastructure

There will be temporary infrastructure associated with the construction of the wind farm, including two temporary site construction compounds, one located within the southern portion of the site, the other within the northern portion, both requiring direct access to the Highland Lakes Road.

The site construction compounds will typically comprise offices, laydown area, concrete batching plant, storage area for raw concrete materials, workshops, fuel storage, and other ancillary construction equipment.

Permanent Infrastructure

To operate and maintain the windfarm permanent infrastructure is required, including a permanent utility area located within a secure enclosed compound, comprising an operations and maintenance building, car parking, site office, warehouse/workshop facility, and external yard area for storage of components and ancillary equipment.

An electrical substation and switch-yard, located in a secure enclosure and connected by overhead powerlines, strung on monopoles to facilitate connection to the existing transmission network.

4. Construction process

4.1 Turbine components

Each of the 47 turbines will typically have a minimum of 13 oversized or overweight components that will require transportation to the site. For a single turbine this consists of:

- Nacelle (cover housing for the wind turbine) - 1 delivery
- Hub (rotor hub) - 1 delivery
- Blades - 3 deliveries
- Drive train or generator - 1 delivery
- Tower sections - 7 deliveries

Main over-dimensional transport route

The 47 turbines comprising of 13 components, will generate a total of 611 overseas components, that will be delivered to the Bell Bay port for transporting to the development site. Components that are 5.4 metres high, or less can be transported using the main route, which consists of the following roads:

- Bell Bay Road
- East Tamar Highway
- Midland Highway, and
- Highland Lakes Road

This main route is also suitable to transport the 80-metre-long blades, is 254 kilometres in length and consists of State highways, or roads managed by the Department.

This route was used for the construction of the Cattle Hill Wind Farm. Consultation with the Department has determined this route is suitable to be used again, as the previous over-dimensional task created no adverse impacts.

The Department advised that with the Cattle Hill Wind Farm the over-dimensional convoys commenced at Bell Bay port around 3am, so that the convoy would clear Launceston prior to 6am, to minimise impact to other road users. The same over-dimensional transport arrangement could be deployed for this project.

High tower over-dimensional route

Of the turbine components, the base tower is 5.6 metres in height, which is too high to be transported using the main route, and this one component must be transported using a high tower route. A route study found this high tower route is suitable to accommodate components with a loaded height up to 5.8 metres, 30 metres long and maximum weight of 133.5 tonnes. This route is slightly longer than the main route at 306 kilometres and comprises the following roads.

- Bell Bay Road
- East Tamar Highway
- Bridport Road
- Pipers Brook Road
- Golconda Road
- Lilydale Road
- Prosser Road
- Patersonia Road
- Tasman Highway
- St Leonards Road
- Johnston Road
- Quarantine Road
- Kings Meadow Link
- Midland Highway and
- Highlands Lake Road

Although this high tower route has not been used previously for transporting wind turbine components, this route is deemed suitable for transporting the base towers, after some infrastructure improvements are undertaken, which is listed in the route study.

Overall, this high tower route is expected to be used to transport 47 base towers. Based on a two vehicle convoy, this task can be achieved within 24 trips, which represents a low use of this route.

Scheduling these 24 trips to occur early on the weekends, to clear Launceston prior to 6am, similar to the strategy used for the Cattle Hill Wind Farm, is expected to minimise the impact to local road users.

4.2 Concrete foundations

Each turbine will sit on a substantial concrete foundation. To eliminate transport of concrete to site using the public road network, one or two temporary concrete batching plants may be set-up on-site, one in the southern part of the development site and the other in the northern. The raw materials for the concrete will need to be transported to site from locally sourced suppliers, and include steel mesh and bars, crushed aggregate, fly ash, water, sand, and cement.

Some of the material excavated for the foundations may be suitable to be repurposed on-site. Geotech investigations will be required to determine if on-site material can be used within the concrete manufacturing process, or suitable for internal road construction. Accordingly, this assessment has considered a `worst case' scenario where all materials are imported to site.

The aggregate material is expected to be sourced from nearby quarries. The developer believes there are two quarries at Cluny near Bothwell and Arthurs Lake Road, that could provide suitable quarry materials to reduce the transport distance.

The developer advised the water supply for the concrete mixing will be either pumped from Shannon River or obtained from on-site bores. In either case, the supply of water for the concrete manufacturing process will not include a road transport task.

4.3 Turbine erection

The erection of the turbines will require the use of cranes, these will be transported to the site prior to the erection of the first turbine and leave the site on completion of the last turbine.

The transportation of cranes to the site is expected to generate a minimal number of transport movements, in comparison to the other transport tasks. The developer will identify the number and types of cranes at a later date and obtain suitable transport permits from the road owners.

For the purpose of this assessment the movement of cranes has not been considered.

4.4 Internal road network

The developer indicated some 47 kilometres of internal access roads will be required for the project, including some 32.5 kilometres of new access roads. All access roads will be an all-weather gravel surface, with the arterial internal road network having six-metre-wide trafficable width, supported with 1.5-metre-wide gravel shoulders, with 300mm deep pavements. All roads will include a suitable drainage system, including table drains and culverts.

The developer has estimated the construction of the internal road network, will require the importation of 121,000 cubic metres of gravel road materials.

4.5 Construction and management staff

The developer has advised at peak construction 200 employees are expected to be operating within the development site. Construction staff are likely to be employed for 12 hour shifts during summer, 10 hour shifts in winter, working seven days.

Employees are expected to be accommodated locally during the week, in locations such as Miena, Bothwell, Bronte Park, Waddamana, Flintstone and Wilburville. The developer indicated that buses could be used to transport some of the employees between their accommodation and the development site. The developer has also indicated that semi-permanent work camp facilities could be developed for the project.

The developer indicated the construction stage of the project could extend up to 24 months, or 700 working days.

5. Predicted traffic and transport requirements

This section of the assessment will estimate the transport task, and the type and volume of vehicle movements that the development is likely to generate.

For the purposes of this traffic assessment, the calculation of the average daily vehicle trips has been based on 700 working days.

5.1 Vehicle trips for the movement of the turbine components

All of the turbine components will be either oversize or overweight, and as part of the over-dimensional permit system will be escorted by the Department personnel.

The Department has advised that the over-dimensional components will be transported in a convoy of two loads (maximum restriction imposed by the Heavy Vehicle Regulator), this means the project would require 311 escorted vehicle movements.

This over-dimensional transport task is similar to the Cattle Hill Wind Farm.

Table 5.1 – Transport task for the turbine components

Route	Component	Loaded height	Max loaded weight	Loaded length	Number of components	Number of trips
Main route	Blades	4.9m	52.5t	80m	141	71
	Nacelles	5.3m	145t	35m	47	24
	Drive generators	4.3m	169t	32m	47	24
	Hubs	5.1m	54.5t	30m	47	24
	Mid 1 towers	5.3m	130.5t	39m	47	24
	Mid 2 towers	5.3m	120.5t	39m	47	24
	Mid 3 towers	5.3m	95.5t	39m	47	24
	Mid 4 towers	5.3m	120.5t	45m	47	24
	Mid 5 towers	5.4m	92.5t	45m	47	24
	Top towers	5.1m	71.5t	42m	47	24
High route	Base towers	5.6m	133.5t	35m	47	24
Total						**311**

5.2 Vehicle trips associated with construction of the permanent infrastructure

Construction of the permanent infrastructure such as the operations and maintenance buildings, electrical substation, switch-yard, and connection to the existing transmission network is expected to occur throughout the project. These activities could generate daily heavy vehicle trips delivering equipment, and for the purpose of this assessment up to two heavy vehicle trips per day is assumed, which represents 1,000 trips over the life of the project.

5.3 Vehicle trips associated with the early construction works

Early construction works to establish the site compounds, will require materials to be delivered to site, these activities will generate one off vehicle movements and are unlikely to occur while the wind turbines are being constructed. For the purpose of this assessment the trips associated with this activity is considered insignificant, and not considered within the assessment.

Similarly, construction of the internal access tracks and excavation of the foundations will require transportation of heavy machinery, which is expected to be transported to the development site at project commencement and returned on project completion. These vehicles are expected to generate a single heavy vehicle transport trip to and from the site, and have not been considered in this assessment, as they contribute an insignificant number of vehicle movements to the project.

5.4 Vehicle trips associated with general construction employees

During the peak construction stage, the project is expected to employ 200 employees, working seven days per week. The employees are expected to be housed locally during the week, which will generate a daily traffic flow on the surrounding road network during the morning and afternoon peaks. In the summer months employees are expected to work 12-hour shifts, arriving on site at 7:00am and leaving at 7:00pm, with both trips expected to occur within daylight hours. During winter, the work shift is expected to be reduced in line with the amount of daylight, which would change the time of the local trips.

Having consideration to various local accommodation centres, assumptions have been made on where the employees could be housed, the likely number of daily vehicle trips, with the routes involved shown in table 5.4. The developer has advised there is potential for mini buses to transport some employees, however this has not been included within the assessment. For a `worst case' scenario, it is assumed each employee generates a separate work trip.

Construction employees could generate 400 daily short trips during weekdays, on roads in close proximity to the development site.

Table 5.4 – Estimated trips generated by general construction employees

Location	Connecting routes	Percentage	Peak trips	Daily trips
Wilburville	Arthur Lakes Road Poatina Road and Highland Lakes Road	10%	20	40
Miena	Highland Lakes Road	30%	60	120
Waddamana	Waddamana Road Highland Lakes Road	10%	20	40
Bothwell	Highland Lakes Road	30%	60	120
Bronte Park	Marlborough Road Highland Lakes Road	10%	20	40
Other		10%	20	40
Total		**100%**	**200**	**400**

5.5 Quantity of raw materials required

47 kilometres of internal access road network will need to be constructed, with 32.5 kilometres being new roads, and the other 14.5 kilometres of existing tracks upgraded. The developer has estimated 121,000 cubic metres of road material may be required, once again this is assuming a `worst case' scenario.

As indicated previously, depending on the quality of material excavated from the turbine foundations, some of the excavated material may be repurposed on-site, which would reduce the volume of materials that need to be transported.

For assessment purposes all the raw materials are imported to the development site.

For the concrete foundations the developer has estimated the following quantity of raw materials:

- Cement – 46,200m^3
- Aggregate – 158,200m^3
- Sand – 126,000m^3
- Fly ash – 46,200m^3
- Water – 300 L/m^3
- Reinforcement 8,400 tonnes

5.6 Converting cubic metres of raw material into metric tonne in weight

Heavy vehicles operating on public road infrastructure are limited by axle weight, and it is important to convert the estimated quantity of raw materials into cubic tonnes, to determine the number of laden vehicle trips. Each type of raw material can have a different weight and table 5.6 provides a rough estimation of metric tonne of weight per cubic metre of material.

Table 5.6 – Conversion factors

Type of raw material	Cubic metre	Metric tonne of weight
Gravel, loose, dry 40 to 60mm	1	1.5 tonnes
Gravel, loose dry, less than 40mm	1	1.68 tonnes
Sand	1	1.9 tonnes
Cement	1	2.4 tonnes
Fly Ash	1	1.8 tonnes

5.7 Number of laden vehicle trips

Two vehicle types have been assessed for the heavy vehicle transport task, a six-axle truck and dog with a 30-tonne payload, and an eight-axle truck and dog with a 43.7 tonne payload, including allowance for higher mass limit with the eight-axle vehicle.

The transport task of importing the raw materials to the development site is substantial. It is important to note that general access vehicles are frequently not the most productive vehicle, and these vehicles use a smaller number of axles, which can cause adverse road pavement damage compared with High Productivity Vehicles (HPV).

Table 5.7 – Estimation of laden vehicle trips to transport the raw construction materials

Material Type	Cubic metres	Metric tonnes	6 axle truck and dog Maximum payload 30t		8 axle truck and dog Maximum payload 43.7t		Source
			Total trips	Daily trips	Total trips	Daily trips	
Road pavement gravel	121,000	181,500	6,050	9	4,153	6	
Cement	46,200	110,880	3,696	5.3	2,537	3.6	Major city
Aggregate	158,000	253,120	8,437	12	5,792	8.3	Regional quarry
Sand	126,000	239,400	7,980	11.4	5,478	7.8	Major city
Fly ash	46,200	83,160	2,772	4	1,903	2.7	Major city
Reinforcement		8,400	280	0.4	192	0.3	Major city
Total		**876,460**	**29,215**	**42**	**20,055**	**29**	

Assuming 700 working days (life of the construction stage), the general access vehicle (6 axle truck and dog) is expected to complete the transport task with 29,215 laden trips, at an average of 42 laden trips per work day.

While using HPV such as the eight-axle truck and dog vehicles, the total number of trips to transport the same quantity of materials can significantly be reduced to 20,055 laden trips, with an average of 29 laden trips per work day.

5.8 Summary of trip generation

This assessment examines a `worst case' scenario, where the construction employees are expected to generate 400 trips per work day, and all the raw materials for the construction of the internal roads and turbine foundations are imported to the site. Of the total trips 321,471 trips, 87 percent are expected to be light vehicle (less than 5.5 metres in length) or trade type vehicles, six percent to be ladened heavy vehicles, six percent unloaded heavy vehicles, and less than one percent being over-dimensional trips.

Table 5.8 – Estimation of total trips

Process	Type of vehicle	Total project trips	Daily trips
Permanent infrastructure	Heavy vehicles	1,050	2
Turbine components	Over dimensional loads	311	1
General employees	Passenger vehicles	280,000	400
Raw materials	Laden heavy vehicles	20,055	29
	Unloaded heavy vehicles	20,055	29
Total		**321,471**	**461**

6. Existing traffic flows

6.1 Vehicle movements on the current road network and seasonal fluctuations

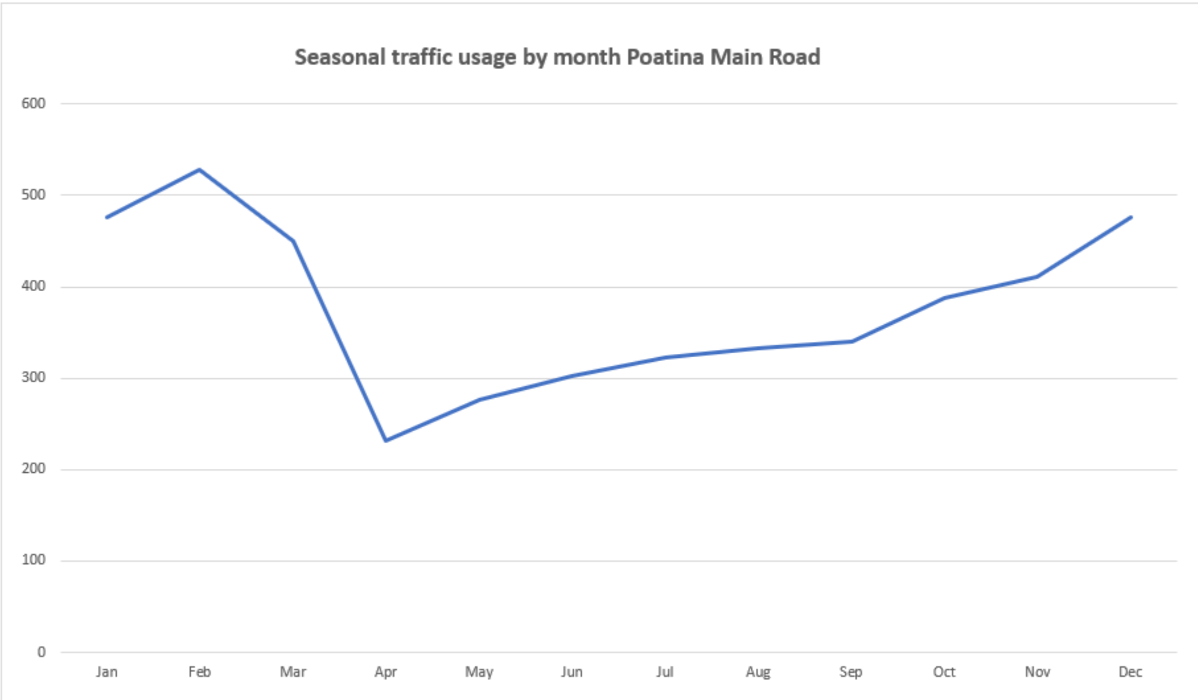
To evaluate the project's likely impact with additional vehicle movements on the road network, it is important to understand the current traffic usage and level of service motorists are currently receiving.

The traffic flows on the roads leading to the development site are seasonal, with higher traffic usage during the summer months compared with the winter months. Unfortunately, the available traffic data from the short-term traffic stations on the surrounding road network is for June 2021, which is not representative of the traffic usage for summer months.

A continuous counting station located on Poatina Main Road has been used to determine seasonal fluctuations, to enable the short-term data for June 2021 to be adjusted to represent the peak summer traffic conditions.

The Poatina traffic station found traffic usage is very seasonal, with the average summer flow being 45 percent higher than winter.

Graph 6.1 – Daily traffic flow by month of year



6.2 Surrounding road traffic usage

Having consideration to the seasonal fluctuations, the traffic flows for June 2021 short-term counting stations, have been adjusted to represent traffic usage for summer months 2021, and is shown in appendix A.

Table 6.2 – Adjusted summer 2021 traffic usage for the surrounding State Roads

Road	Location	Daily	Morning peak	Evening peak	Heavy Vehicles
Marlborough	South of Highland Lakes Road	215	23	14	19.3%
Poatina	North of Highland Lakes Road	407	43	23	21%
	North of Poatina	560	46	46	19.6%
Highlands Lakes Road	North of Miena	435	30	26	16.7%
	Miena to Poatina MR*	370	25	22	14%
	South of Poatina MR	363	25	30	10.4%
	North of Bothwell	430	32	49	11.4%
	West of Midland Highway	776	58	60	14.2%
Midland highway	North of Tunbridge	5153	376	470	21.5%
	South of Highlands Lake Rd	5681	430	400	15.6%

* Traffic usage based on 85 percent of traffic south of Miena

6.3 Traffic efficiency on the surrounding road network

Traffic efficiency for a road can be measured by the level of service the motorist is receiving on the trip between destinations, and the RTA Guide to traffic generating developments has considered this matter and provided a table of Level of Service (LOS) for rural roads operating at 100 km/h.

An extract from the RTA Guide is shown in diagram 6.3, it provides LOS depending on the road terrain, the percentage of heavy vehicles using the road, and based on peak hour two-way traffic flow. The highest LOS for a rural undivided two-lane road is LOS B, which means motorists can operate along the road unimpeded, are generally not influenced by other vehicles and have the ability to choose their own travel speed.

For each of the State Roads expected to carry additional traffic movements generated by the development, the LOS has been assessed based on the terrain, current Heavy Vehicle (HV) content, and peak two-way traffic flows. Table 6.3 indicates all the roads are currently operating at LOS B.

Table 6.3 – Existing level of service for surrounding state roads

Road	Location	Terrain	HV content	Peak traffic flow	LOS
Marlborough	South of Highland Lakes Road	Rolling	19.3%	23	B
Poatina	North of Highland Lakes Road	Mountainous	21%	43	B
	North of Poatina	Rolling	19.6%	46	B
Highlands Lakes Road	North of Miena	Rolling	16.7%	30	B
	Miena to Poatina MR	Rolling	14%	25	B
	South of Poatina MR	Rolling	10.4%	30	B
	North of Bothwell	Rolling	11.4%	49	B
	West of Midland Highway	Rolling	14.2%	60	B
Midland highway	North of Tunbridge	Level	21.5%	470	B
	South of Highlands Lake Rd	Level	15.6%	430	B

Diagram 6.3 – RTA Guide for determining Level of service for rural roads

Table 4.5
peak hour flow on two-lane rural roads (veh/hr)
(Design speed of 100km/hr)

Terrain	Level of Service	Percent of Heavy Vehicles			
		0	5	10	15
Level	B	630	590	560	530
	C	1030	970	920	870
	D	1630	1550	1480	1410
	E	2630	2500	2390	2290
Rolling	B	500	420	360	310
	C	920	760	650	570
	D	1370	1140	970	700
	E	2420	2000	1720	1510
Mountainous	B	340	230	180	150
	C	600	410	320	260
	D	1050	680	500	400
	E	2160	1400	1040	820

6.4 Current level of road safety on the surrounding rural roads

The Department of State Growth maintains a database of reported road crashes. A check of this database found crashes recorded along the surrounding road network, that will be used within this project. The number of crashes is not as important as the crash severity rate, which is the number of casualty crashes, based on the level of traffic activity.

Casualty crash rate is calculated by combining the number of casualty crashes occurring over the last five years (i.e., fatal, serious, and other injury crashes) and dividing by the number of vehicles using the length of road, over five years. The rate is expressed as per 100M VKT (100 Million Vehicle Kilometres Travelled).

The casualty crash rate provides an indication of the safety performance of the section of road. The latest Austroads Casualty Crash Rate for Tasmanian undivided rural (100km/h) roads were calculated in 2010, with the average casualty crash rate being 18.18 per 100M VKT.

The casualty crash rate was calculated for each of the surrounding rural road sections, based on the reported crash data for the last five years, found all the routes are performing at an acceptable level of safety, with the rates being significantly lower than the average casualty rate for the Tasmanian rural road network.

Table 6.4 – Calculated rural road casualty crash rates

Road	**Section**	**Length of section**	**ADDT**	**Casualty crashes five years**	**Casualty Crash Rate**
Highland LR	Midland to Bothwell	19kms	776	8	2.9 100M VKT
Highland LR	Bothwell to Interlaken	35kms	430	10	3.6 100M VKT
Highland LR	Interlaken to Poatina MR	10.2kms	363	4	6.1 100M VKT
Highland LR	Poatina MR to Miena	12kms	435	5	5.2 100M VKT
Poatina MR	Highland LR to Arthurs Lake	4.5kms	407	1	2.9 100M VKT

This crash history does not indicate a significant crash problem, and the increase in traffic movements likely to be generated by the development site, is not expected to alter this crash rate.

7. Comparison between Cattle Hill and St Patricks Plains projects

With the development of St Patricks Plain Wind Farm being very similar to the Cattle Hill Wind Farm project, it would be useful to understand the challenges the Cattle Hill project generated.

Table 7.0 provides a comparison between the two projects, and it is clear that the transport task is very similar, involves the same main route to transport the over-dimensional loads, except the St Patricks Plains route will not need to travel along Waddamana Road, reducing the length of the route.

The axles loading of the over-dimensional loads are expected to be similar, while the longer blade length will require additional mitigation measures to be implemented.

Table 7.0 – Comparison of the two wind farm projects

Item	Cattle Hill	St Patricks Plains
Number of turbines	48	47
Height of turbines	100 metres	150 metres
Blade length	70 metres	80 metres
Port for overseas components	Bell Bay	Bell Bay
Main over-dimensional route	Bell Bay Road, East Tamar Highway, Midland Highway, Highlands Lake Road and Waddamana Road.	Bell Bay Road, East Tamar Highway, Midland Highway, and Highland Lakes Road

7.1 Over-dimensional route and process

The Department was involved in the escorting task of the over-dimensional components, and has advised the following:

- Each over-dimensional trip commenced at Bell Bay around 3:00am so that the convoy could pass through Launceston before 6:00am.
- The convoy had been allocated a device from the Department that provided a `green wave' through the signalised intersections, so that the convoy could travel at a designated speed and not stop while travelling through Launceston.
- The convoy would stop along the Midland Highway prior to reaching the Highland Lakes Road, as they waited for school buses to exit, and not commence travelling along the road before 7:30am.
- The convoy could take up to one hour to reach Bothwell, where the convoy would stop, allowing for vehicles to refuel, or personnel to obtain food.
- The convoy would leave Bothwell around 9:00am and travel to the development site.
- Not travelling along Waddamana Road will significantly shorten the escort trip.
- The convoy process involved two escorting vehicles at the front, the first escorting vehicle travelling a considerable distance ahead of the convoy and parking oncoming vehicles at available pull-over areas, as the load would need both traffic lanes. The second escorting vehicle was always a short distance in front of the convoy, which included pilot vehicles at the front and rear of the convoy.

- From an escorting perspective, the impact to other road users was considered tolerable, with an estimated five to six minutes delay for oncoming and following road users. After the first few trips, the escort personnel developed a procedure to minimise road user conflict and impact.
- The main route contains several culverts, or overhead structures, requiring specific traffic management plans, which are manageable and contribute little impact to other road users.
- Success relies on advance communication to the local community about the over-dimensional transport schedule, so the local users could avoid using the roads at that time, the schedule would be advertised at least two months before the movements, with the schedule times maintained. The previous developer manned an information centre at Bothwell, to provide live information to the local community about the over-dimensional loads.
- East Tamar Highway has a high road standard, with sections having overtaking lanes and divided carriageway, commencing the start of the convoy under night conditions did not pose any unacceptable risk. Highland Lakes Road must be transversed during daylight hours.
- To assist with the over-dimensional task, the Cattle Hill project created some pull over areas along the Highland Lakes Road for traffic to wait for loads to pass. Additional all-weather surface pull-over areas should be considered, with adequate tapers for vehicles to enter and leave efficiently.

7.2 Damage of road infrastructure

The Department's Road Asset Engineer indicated that the transport task of developing the Cattle Hill Wind Farm, caused no notable road damage to the State Road network that could be attributed to the project.

The Department would prefer the use of HPV for the transport of raw materials, as HPV generates less stress on the road pavement, and reduces the overall number of heavy vehicle trips.

Currently, the section of the Highland Lakes Road around Den Hill (Lower Marshes Road to Bisdee Road) is located on a highly sensitive landslip, and it would be necessary for an inspection to be carried out three months before the project commences, to determine if remedial work is required.

Road dilapidation surveys will be undertaken on the routes being used and will be used to quantify whether the project creates any excessive damage, above normal wear, and tear use.

7.3 Bridge structures

The Department's Bridge Engineer expects with the over-dimensional route being the same, that the existing bridge structures should be suitable to accommodate similar axle loads as generated by this project. However, some of the structures may have deteriorated since the previous project and it would be necessary to check all the structures. The Department would undertake the investigation once a complete list of axle weights is provided.

All the bridge structures on both the main route and high tower route will need to be assessed for the various loadings.

7.4 Changes in traffic control on the main over-dimensional route

Since the Cattle Hill Wind Farm project there have been some changes in the State Road network, including a new roundabout on the East Tamar Highway at Mowbray. The route study indicates that at this location, a hardstand located on the south-east corner would ensure over-dimensional loads can be managed through the roundabout.

The Perth bypass has been completed, and a new roundabout has been implemented at the southern access into Perth. The route study indicates a section of the inner core could be converted to a hardstand to manage the longer loads.

7.5 Impact from a traffic engineering perspective

The Department's traffic engineering personnel are not aware of any adverse traffic impact created by the Cattle Hill Wind Farm project.

8. Traffic impact

The main impact of the proposed wind farm with regard to traffic and transport is the additional number of vehicles on the roads during the construction period, and the size of some of the loads.

8.1 Traffic impact from over-dimensional loads

This project will use the same main over-dimensional route that was used for the construction of the Cattle Hill Wind Farm, which operated successfully, and minimised the impacts to other road users.

This project is expected to generate a similar number of over-dimensional loads as the Cattle Hill Wind Farm project, and benefit from the learning of the previous project. The over-dimensional loads will adopt the same traffic arrangements, mitigations, and methodology.

In total 311 over-dimensional loads are expected, based on 700 working days (up to 24 months) and a schedule of less than one escort load per day, should meet the required delivery task.

The Cattle Hill project demonstrated that the main route is capable of accommodating one over-dimensional load per day, without adversely impacting the safety and efficiency of other road users.

The high tower route is expected to carry 24 over-dimensional loads, a route study found the route would be suitable with a range of infrastructure improvements, that are listed in the route study.

8.2 Traffic impact from general construction employees

The developer has estimated that 200 employees are expected to be required during the construction period, they are expected to be housed locally.

During the weekdays, these employees are expected to generate 400 short trips using passenger type vehicles, with a maximum 200 trips in the morning and evening peak periods. This assumes the `worst case' where all employees are travelling within a single one-hour period.

The highest increase in vehicle trips is expected on Highland Lakes Road, south of Poatina Main Road, where it is estimated the daily volume could increase by 260 daily trips, with 130 occurring in both the morning and evening peak periods. The other 70 trips are expected to arrive and leave the development site from the opposite direction.

While this represents a significant increase in vehicle movements, the maximum number of vehicle trips within a peak hour will increase from 30 to 160 trips, and based on the RTA Guide there will be no deterioration in the level of service, with motorists continuing to receive LOS B.

Overall, the current road network is lowly trafficked, the increase in trips generated by construction employees is not expected to cause any adverse traffic impacts, and the roads are expected to continue to operate at LOS B, as demonstrated in table 8.2.

Table 8.2 – Predicted traffic conditions generated by construction employees

Road	Location	Max existing peak hour conditions		Predicted max peak hour conditions	
		Volume	LOS	Volume	LOS
Marlborough	South of Highland Lakes Road	23	B	43	B
Poatina	North of Highland Lakes Road	43	B	67	B
	North of Poatina	46	B	46	B
Highlands Lakes Road	North of Miena	30	B	30	B
	Miena to Poatina MR	25	B	85	B
	South of Poatina MR	30	B	160	B
	North of Bothwell	49	B	120	B
	West of Midland Highway	60	B	63	B
Midland highway	North of Tunbridge	470	B	471	B
	South of Highlands Lake Rd	430	B	432	B

8.3 Traffic impact from the heavy vehicle task

As demonstrated in section 5.8 of this assessment, while the heavy vehicle task of transporting the raw materials to the development site is substantial, when broken down over the construction period, the average daily number of ladened trips is manageable. It is acknowledged that the frequency of vehicle movements would fluctuate depending on the construction activities occurring at the time.

HPV with a larger payload, is the most efficient transport method, these vehicle types have the least impact to the road pavement, and the heavy vehicle prediction has been based on using HPV.

The raw materials are expected to be sourced from a range of locations, likely to include two local gravel quarries at Bothwell and Wilburville, while other products and materials are likely to be sourced further afield, from Hobart and Launceston. For the purpose of this assessment, it is assumed that the aggregate for the road pavement and turbine foundations to be sourced from Bothwell and Wilburville, with the other materials sourced from both Launceston and Hobart. It is assumed that trips from Launceston could be split equally, between Poatina Main Road and the Midland Highway

Most of these trips are expected to occur outside of peak commuter periods and occur throughout the working day. Based on a 10-hour working day, the average number of heavy vehicle trips reduces, with the table below providing information of daily and hourly ladened trips that may occur on the road network.

Table 8.3 – Prediction of additional heavy vehicle trips

Road	Location	Additional heavy vehicle trips	
		Daily	**Hourly**
Marlborough	South of Highland Lakes Road	0	0
Poatina	North of Highland Lakes Road	28	4
	North of Poatina (Poatina to Midland Hwy)	5	1
Highlands Lakes Road	North of Poatina MR	0	0
	South of Poatina MR	33	4
	North of Bothwell	33	4
	West of Midland Highway	25	4
3Midland highway	North of Tunbridge	5	1
	South of Highlands Lake Rd	20	3

Overall, the heavy vehicle task is manageable, as this assessment predicts the development could generate an average of 29 ladened heavy vehicles per day, with these vehicles using three or four different routes to the development site. Based on the ten-hour working day, the highest number of HPV trips per hour could be four on any one route, most likely on the Highland Lakes Road from Bothwell to the development site.

This prediction is the worst-case scenario, and this level of additional ladened HPV is not considered excessive for the State Road network and is expected to operate without causing adverse safety or traffic efficiency impacts to other road users or cause excessive pavement wear.

Most of the HPV trips are expected to occur outside of the periods when the general construction vehicles are operating, minimising the impact to other road users, and this moderate increase in hourly trips is not expected to cause a deterioration in the level of service.

8.4 Structural capacity of existing roads and structures

With the transport task for this project being similar to the Cattle Hill Wind Farm project, using similar transport routes, no adverse impact to culverts or bridge structures are expected. The Department will investigate this matter further once a full list of axle loads is provided by the developer.

The majority of the transport task will operate on State Roads, that are designed to carry significant passenger and freight vehicles.

8.5 Disturbance to local community

The general increase in daily traffic has the potential to increase the short-term traffic noise levels along the access routes. The level of noise disturbance to residents will be directly related to the proximity of the dwellings to the access road, and greater in the high speed zones.

The majority of the land-use along the routes is undeveloped or farm land, there is a low number of dwellings, with most dwellings well set back from the edge of the road, and the risk of excessive noise disturbance is expected to be low.

Over-dimensional trips will adopt a similar transport methodology used by the Cattle Hill Wind Farm, where the load departs Bell Bay in the early hours of the morning, so that the convoy can pass through and clear Launceston before 6:00am. The convoy would travel along Highland Lakes Road in the morning, after the school buses and commuter traffic have exited the road. This is expected to minimise traffic impacts and create no adverse impact to residents.

The high tower over-dimensional route will use local government roads; with a minimal total number of trips, scheduling can occur for early mornings on weekends, to enable loads to clear built-up areas before active morning traffic flows. Some short-term local road closures may be considered, and any impact is expected to be tolerable.

8.6 Impact to wildlife

The highest risk of wildlife interaction is along Highland Lakes Road, and the other roads surrounding the development site. Introducing buses to transport employees from their accommodation will reduce the number of vehicle trips, thus reducing the risk of vehicle conflicts with wildlife. Alternatively, scheduling work shifts so that employees are traveling in daylight hours will also mitigate any adverse impact to wildlife.

The over-dimensional loads are travelling along Highland Lakes Road in daylight hours and the convoy is expected to be travelling at relatively low speed, and unlikely to create an adverse impact to wildlife.

Delivery of raw material to the site should occur during the daylight hours, and night time deliveries should be avoided where practicable.

Based on assumptions to predict a worst-case scenario for increase in traffic usage, table 8.6 identifies the sections of road (highlighted in blue) where the traffic usage is expected to increase greater than ten percent, and wildlife considerations should be prioritised on these routes.

Table 8.6 –Predicted increase in traffic movements

Road	Location	Change in traffic usage		Percent change	
		Daily	Peak hour	Daily	Peak hour
Marlborough	South of Highland Lakes Road	215-255	23-43	18%	87%
Poatina	North of Highland Lakes Road	407-490	43-71	20%	61%
	North of Poatina	560-565	46-47	2%	4%
Highlands Lakes Road	North of Miena	435-435	30-30	0%	0%
	Miena to Poatina MR	370-490	25-85	32%	340%
	South of Poatina MR	363-636	30-160	75%	533%
	North of Bothwell	430-592	49-124	37%	253%
	West of Midland Highway	776-801	60-67	4%	5%
Midland highway	North of Tunbridge	5153-5163	470-471	1%	1%
	South of Highlands Lake Rd	5681-5713	430-435	1%	0%

8.7 Impact from longer blades

The blades for this project are expected to be 10 metres longer than Cattle Hill Wind Farm, increasing from 70 to 80 metres, and the longer blades will require additional roadside vegetation trimming and earthworks to be undertaken, which has been identified within the route study. The additional measures include removal of trees and provision of additional hardstand areas, mainly along the Highland Lakes Road.

8.8 Impact to road safety

With the Cattle Hill Wind Farm project, one of the blades overturned on route to the development site, and the police investigation found the drivers were under the influence of an illegal substance, which was the primary cause of the incident. While no injuries were recorded, removal of the load took several hours, blocking access to the local community.

No other incidents were reported.

To avoid similar incidents, the contracted transport company should consider implementing a comprehensive testing process for all personnel involved in the over-dimensional transport task.

As indicated in section 6.4, the surrounding rural road network is providing an acceptable level of safety for road users, and the increase in traffic flow is not expected to alter this crash risk.

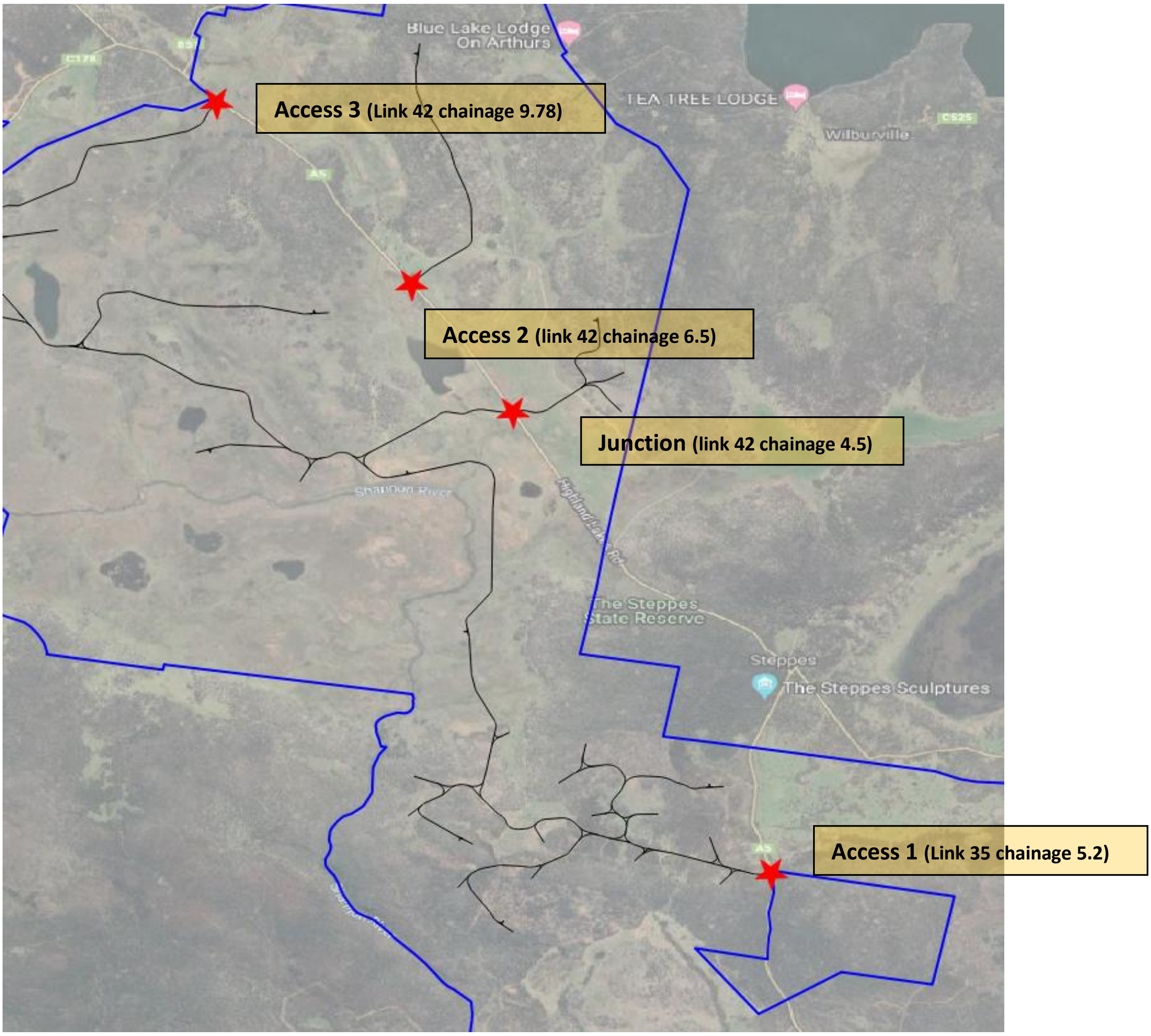
9. Access to the development site

The developer has indicated three access and one junction will be required for the project, the diagram below shows each of the locations, with all being existing property accesses.

This section will evaluate each access in respect to available sight distance, road alignment and extent of the upgrade for each to suit the vehicle task. The speed limit past each of the accesses is the rural default 100km/h, and the required Safe Intersection Sight Distance for this speed environment is 250 metres.

For the purpose of this assessment the accesses have been numbered 1 through to 3, and the junction marked of the diagram below. The Department has a link and chainage road reference system that operates on their network.

Diagram 9.0 – Proposed access points to the development site.



9.1 Access location 1 – 2.7 kilometres south of Interlaken Road (Link 35 chainage 5.2)

At this location there is an existing gated gravel access, the road construction beyond the gate is a reasonable standard, that can accommodate two-way traffic movements.

Photograph 9.1A – Existing property access

Horizontal alignment	Past the property access the roadway is straight, north of the access there is a slight reverse curve, but approaching vehicles remain visible to a driver leaving the access.
Vertical alignment	A slight grade of three percent past the property access; 200 metres to the south is a vertical crest which limits approaching sight distance.
Available sight distance to the south	The vertical crest limits the available sight distance to 225 metres.
Available sight distance to the north	No restriction with the sight distance which exceeds 500 metres.
Access layout	The access intersects at an appropriate angle, is reasonably flat with a slight grade away from the roadway. The gate is located 19 metres from the edge of the roadway, at this point the width is 4.8 metres, and flares to 20 metres at the roadway.
State Road reserve	The property fence is located 10 metres from the roadway; on the southern approach there is a 4-metre-wide gravel shoulder. There is no table drain or culvert underneath the existing access.

Photograph 9.1B – Available sight distance to the south (225 metres)

Photograph 9.1C – Available sight distance to the north (>500 metres)

9.1.1. Access improvements for location 1

The current access will need to be moved approximately 30 metres in a northerly direction, to achieve a minimum 250 metre Safe Intersection Sight Distance in both directions. This means the location of the existing access will be closed. The impact of moving the access will be minor, with the area being on flat terrain, and several trees requiring removal, as shown in photograph 9.1D.

Photograph 9.1D – New location for access

The width of the access will be widened to accommodate the swept path for 80 metres turbine blades approaching from a southerly direction, the access will be an all-weather gravel surface, and culverts underneath the access is not considered necessary.

9.2 Junction – 4.6 kilometres north from Interlaken Road (link 42 chainage 4.5)

At this location there are existing gated accesses on both sides of the roadway creating an existing cross junction, the southwest side access is signed as 6011 St Patricks Plains. Both sides of the junction are gravel, with the southwest track being well established, while on the opposite side the track is less established.

Photograph 9.2A - Existing junction – Southwest side

Photograph 9.2B – Existing junction – Northeast side

Horizontal alignment	Past the property junction the roadway is straight; 400 metres north of the junction there is a vertical crest.
Vertical alignment	Slight grade of 1.5 percent past the property access.
Available sight distance to the southeast	The vertical crest limits the available sight distance, but exceeds 500 metres
Available sight distance to the northwest	The available sight distance is 350 metres.
Junction layout	The side intersect at an appropriate angle, is reasonably flat with a slight grade fall from the roadway. The gates are located 12 metres from the edge of the roadway and at this point the width is 4.6 metres, and flares to 12 metres at the roadway. The maximum grade from the roadway to the property gate is 16 percent.
State Road reserve	The property fence is located 12 metres from the roadway, and there is no table drain or culvert underneath the existing tracks.

Photograph 9.2C – Available sight distance to the southeast (>500 metres)

Photograph 9.2D – Available Sight Distance to the northwest (350 metres)

9.2.1. Access improvements to the junction

The side tracks will be widened to accommodate the swept path of 80-metre-long turbine blades turning into the property. The access will be constructed with a maximum of 10 percent grade to accommodate the efficient movement of heavy vehicles, and this will allow for a suitable culvert to be provided underneath the tracks, with culvert end walls being driveable.

9.3 Access location 2 – 5.6 kilometres north of Interlaken Road (link 42 chainage 6.5)

At this location there is an existing gate access on the northeast side of the Highland Lakes Road,

Photograph 9.3A – Existing access

Horizontal alignment	Past the property access the roadway is straight.
Vertical alignment	No significant.
Available sight distance to the southeast	The available sight distance exceeds 350 metres.
Available sight distance to the northwest	The available sight distance is 310 metres.
Access layout	The access intersects at an appropriate angle, is reasonably flat with a slight grade fall from the roadway. The gate is located 12 metres from the edge of the roadway and at this point the width is 4.6 metres.
State Road reserve	The access extends from the roadway with a maximum grade of 15 percent, there is a culvert underneath the access

Photograph 9.3B – Available Sight Distance to the southeast (350 metres)

Photograph 9.3C- Available sight distance to the northwest (310 metres)

9.3.1. Access improvements to location 2

The access will be widened to accommodate the swept path of 80 metre long turbine blades turning right into the property. The access will be constructed with a maximum of 10 percent grade to accommodate the efficient movement of heavy vehicles, and this will allow for a suitable culvert to be provided underneath the access, with the culvert end walls being driveable.

9.4 Access location 3 – 1.3 kilometres south of Waddamana Road (link 42 chainage 9.78)

At this location there is an existing gated access located between overhead transmission lines, with no proper access infrastructure beyond the gate.

Photograph 9.4A – Existing access

Horizontal alignment	Past the property access the roadway is straight, northwest of the access there is a vertical crest, which creates a dip in the roadway that can hide an approaching vehicle.
Vertical alignment	Slight grade of 2.8 percent past the property access.
Available sight distance to the southeast	The available sight distance exceeds 500 metres
Available sight distance to the northwest	The available sight distance is 150 metres.
Access layout	The access intersects at an appropriate angle, the maximum access gradient of 15 percent. The gate is located 14 metres from the edge of the roadway.
State Road reserve	From the roadway the property fence is located 14 metres and table drain 4 metres. The existing access does not have a culvert underneath.

Photograph 9.4B – Available sight distance to the southeast (>500metres)

Photograph 9.4C – Available sight distance to the northwest (150 metres)

9.4.1. Access improvements for location 3

The access will need to be moved approximately 130 metres in a southeast direction to achieve a minimum 250 Safe Intersection Sight Distance in both directions, the impact of moving the access will be minor as the terrain is flat as shown in photograph 9.4D.

Photograph 9.4D – Location for new access

The access will be constructed to accommodate the swept path of 80-metre-long turbine blades turning left into the property. The access will be constructed with a maximum of 10 percent grade to accommodate the efficient movement of heavy vehicles, and this will allow for a suitable culvert to be provided underneath the access, with the culvert end walls being driveable.

9.5 Summary of the proposed accesses to the development site

Currently there are three accesses and one junction to the development site, two of the accesses will be relocated to achieve 250 metres Safe Intersection Sight Distance.

Access 1 will be relocated around 30 metres, resulting in the existing access closed and relocated to the new location.

Access 3 will be relocated 130 metres, the existing access will remain open, which means it will be necessary for the creation of a new access.

All will be upgraded with an all-weather hard wearing gravel surface, with the maximum gradient being ten percent, where possible the provision of culverts, with drivable headwalls.

Accesses will intersect the roadway at approximately ninety degrees and the width widened to accommodate the swept path of 80 metre turbine blades approaching from a southerly direction, as shown in diagram 9.5.

Diagram 9.5 – Swept path for an 80 metre long turbine blade

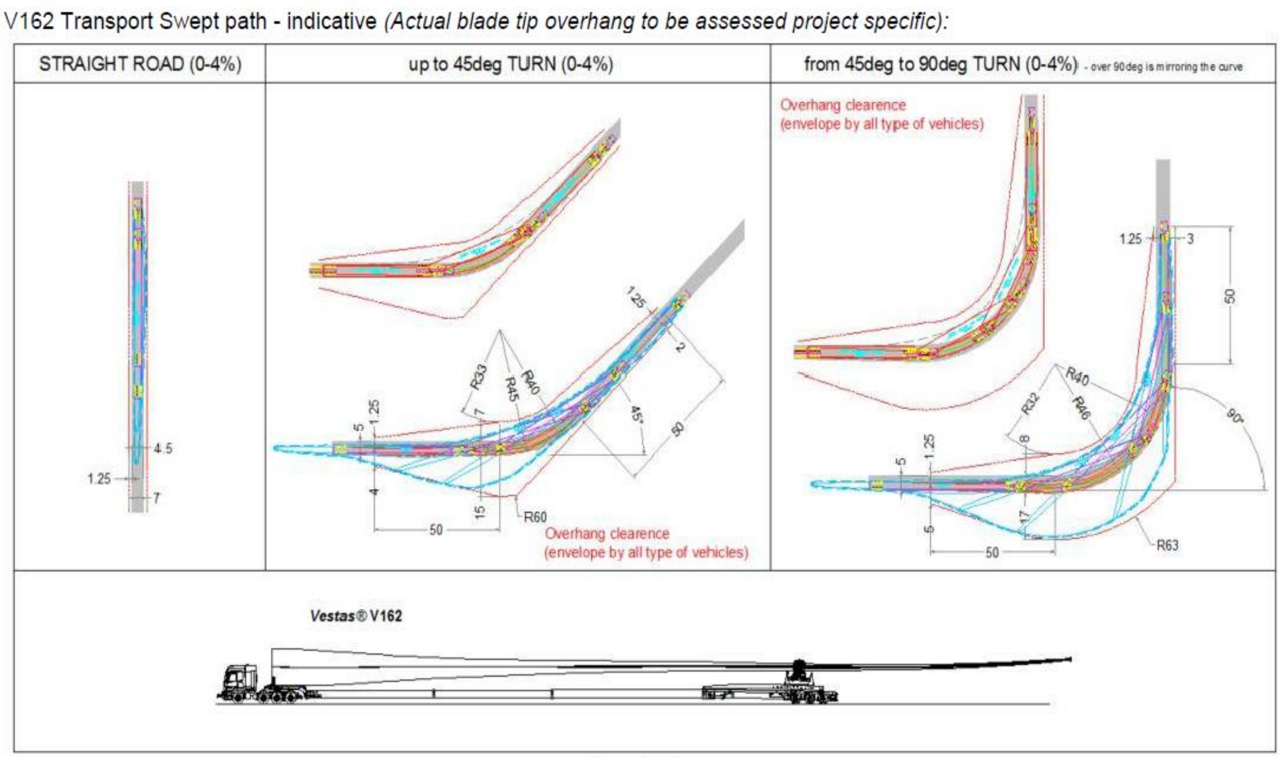


Figure 13-2

10. Operational Traffic

Once completed, the wind farm operations are expected to generate a low number of vehicle movements up to 20 trips per day to undertake a range of monitoring and maintenance activities. This means the existing accesses will be lightly trafficked, predicted to be less than four vehicle trips per day, per access, and this number of trips is not expected to cause any adverse safety or traffic flow impacts.

It is expected that majority of the monitoring and maintenance traffic movements will be undertaken by light passenger or trade type vehicles (work utilities), which are compatible with the existing traffic movements operating along the highway.

Any replacement of turbine components will require these to be manufactured over-sea, delivered to Bell Bay Port, transported to site as over-dimensional load, with a permit from relevant the road owners.

11. Planning scheme

11.1 C3.0 – Road and Railway Assets Code.

The project must be assessed against the Tasmanian Planning Scheme (Central Highlands Council).

The development site will access the Highland Lakes Road at three accesses and one junction. To achieve appropriate Safe Intersection Sight Distance, two of the existing accesses will need to be relocated. At location three a new access will be required, while at access one the existing access location will be moved 30 metres.

During the construction stage of the project, the number of traffic movements using the accesses and junction will intensify, and must be assessed against the planning scheme for an existing access, clause C3.5.1. The width of all accesses and junction will be widened to accommodate the swept path of the over-dimensional vehicle turning left off the highway.

At location three, the existing access has insufficient Safe Intersection Sight Distance to accommodate an intensification of traffic movements. A new access will be created 130 metres in a southwest direction from this existing access, to ensure vehicles can access the site and highway in a safe and efficient manner. Creation of this new access will be assessed against the planning scheme clause C2.6.3.

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

The development site will use two existing accesses (locations one and two) and one existing junction from the Highland Lakes Road. With the access location one being moved 30 metres to ensure Safe Intersection Sight Distance is available. The width of the existing accesses and junction will be upgraded to accommodate the swept path of an 80 metre long turbine blade, turning off the Highland lakes Road.

The volume of traffic using each of these two accesses and junction will intensify significantly over the construction period, and need to be assessed against the performance criteria P1, as the AADT will increase by more than 10 percent, exceeding the tolerance in the plannings scheme table C3.1.

With the development site being accessed by three accesses and one junction, the traffic trips generated by the development site will be spread across all of the accesses, and each access can be expected to operate with a predicted 92 daily trips, when the total 461 daily trips is evenly spread.

Performance criteria	Assessment
Vehicular traffic to and from the site must minimise any adverse effects on the safety of a junction, vehicle crossing or level crossing or safety or efficiency of the road or rail network, having regard to:	
a) any increase in traffic caused by the use;	During peak construction, this assessment predicts the development has the potential to generate a total of 461 vehicle trips per day, with each of the two existing accesses and one junction likely to generate a temporary increase in trips, predicted to be 92 daily trips per access. This represents 46 vehicles entering and leaving the road, based on a working day of ten hours, an average of one vehicle movement every seven minutes, which is reasonably low and not expected to cause any adverse safety, or traffic flow impact.
b) the nature of the traffic generated by the use;	Majority (87 percent) of the increased daily trips are expected to be light passenger or trade type vehicles (work utilities); with ten percent of the daily trips being general access heavy vehicles; one over-dimensional load every

	second day (split between the accesses), that will be transported under permit from the Heavy Vehicle Regulator, using the Department escort personnel. Once the construction is completed, the number of daily trips to provide ongoing operation and maintenance activities is expected to generate less than 20 daily trips, or four daily trips per access, which means the accesses will become lightly trafficked and not expected to cause any adverse safety or traffic impact.
c) the nature of the road;	Highland Lakes Road is part of the State Road network, classified as category 5 - Other Road. The road surface is sealed, has a six-metre-wide carriageway, with gravel verges. The road is designated as a B-double route with higher mass limits, which means the road owner has assessed the route to facilitate safe and efficient movement by heavy vehicles, so the increase in daily heavy movements is not expected to cause any adverse impact. Each of the accesses to the development site has been assessed for available Safe Intersection Sight Distance (SISD), with two of the existing accesses relocated to achieve the recommended SISD for the 100 km/h speed environment. This means vehicles will be able to enter and leave the road in a safe and efficient manner, without causing disruption to existing road users.
d) the speed limit and traffic flow of the road;	The rural default speed limit of 100 km/h operates along the road and past each of the accesses. The existing average annual traffic flow is 363 vehicles per day, with 25 vehicles in the morning peak hour and 30 in the evening peak hour (source: Department of State Growth traffic database). This level of traffic flow is low for the road type, and this assessment found the road is operating at the highest level of traffic efficiency for a rural road. The additional vehicle movements generated by the development is not expected to cause any adverse impact to the traffic flow, and the level of traffic performance, or efficiency is not expected to deteriorate with the additional vehicle movements.
e) any alternative access to a road;	The development extends across a large site, has an estimated 15 kilometres of road frontage to the Highland Lakes Road, and multiple accesses is the most efficient method to provide suitable access. Upgrading the current accesses is expected to provide safe and efficient traffic movement, to and from the development site.
f) the need for the use;	Increasing renewable power generation is important for the State.
g) any traffic impact assessment; and	An independent traffic impact assessment found no reason for these existing accesses not to be used for the construction of the wind farm.
h) any written advice received from the road authority.	None

11.2 C2.0 Parking and Sustainable Transport Code

C2.5.1 Car parking numbers

Under the planning scheme this new use would be classified as Utilities, and the planning scheme table C2.1 specifies no parking is required.

The development site is located off the State Road network, with the site accessed from multiple locations. The establishment of temporary work areas and permanent maintenance infrastructure will incorporate a suitable number of car parking spaces, to meet the reasonable parking demand generated by employees and deliveries. There will be no parking overflow to the public road network.

This development meets the acceptable solution under the planning scheme for on-site car parking.

C2.5.2 Bicycle parking numbers

Under the planning scheme this new use would be classified as Utilities, and the planning scheme table C2.1 specifies no bicycle parking is required.

C2.5.3 Number of motorcycle parking spaces

The rural on-site work compounds will have sufficient area to establish suitable temporary or permanent parking spaces to meet the planning scheme requirements, which will include motorcycle spaces, complying with the acceptable solution.

C2.5.4 Loading Bays

Although no single building within the development area is expected to have a floor area exceeding 1,000 square metres, each of the temporary and permanent work areas will have a suitable area to accommodate the loading and unloading of heavy vehicles, comply with the acceptable solution.

C2.5.5 Number of car parking spaces within the general residential zone and inner residential zone

Not applicable as a rural site.

C2.6 Development standards for Buildings and Works

The development will construct permanent parking areas associated with the monitoring and maintenance facilities, and temporary parking areas during the construction stage. At each location there will be sufficient off-road area to meet the standard planning scheme parking requirements as defined below.

Development standards	**Comment**
2.6.1 Construction of parking areas	All internal access roads, along with parking areas will be constructed with an all-weather hard wearing gravel surface, with appropriate drainage devices, including culverts to maintain natural surface water flows, complying with the acceptable solution A1.
2.6.2 Design and layout of parking areas;	The parking layouts will conform with the parking dimensions specified in the planning scheme table C2.3, to ensure vehicles can enter and leave the spaces in a effective manner. The access roads will have sufficient width to facilitate two-way traffic movements complying with the planning scheme C2.2, ensuring all vehicles can enter and leave the development site in a forward-driving direction. The parking spaces will be located on gradient less than five percent, supported with wheel stops. The parking layouts will comply with acceptable solution A1.1.
2.6.3 Number of vehicular accesses;	See below for assessment against the performance criteria.
2.6.4 Lighting of parking areas within the General Business Zone and Central Business Zone;	Temporary lighting will be provided at the temporary work site, while permanent lighting will be provided at the permanent site compounds, complying with the acceptable solution.
2.6.5 Pedestrian access	Although dedicated parking is not required under Table C2.1 for Utilities, the permanent and temporary work sites will ensure pedestrian safety is considered when designing the layouts. Complies with the acceptable solution A1.2.
2.6.6 Loading Bays	The permanent and temporary work sites will include suitable loading and unloading areas separated from the parking spaces, having sufficient area for heavy vehicles to turn around, complying with the acceptable solution A1.
2.6.7 Design of Bicycle Parking facilities;	Not applicable for this type of rural development.
2.6.8 Siting of car parking;	The site compounds containing car parking will be well set back from the State Road network and not create adverse visual impact.

C2.6.3 Number of vehicular accesses

The development site will use two existing accesses and one existing junction, plus the creation of a new access at location three. The creation of the new access will need to be assessed against the performance criteria for number of vehicular accesses.

Performance criteria	**Assessment**
The number of access points for each frontage must be minimised, having regard to:	
a) any loss of on-street parking; and	The development is located in a rural environment and there is no on-street parking, and the new access will not cause any adverse impact to on-street parking
b) pedestrian safety, and amenity;	Due to the rural environment, the additional access point will not cause any adverse impact to pedestrian safety, amenity, or convenience.
c) traffic safety;	The additional access will be located to provide users with appropriate Safe Intersection Sight Distance and no adverse impact to traffic safety is expected.
d) residential amenity on adjoining land;	The development is located on a large rural site, and an additional access will not cause any adverse impact to adjoining land.
e) the impact on the streetscape;	The development site has 15 kilometres of frontage to the Highland Lakes Road, and the creation of an additional access point along this road frontage is not expected to cause any adverse impact to the streetscape.

12. Conclusion

St Patricks Wind Farm will construct 47 wind turbines on land located on either side of the Highlands Lakes Road, south of Poatina Main Road, approximately 25 kilometres north of Bothwell.

All wind turbines will be manufactured overseas, delivered to the Bell Bay port, transported by road to the site as an over-dimensional convoy, with the road escorting role supplied by the Department of State Growth.

Most (92 percent) of the wind turbine components are suitable to be transported using the same on-road route as the recent Cattle Hill Wind Farm project, which consists of State Roads. With the St Patricks Wind Farm project generating a similar over-dimensional transport task as the Cattle Hill Wind Farm project, through initial consultation the road owner is confident that the over-dimensional task can be adequately managed, scheduled to operate to minimise adverse impact to other road users.

The base tower components of the wind turbine will not be suitable for the main over-dimensional route due to the loaded height exceeding 5.4 metres. An alternative high tower over-dimensional route has been identified as being suitable, which involves local government roads. Although the high tower route has not been used previously to transport wind turbines, with some targeted infrastructure improvements the route is expected to provide a suitable level of service. This high tower route will only need to facilitate 24 two-vehicle convoys, which can be scheduled to occur during the early mornings on weekends, to minimise the impact to local road users. Early engagement with the local road owner should commence immediately.

Construction of the turbine foundations, internal access tracks and other associated infrastructure will generate a significant road transport task. High Productivity Vehicles will be used where practical to reduce the number of heavy vehicle movements and reduce impact to the road pavements.

This assessment has assumed a `worst case' scenario where all the raw materials (except for water) will be imported to the site from local suppliers, as Geotech investigation has not been undertaken to determine if the on-site materials would be suitable for road or foundation construction.

This `worst case' scenario indicates that on average an additional 29 ladened HPV could be operating on the surrounding State Road network each working day, and this volume could be reduced if suitable construction material is available on-site. The increase of HPV is not considered excessive, and easily manageable by the State Road network, and no adverse impact to other road users is expected.

The over-dimensional loadings should be provided to the Department of State Growth to undertake the relevant bridge assessments, to ensure all structures can safely accommodate the loadings.

This project is expected to extend up to 24 months, during the peak construction period 200 employees are expected to be accommodated within surrounding towns, or semi-permanent camps established. This assessment has considered a `worst case' scenario where all employees generate a vehicle trip in the morning and evening on the surrounding road network, while these additional trips create a moderate increase, a deterioration in the level of service for other road users is not expected. This means additional vehicle movements is not expected to cause any adverse impact to existing road users.

Some surrounding roads will see a significant increase in road usage, beyond ten percent during the construction stage. As these roads are of a rural nature, a wildlife impact assessment should be undertaken to determine what mitigations can be implemented, to minimise the impact to wildlife.

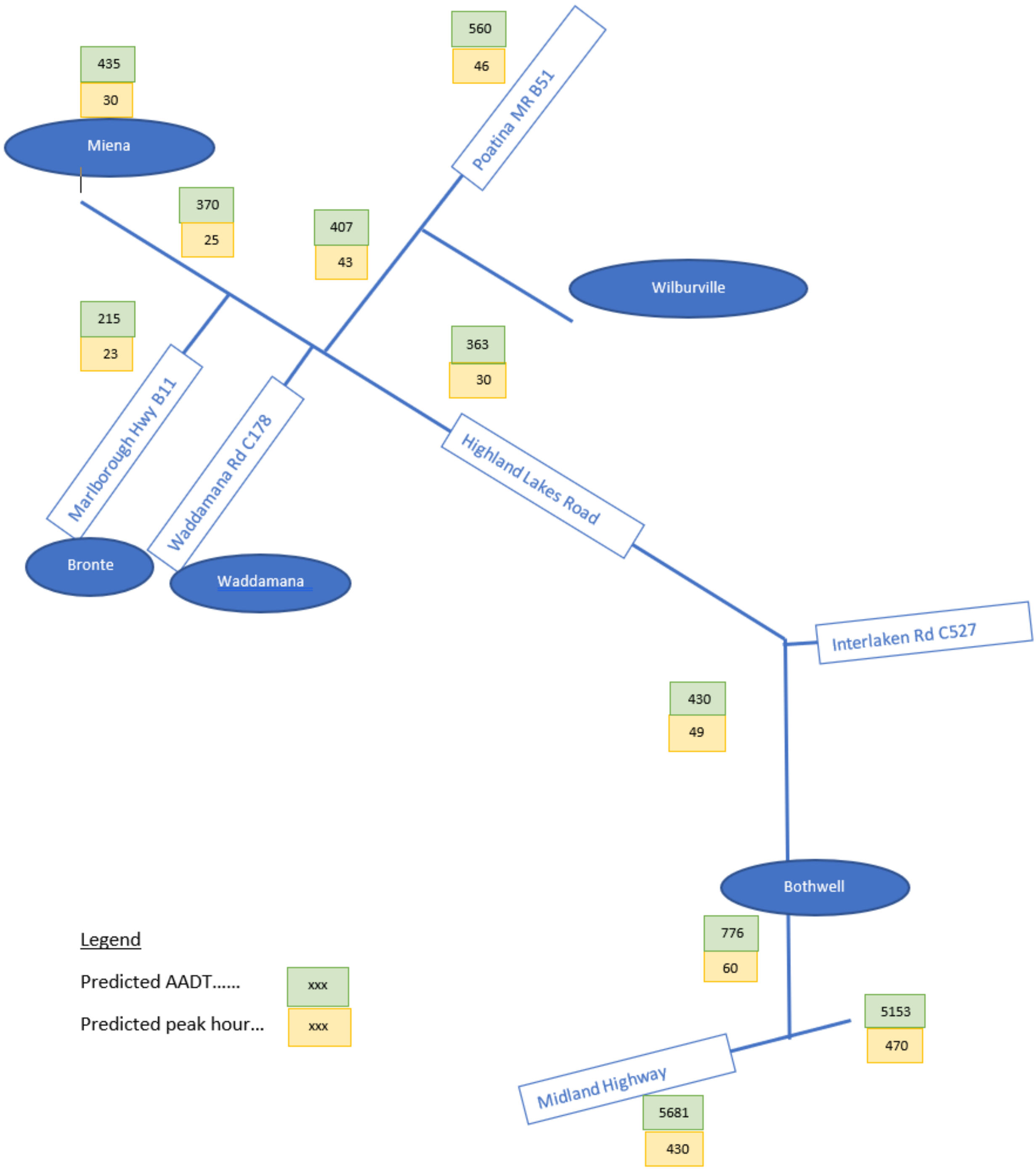
The section of the Highland Lakes Road around Den Hill (Lower Marshes Road to Bisdee Road) is located on a highly sensitive landslip, and it would be necessary for an inspection to be carried out three months before the project commences, to determine if remedial work is required.

The axle loading of the over-dimensional loads are expected to be similar to the Cattle Hill Farm project, while the use of longer blades will require additional road mitigation measures to be implemented.

Road dilapidation surveys will be undertaken on the routes to quantify whether the project creates any excessive damage, above normal wear, and tear use.

This independent traffic impact assessment found no reason for this project not to proceed.

13. Appendix A – Existing traffic volumes



14. Appendix B – Predicted traffic flow during construction period