May 06, 2025

Our File: 2341-21938-00

Dwayne English, CET
Civil Construction Manager
Tourmaline Oil Corp.

Re: Traffic Technical Memo - Jackfish Lake Road, Chetwynd BC

1. Introduction

1.1. BACKGROUND

To assist with the application of a temporary use permit, McElhanney Ltd. (McElhanney) has been retained by Tourmaline Oil Corp. (Tourmaline) to complete a technical memo outlining the traffic conditions for a proposed 414-man camp that will support oil drilling operations. The proposed camp is located off Del Rio Road (via Jackfish Lake Road), approximately 50km north of Chetwynd, BC (illustrated in Figure 1).

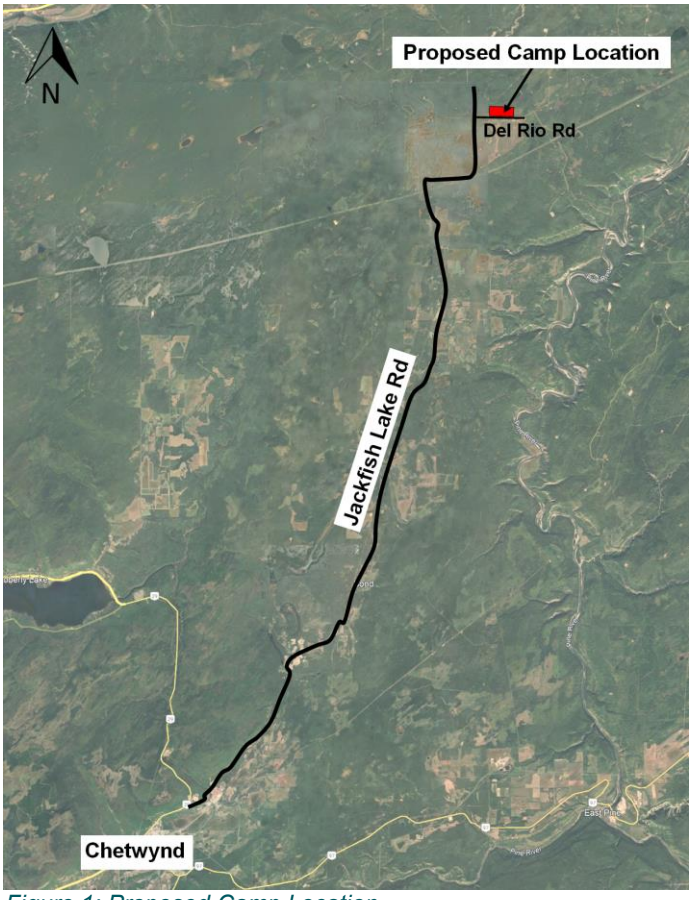

Figure 1: Proposed Camp Location

The Ministry of Transportation and Transit (MoTT) and the Peace River Regional District (PRRD) requested a technical memo to summarize the estimated trip generation/distribution of the 414-man camp, provide a review of the development access sight lines, and identify signage requirements.

1.2. SITE CONTEXT

The camp will be located on private land, and will be accessed from Del Rio Road, (~1km east of Jackfish Lake Road). Del Rio Road is a two-lane rural road with gravel surfacing and a posted speed of 60km/h. The site is already clear from vegetation as it was previously used for a camp, which has since been decommissioned. The study area is illustrated in Figure 2 and the proposed camp site plan (dated April 17, 2025), is illustrated in Figure 3.

Figure 2: Study Area

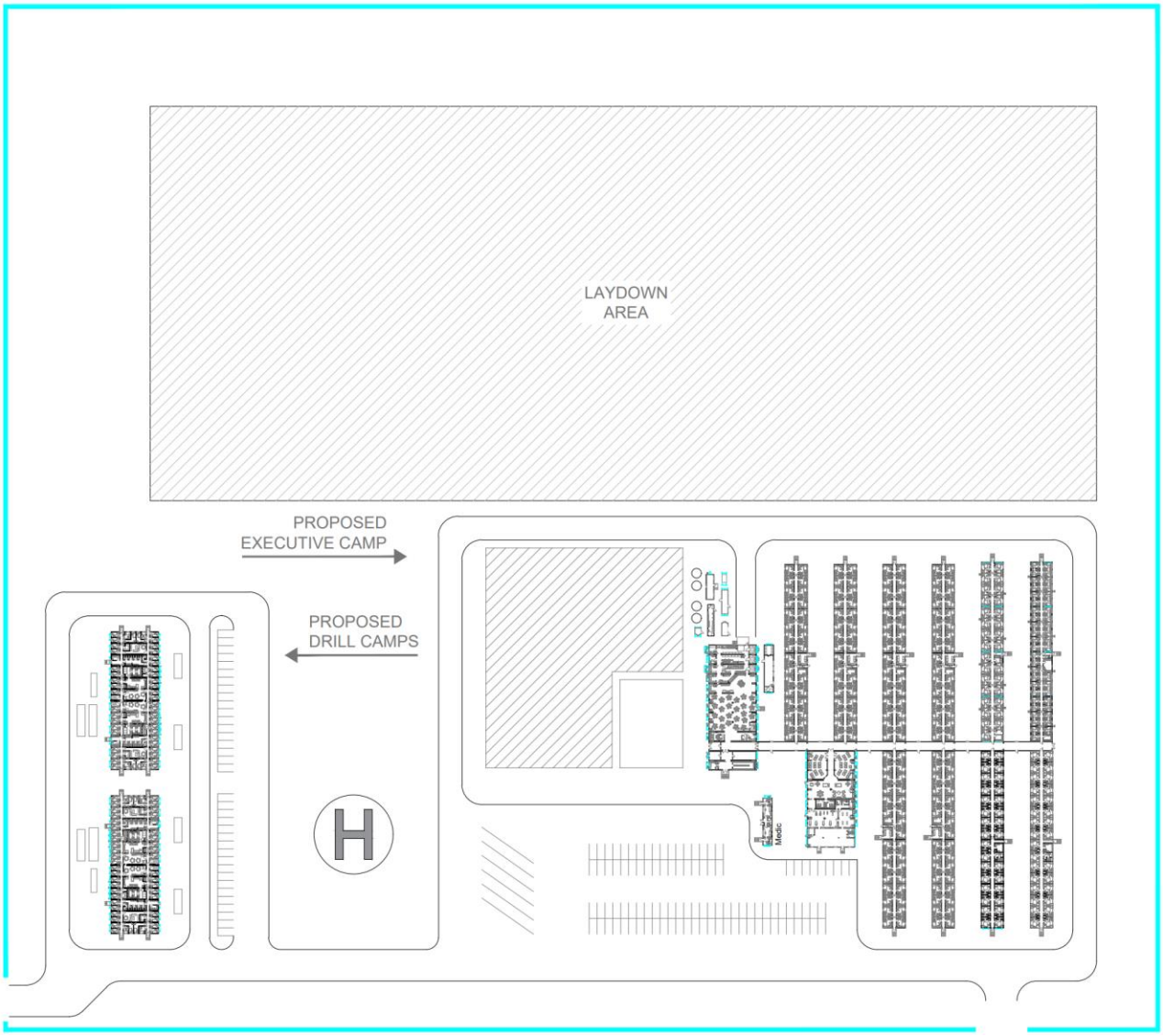

Figure 3: Proposed Camp Site Plan (Source: Clean Harbours Lodging Services)

2. Trip Generation and Distribution

The following sections provide a summary of the traffic patterns that can be expected from the proposed camp, including the distribution of trips to/from the camp site and the number of vehicle trips generated.

2.1. TRIP GENERATION

The Trip Generation Manual (11th Edition) from the Institute of Transportation Engineers (ITE) does not provide specific data on trip generation for industrial camps. The number of vehicle trips was instead estimated from discussions with Tourmaline, based on the number of camp users and support vehicles expected to travel to/from the camp. The trip generation assumptions for the camp are as follows.

General Assumptions:

- The camp is expected to be developed in two phases, and operate for a maximum of six years total:
    - Phase One, which will include a capacity of ~100 people and be operational for up to two years.
    - Phase Two, which will include a total camp capacity of ~414 people, and may be operational for up to four more years (six years total).
- As the traffic generated by the camp is expected to be low, the remainder of the analysis will estimate the traffic generated at peak camp operations (i.e., 414 people during Phase Two).
- In addition to the camp, there will also be a laydown area for equipment/material, such as pipe, or facility equipment. The laydown will be located directly adjacent to the camp and will be accessed from Del Rio Road via the two camp accesses (refer to Figure 3).

Camp Staff:

- An estimated total of 45 staff/admin maintain/operate the camp during the peak operations, 10 of which are assumed to commute to/from Chetwynd, and 35 of which will stay in the camp.
- The 35 camp staff will occupy some of the 414 beds, which will reduce the total number of beds available for residents/workers. These staff will typically stay on site during their shifts and are expected to generate negligible traffic in the peak hours.
- The vehicles generated by the staff are assumed to be primarily entering the camp during the AM peak hour and exiting during the PM peak hour.

Camp Residents/Workers:

- The number of available beds for camp residents/workers is 379 at peak capacity (414 total beds, minus the 35 occupied by camp staff).
- The camp will operate on two-week rotations, with two 12-hour shifts per day. The camp rotations will likely not occur during peak hours and are not expected to cause congestion or otherwise.
- Once workers are at the camp, they will bus to/from the worksites and are not expected to drive personal vehicles. A small number of medical, senior, and other support staff will likely use individual vehicles.
- These vehicles are assumed to have an equal enter/exit distribution for both the AM and PM peak hours, due to the two 12-hour shifts, and people entering/exiting the camp for each shift.

Support Vehicles, Deliveries, and Other Vehicles:

- Tourmaline estimated up to 20 vehicles per day would provide deliveries to the laydown area adjacent to the camp. As a conservative estimate, it was assumed that these trips would consist of a maximum of 5vph, during the peak hours.
- Tourmaline estimated 3-5 trips/day would be generated by camp visitors and deliveries, such as water trucks or maintenance supplies. It was conservatively estimated that these trips would consist of a maximum of 5vph during the peak hours.
- Aside from those assumed to occur during the peak hours, the trips are expected to occur largely outside the peak hours and thus will not impact surrounding road operations to a significant degree.

These trips were assumed to have an equal entering/exiting distribution for both the AM and PM peak hours (i.e., delivery vehicles enter, unload, and then exit without any other business at the camp).

In general, the largest traffic generators travelling to/from the camp are expected to be commuting workers in buses. Based on the above rationale, Tourmaline estimated that peak hour traffic volumes will be a maximum of 50vph during peak camp operations, though the volumes will likely be lower during typical conditions. The estimated peak hour volumes are shown in Table 1 and Table 2.

Table 1: Estimated AM Peak Hour Trip Generation Volumes

Use Type	Directional Distribution		New Trips (vph)	
	Entering	Exiting	Entering	Exiting
Laydown Operations	50%	50%	5	5
Camp Deliveries and Support	50%	50%	5	5
Staff and Administrators	90%	10%	9	1
Workers/Residents/Buses	50%	50%	10	10
AM Total			**29**	**21**

Table 2: Estimated PM Peak Hour Trip Generation Volumes

Use Type	Directional Distribution		New Trips (vph)	
	Entering	Exiting	Entering	Exiting
Laydown Operations	50%	50%	5	5
Deliveries & Camp Support	50%	50%	5	5
Staff and Administrators	10%	90%	1	9
Workers/Residents/Buses	50%	50%	10	10
PM Total			**21**	**29**

2.2. TRIP DISTRIBUTION

The trip distribution was estimated from discussions with Tourmaline, in consideration of the location of the work sites from the camp. The sites are distributed primarily south-east of the proposed camp and will be accessed via private roads. The potential work sites are illustrated in blue in Figure 4.

For each daily shift, the workers will bus between the camp (highlighted with orange in Figure 4), and the work sites (drilling sites, and the main plant facility, highlighted in blue). The main plant facility directly south of the camp will require the most workers (approximately 150-200). As a result of the location of the work sites, the camp residents will generate minimal traffic on the road network during operations, as travel to/from each site requires minimal use of the public roads.

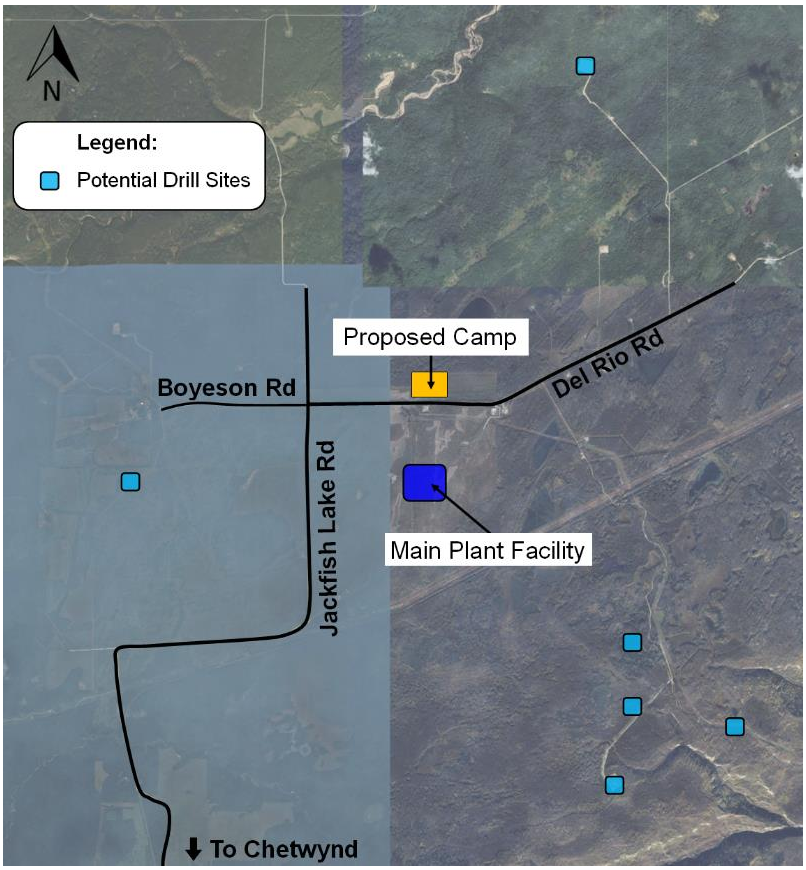

Figure 4: Work Site Locations Relative to Proposed Camp

The only route to access the camp and surrounding area is via Jackfish Lake Road from Chetwynd. Delivery vehicles, support vehicles, visitors, and camp staff will travel to/from this direction to the camp, as well as workers for their two-week rotation.

Based on the traffic generated by the camp and the estimated trip distribution patterns, there is expected to be ~30vph entering/exiting from the west towards Jackfish Lake Road, and ~20vph entering/exiting from the south and/or east in each peak hour. In general, the traffic volumes are expected to have a negligible impact on Del Rio Road and Jackfish Lake Road, and the roads are expected to operate without significant congestion or delays with the increased camp traffic volumes, particularly given the rural nature of the area and the expected low background traffic volumes.

3. SIGHT DISTANCE ANALYSIS

A desktop sight distance assessment for each of the access locations was completed by Caltech using LiDAR data. The assessment assumed a viewpoint ~1.5m off the ground at each access location, to an observed point 1.5m above the ground where visibility is lost in each direction. This differs slightly from TAC methodology (with heights of 1.08m and 1.3m respectively), however, given the nature of the area and the larger vehicles expected, 1.5m will provide a good basis for identifying potential issues. Site photos were also taken during a field visit by Tourmaline staff in April 2025. The sight distances for each access are provided in Table 3.

Table 3: Measured Sight Distances.

Location	Available Sight Distance	
	Looking East (Left)	Looking West (Right)
West Access and Del Rio Road	~390m	>500m
East Access and Del Rio Road	~400m	~365m

The available sight distances were compared to the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads. The TAC criteria for 60km/h road speeds and grades of 3% or less are as follows (Table 4):

Table 4: TAC Sight Distance Criteria (60km/h)

TAC Criteria (60km/h Speeds)	Minimum Sight Distance (m)
Stopping Sight Distance	85m
Intersection Turning Sight Distance	190m
Decision Sight Distance (Condition A)	95m
Decision Sight Distance (Condition C)	145m

The sight distances at each access location exceed the TAC criteria looking in both directions. The sight lines for each access location are shown in Figure 5 and Figure 6 below.

Figure 5: Sight Lines at Western Access and Del Rio Road

Figure 6: Sight Lines at Eastern Access and Del Rio Road

4. Access Geometry

The selection of a design vehicle for camp operations was based on evaluating the largest vehicles expected to regularly use the accesses. Considering the anticipated activities (delivery trucks, water trucks, sewage trucks etc.) it is expected that oilfield trucks will be the largest frequent vehicle, with possible oversized vehicles during mobilization of the camp buildings. The access geometry should be designed to suit the turning movements for these vehicles as discussed below.

For the access operations, the largest vehicle with frequent/daily entry (e.g., an oilfield truck) must be able to enter each access while another vehicle is waiting at the stop bar to exit. Over tracking for outbound movements is considered acceptable, if necessary, as truck drivers needing additional space would not attempt to turn until traffic was clear in both directions.

To determine conceptual access geometry requirements for the typical design vehicle, a turning path analysis was completed based on existing aerial imagery, and an estimation of the available road/access widths. Del Rio Road was measured to be ~8m wide, and each existing access from the previous camp (which has since been decommissioned, though the accesses appear to generally still exist) were measured to be a maximum of ~20m wide.

The turning movements for a typical oilfield truck (with an overall length of 40ft, or ~12m) were compared to the standard vehicles from the BC Supplement to TAC Guidelines, to provide equivalent vehicle tracking parameters that are readily available. The oilfield truck is expected to perform better than a WB-15 Tractor Semi-Trailer (Figure 5). The turning path analysis was therefore completed using the standard WB-15 design vehicle.

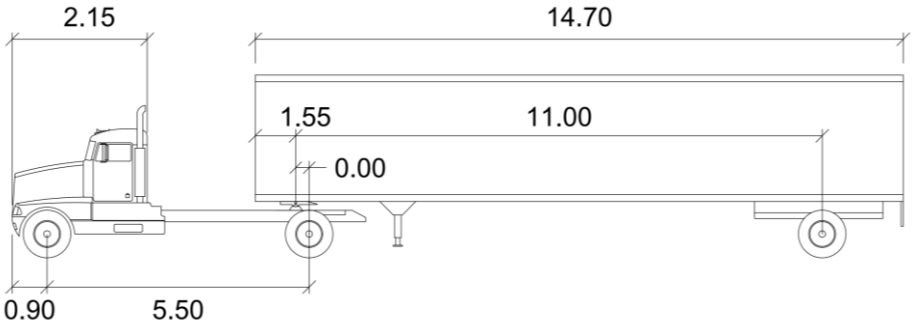

Figure 7: WB-15 Design Vehicle Dimensions

The turning movements for a WB-15 for the camp access locations on Del Rio Road are provided in ***Appendix A***. Based on the turning path analysis, the most frequent large vehicles (oil field trucks) are only expected to require a 12metre wide access, so the existing 20 metre access should be more than sufficient.

For infrequent oversized vehicles (such as during camp mobilization), these vehicles may require the full road/access width for entry, with traffic control in place for other road users as necessary.

5. Signage Requirements

To alert other traffic on Del Rio Road to the potential for heavy vehicles turning at the camp accesses (particularly relevant with the proposed laydown area), W-317 “Truck Crossing” signs should be installed 135m in advance of each access, in each direction. A W-317-R sign (see right) should be installed facing westbound traffic, and a W-317-L should be installed facing eastbound traffic. When the accesses are not in use (i.e., during extended periods of non-work), the signs should be covered or removed.

W-317-R “Truck Crossing”

A stop sign should also be installed at each of the two camp accesses, for vehicles entering Del Rio Road.

6. Summary and Conclusion

To assist with the application of a temporary use permit, Tourmaline has retained McElhanney to complete a traffic memo, outlining the traffic conditions for a proposed camp which is expected to house 414 people during peak operations, for up to six years. The proposed camp is located ~50km north of Chetwynd BC on Del Rio Road, at the site of a previous camp from a few years ago. The analysis and findings of the memo are summarized below:

- Based on the expected trip distribution patterns and the traffic generated from the camp, the camp is expected to have a negligible impact to the traffic volumes on Del Rio Road and Jackfish Lake Road. Specifically:
  - The camp is expected to generate a maximum of 50vph during the AM and PM peak hours (based on commuting workers, the adjacent laydown area, and any camp visitors/deliveries). Other vehicle trips generated, such as camp worker rotations, and other camp visitors/deliveries, are expected to occur outside of the peak hours.
  - Most of the work sites are near the camp, requiring minimal travel on the existing road network. Workers will bus between the work sites and the camp for each shift. Delivery trucks and visitors will access the camp via Chetwynd to the south, along Jackfish Lake Road.

- The sight distance analysis confirmed that the available sight lines at each of the access locations more than satisfy all TAC sight distance criteria, looking in both directions.

- The access widths from the previous camp were measured to be a maximum of 20m. Based on the turning path analysis, the most frequent large vehicles (oil field trucks) are only expected to require a 12-metre wide access, so the existing 20-metre access should be more than sufficient. The accesses should be designed to accommodate the following:
  - The largest typical/frequent vehicle (an oilfield truck) should be able to enter each access while another vehicle is waiting to exit at the stop bar. Over-tracking for exiting vehicles is considered acceptable, as truck drivers needing additional room would not attempt to turn until traffic was clear in both directions. The turning analysis can be seen in Appendix A.
  - Infrequent oversize trucks (such as during camp mobilization) may require the entire road/access width for entry into the camp, with traffic control for other road users as necessary.

- W-317-R/L signage should be installed 135m in advance of each access, in each direction.

- Stop signs should be installed at each camp access, for vehicles entering Del Rio Road.

7. Closing

This traffic technical memo has been prepared by McElhanney Ltd. (McElhanney) for the benefit Tourmaline Oil Corp., the Peace River Regional District, and the Ministry of Transportation and Transit. The information and data contained herein represent McElhanney's best professional judgment considering the knowledge and information available to McElhanney at the time of preparation.

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Yours truly,

McElhanney Ltd.

[redacted]

Caleb Marttinen, EIT
Transportation Engineer
778-693-2219

[redacted]

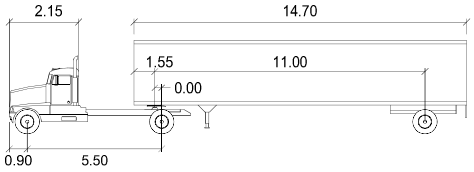
Senior Transportation Engineer
778-693-2199

[redacted]

PERMIT TO PRACTICE
McElhanney Ltd.
PERMIT NUMBER: 1003299
Engineers and Geoscientists of BC

Attachments:

Appendix A – Turning Path Templates



WB-15 (BC)

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.1
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

Original Drawing Size: (560mm x 864mm)

McElhanney
12 - 556 North Nechako Road,
Prince George BC V2K 1A1
Tel. 250 561 2229

FOR DISCUSSION ONLY

0 7.5 15 Meters

TOURMALINE OIL CORP.
JACKFISH LAKE ROAD CAMP ACCESS
TURNING GEOMETRY SKETCH PLAN

PROJECT No. 2341-21938-00

DATE: 2025-05-05