Lee Valley Dam

Tasman District

Transportation Assessment Report

October 2013

TDG Ref: 11416_2 lee valley dam report.docx

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Transportation Assessment Report

Quality Assurance Statement

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Status: Final report

Date: October 2013

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1. Executive Summary

Traffic Design Group has been engaged by Tonkin & Taylor (T&T) on behalf of the Waimea Water Augmentation Committee (WWAC) to investigate the vehicle traffic effects of the proposed CFRD water storage dam as detailed in the T&T Design Report and to prepare a detailed transportation assessment report (TAR).

The following TAR examines the existing road infrastructure and its capacity, the existing traffic environment, the projected additional traffic demands during construction and the longer term and how that can be managed in terms of the Tasman Resource Management Plan.

The major focus of this TAR is the management of the significant additional traffic that will be generated to and from the site during the construction of the dam, and in particular over the unsealed section of Lee Valley Road and extending through to the site. To this end, all traffic will need to be carefully controlled by way of a construction traffic management plan (CTMP) developed by the contractor to the satisfaction of Council.

As a summary of the report which follows, the existing road infrastructure extending from Brightwater to the unsealed section of Lee Valley Road is of a good standard and readily able to accommodate all of the traffic generated by the construction and long-term operation and maintenance of the proposed dam. The unsealed section of Lee Valley Road and the unsealed access road beyond that provides the only road access to the site is currently lightly trafficked and is tightly constrained by the topography. Taking account of these factors and of the small increase in traffic generated by the dam post construction, it is not considered to be either appropriate or economic to undertake a major reconstruction of this section of public road. Rather, it is recommended that with relatively minor modification, the existing road be carefully managed in conjunction with Council and other stakeholders including adjoining owners and existing road users, by way of a detailed construction traffic management plan.

In summary therefore, all traffic generated by the proposed dam is able to be accommodated via the existing road infrastructure via Lee Valley Road, requiring specific traffic management throughout construction and thereafter without specific management following commissioning.

2. Location in the Road Network

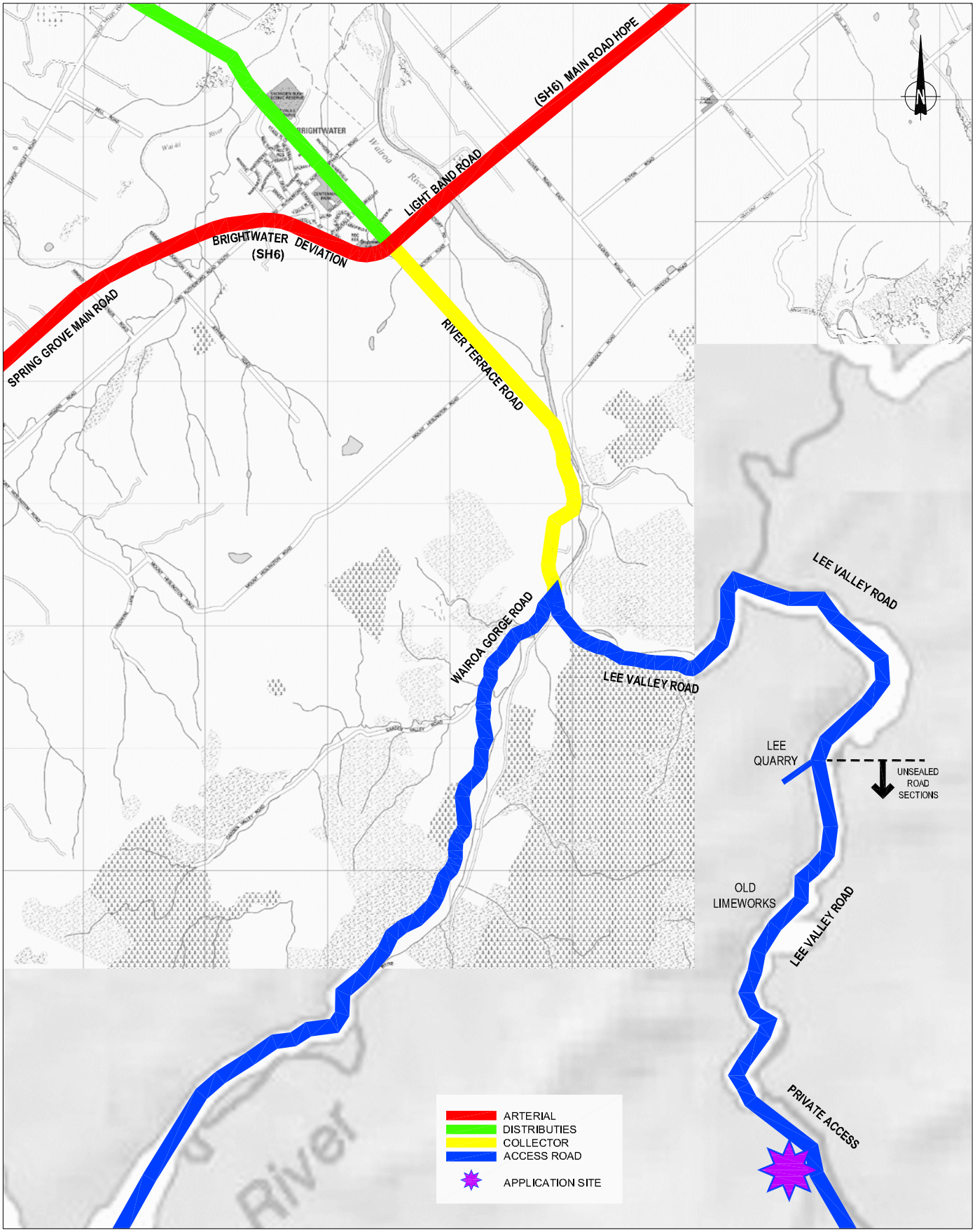
The proposed Lee Valley Dam is located along a private road that is accessed from the end of the public section of Lee Valley Road, as shown in **Figure 1**.

SH6 is a National Route as classified by the TRMP. In its role, SH6 provides a direct link between the Nelson Tasman region and the West Coast and Canterbury to the south.

As Figure 1 illustrates, River Terrace Road connects directly with SH6 at Brightwater and connects with Lee Valley Road at its intersection with Wairoa Gorge Road. River Terrace Road is classified as a Collector Road in the TRMP Road Hierarchy.

Lee Valley Road is a rural Access Road connecting through to the site from the intersection of River Terrace Road with Wairoa Gorge Road, and provides the intended road access to the dam site.

The proposed dam, albeit remote from centres of population, is well connected to the District's primary road network, and to the wider region and adjoining provinces.



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LEE VALLEY DAM ACCESS, TASMAN DISTRICT

LOCALITY PLAN

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3. The Existing Road Environment

3.1 State Highway 6

SH6 is the main state highway linking the Nelson/Tasman region with the West Coast and Canterbury, intersecting with River Terrace Road at Brightwater. In this locality, it carries around 7,000 vehicles per day (vpd) and some 7.6% heavy commercial vehicles at Pitfure Bridge, Brightwater.

These traffic flows are well within the capacity of this two-lane, two way highway and it operates at a relatively high 'level of service' in this locality.

3.2 River Terrace Road

River Terrace Road extends south-west from its intersection with the state highway, for a distance of 5.5km through to its intersection with Wairoa Gorge Road. It provides a sealed two-way carriageway throughout. Apart from the first (kerbed) section close to the highway which is 9m wide, the sealed carriageway width typically varies between 6.5m and 7.3m, and is marked with a centreline and over short sections also with edge-lines.

This section is part of the school bus route, and the bus currently turns around at the intersection with Wairoa Gorge Road.

3.3 Lee Valley Road

Lee Valley Road extends from Wairoa Gorge Road through to a gate that gives access via a private road/track leading into the site. The first 4.7km through to Taylors' Lee Valley quarry is sealed, typically to a width of 6.5m and is marked with a centreline. There is a T-intersection with Mead Road part way along this length where Mead Road provides access across the Lee River. There is also a popular recreational reserve with access to the river, from this sealed section of Lee Valley Road.

Beyond the quarry, the road carriageway narrows significantly to the order of 4.5m or less, and is unsealed through to the site. Although this unsealed section of public road extends for some 9km, it provides no public access to the river and is principally for access to a small number of private holdings and an old limeworks that is located along the public road. Near the end of the public road, it crosses a local ford. The land holdings served by this unsealed section include two farms and their dwellings on the river flats, and the balance of the land is in forestry, some of which has recently been harvested.

For the most part, the heavy vehicles that use narrow unsealed section of Lee Valley Road are associated with forestry (during harvesting) and these vehicles typically are in radio contact with each other, so as to avoid the need to pass in locations where it would be unsafe to do so. It is uncertain whether there is any activity at the old limeworks.

3.4 Site Access Road

Beyond the gate, the access into the site is of a similar low standard to the end of the public section of Lee Valley road. It is unsealed, narrow, at around 3.5 to 4m for the most part, with few locations where vehicle can safely pass. This private section of Lee Valley Road is subject to regular landslips. We understand that these landslips are regularly cleared by either the forestry operators or the land owners. We understand that neither WWAC, the forestry operators or the land owner have any plans to stabilise the landslides as part of the dam construction. There are two fords along the private section of Lee Valley Road (one of which crosses Anslow Creek).

4. Existing Traffic Volumes

In the course of investigations associated with the proposed dam development, a number of traffic surveys were undertaken on behalf of WWAC across the local roads giving access to the site, over the busy summer period in 2012. This data has been summarised and presented in map form in **Figure 2**.

4.1 Daily Patterns

The average (January) traffic volume reduces significantly between the state highway and the site. Near to SH6 on the section of River Terrace Road between SH6 and Factory Road, the 5 day average daily traffic (ADT) was recorded at 2,015vpd over the month, with the peak day at 2,590vpd.

At the start of Lee Valley Road, immediately beyond Wairoa Gorge Road, the reported ADT is 867vpd, with a peak day of 1,221vpd. This traffic typically includes residential and recreational traffic, and commercial traffic primarily associated with the quarry and with forestry activity.

At the end of the sealed section of Lee Valley Road, just beyond Taylors Quarry, a 5 day average of 50vpd was recorded, with a peak January daily flow of 72vpd. These are very low flows, as would be expected adjoining an unsealed road section. Beyond the seal, the roads are used by logging trucks, with management protocols between drivers.

4.2 Hourly Patterns

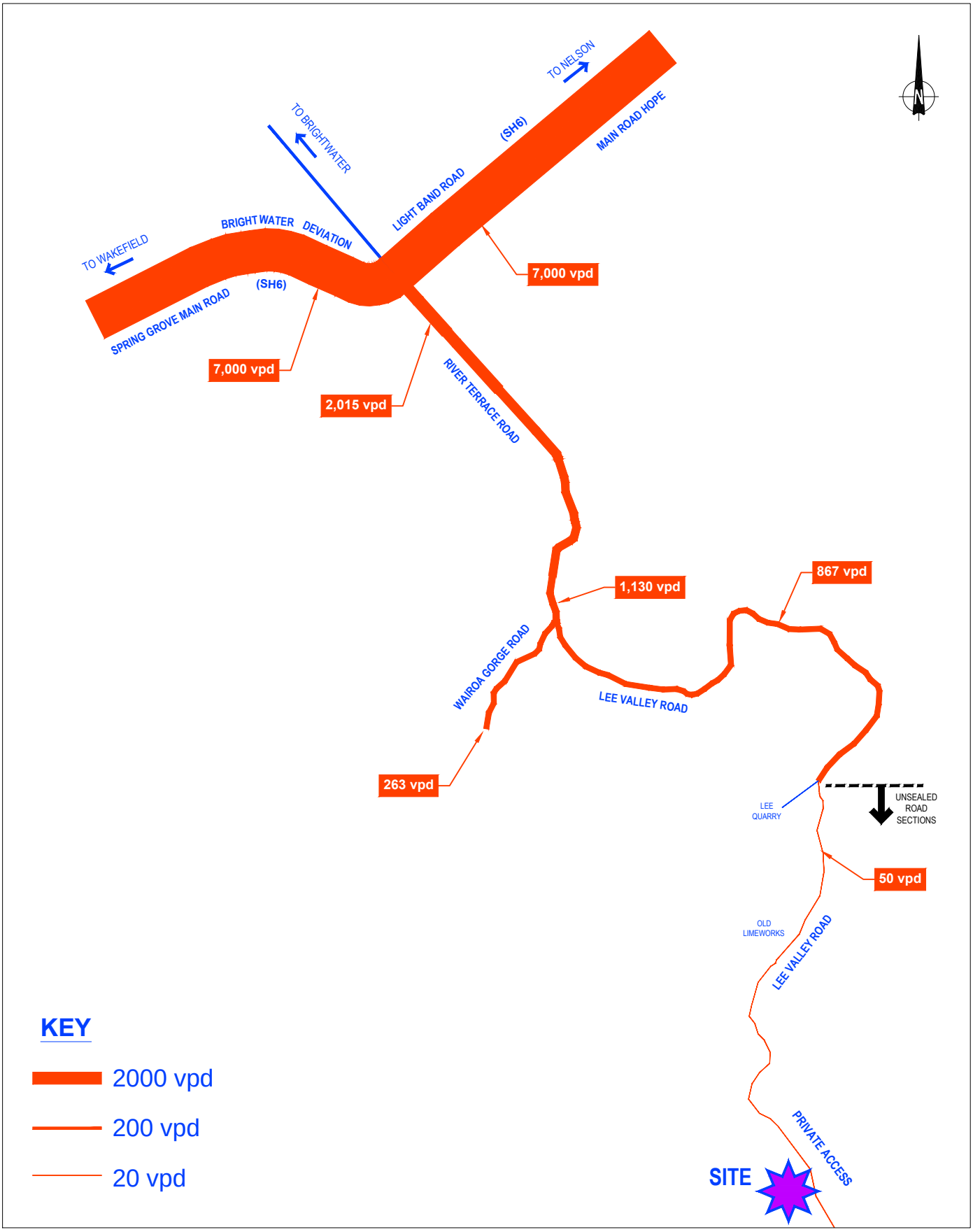
In a similar manner to the daily traffic patterns, the hourly traffic peaks reduce from some 291vph on River Terrace Road near the highway to 181vph at the start of Lee Valley Road, to 17vph at the end of the seal. These represent 11%, 16%, and 24% of the total daily flow, respectively at these locations.

4.3 Traffic Safety

A review of the reported crash record in the locality on River Terrace Road and Lee Valley Road has been undertaken for the last full ten year period 2003 - 2012. A ten year period is chosen for assessment purposes in order to better identify any particular crash patterns or safety deficiencies, since Lee Valley Road in particular carries relatively little traffic and can accordingly be expected to have a low incidence of reported crashes.

In summary, over this 10 year period there were a total of:

- 12 reported crashes at the State Highway intersection with River Terrace Road and Ellis Road, Brightwater (three of which involved injury);
- 13 reported crashes along River Terrace Road including one at the intersection with Mt Heslington Road (8 of which involved injury). The large majority (11 of 13) of these crashes involved a single vehicle loss of control, in common with the trend for the mid-block sections of most rural roads;



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LEE VALLEY DAM ACCESS, TASMAN DISTRICT

EXISTING TRAFFIC VOLUME MAP

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- 3 reported crashes along Lee Valley Road (one of which involved injury). Two of these crashes involved loss of control and the other collision with a vehicle at the Mead Road intersection. None of these crashes occurred along the very lightly trafficked unsealed section of Lee Valley Road.

Apart from the relatively high incidence of crashes at the relatively high standard SH6 intersection, most of which did not involve injury, and where traffic flows are the highest, there is no evidence of concentrations of crashes elsewhere that would be suggestive of localised safety issues.

5. Proposed Dam Development

WWAC is developing the design of this proposed new water storage dam for the Nelson/Tasman region, principally to meet the future water requirements for the Waimea plains. The purpose of this report is to identify the transport related effects, and how they will be managed, particularly throughout the period of construction that is expected to extend for some two to two and a half years.

Since only minimal traffic (ie a monthly visit) is expected to be associated with the long-term operation and maintenance of the dam, this evaluation will concentrate on the traffic demands and effects during construction.

The dam is to be constructed on private land that is only able to be accessed from the end of the public unsealed section of Lee Valley Road. Once construction is complete it is not proposed that there will be any public road access to the dam and reservoir.

During construction, it is expected that for the most part rock and sand will be sourced, crushed, transported and compacted in place within the site, ie without reliance on the public road network. It is also likely that concrete will be batched on site, although this will be at the discretion of the contractor. In that event, cement will need to be delivered to the site. Alternatively, ready-mixed concrete will need to be delivered to the site from Brightwater and beyond, as and when required for (large) concrete pours, which will be a critical element of construction.

The key elements to be transported to and from the site will include all equipment (all large equipment including cranes, excavators, drilling rigs etc is expected to be delivered by low-loader), materials (steel reinforcing, cement or ready-mixed concrete etc), general supplies (fuel, mechanical parts etc), and staff.

A preliminary estimate of the volumes of construction materials required for the dam has been undertaken, from which the total and average number of trucks and truck movements has been calculated by civil engineers (refer Appendix 1).

It is therefore possible to establish the expected overall and average traffic generated by the construction of the proposed dam, as described in the next section of this report, although day to day variations will only be able to be established once a contractor has been appointed.

6. Traffic Generation

6.1 Overview

The majority of the traffic generated by the proposed dam will occur during the construction period of approximately 24-30 months. For assessment purposes, it is assumed that any localised widening or reconstruction of Lee Valley Road would be undertaken during the first 3 months, following which all of the on-site civil construction is expected. During that period it is expected that construction activity and associated traffic would peak during the last 12 months as indicatively shown by the diagram in **Appendix 1**.

6.2 Rock Aggregates for Construction

It is acknowledged that there are several quarries located within 20km of the site and that can be expected to be able to provide suitable rock aggregate for any road maintenance or reconstruction as may be needed. The closest quarries include the relatively small Lee quarry near the end of the unsealed section of Lee Valley Road, Taylors Quarry at the end of the sealed section of Lee Valley Road, and the Fulton Hogan Quarry in nearby Wairoa Gorge Road, all within 20km of the site. However, with the very extensive quantity of rock to be excavated on site in order to construct the dam, it is assumed that the amount of rock necessary for any road maintenance or for the dam itself can be sourced and crushed on site, without reliance on road transport of the material to the dam site from existing local quarries.

In terms of construction sequence, it will be necessary in the first instance to undertake any necessary upgrading of the narrow, unsealed section of Lee Valley Road through to the site access. Construction can then proceed on any upgrading required to the access road through to the dam site and associated lay-down areas, temporary office sites and the like, as required within the site.

The indicative programme in Appendix 1 to this report provides an estimate of the number of truck movements associated with each activity, averaged across the period of construction as a whole and separately for each of the construction phases of each of the main components, ie Access Road, Coffer Dams, Conduit and Northern Starter Dam, Southern Starter dam, Spillway earthworks and steel fabrication, Embankment face construction, and Slip-form of the Dam face and spillway. These truck movements are further disaggregated to those movements that are entirely within the site and those to and from the site for each of two scenarios with and without concrete batching on site.

For the purposes of this report which is principally concerned with access to and from the site, the traffic effects will be assessed on the more conservative basis of no batching plant on the site, albeit the more likely scenario is that batching will be on site, and also taking full account of peak daily traffic flows expected at the height of construction during a concrete pour.

6.2.1 Public Road Maintenance and Reconstruction

Investigations to date have indicated that there is a relatively high standard of road access through to the end of the sealed section of Lee Valley Road and that can be expected to readily accommodate all of the construction traffic. Beyond that point, underlying traffic volumes are very low, at around 50vpd along the public section, and even lower along the access road to the site. Since the dam will not be open to the public, traffic will remain low after the dam has been constructed, it is therefore considered that any widespread upgrading of the unsealed sections of public and private road used to access the site would be unwarranted and uneconomic for Council and WWAC, respectively, to maintain or reseal over the longer term.

Nevertheless, some localised widening may well be warranted and this will depend on the manner in which the contractor proposes to manage the significant increase in traffic during construction. Any such localised widening or reconstruction will need to be undertaken prior to construction commencing on site. Assuming that the road remains unsealed, it can be expected that significantly greater and more regular maintenance (grading, running course, localised rehabilitation etc) if not strengthening will be required along the unsealed road sections accessing the site, for the duration of the dam construction.

It is expected that the existing private section into the site from the end of Lee Valley Road will need to be monitored for active landslips and require subsequent clearance. The two fords along the road will also need monitoring and possibly culverting if all-weather access is required by the Contractor.

At the end of construction it can be further expected that there will be a need for at least some necessary rehabilitation to return the road to as good or better standard than before construction commenced.

6.2.2 Dam Construction and Site Works

An estimated 1.25M cubic metres of soil and rock material is proposed to be excavated on site, providing more than sufficient rock for all works on site, subject to meeting the necessary engineering specifications. This includes the provision of concrete aggregate as needed for a total volume of 14,000 m3 of concrete. Accordingly, no provision is made within the traffic assessment for delivery of rock material to the site, and neither is there any expectation that rock or other excavated material will be transported out of the site, with the possible exception of road maintenance material.

6.2.3 Concrete Aggregate, Sand & Cement

As previously described, it is expected that concrete will be batched on site using the available rock aggregate to be crushed on site. For onsite concrete batching, sand can be supplied from the alluvium resource within the dam site and hence does not need to be imported. If it had to be sourced from offsite, the number of trucks would only be 1 to 2 per day (2-4 truck movements per day) due to the ability to stockpile onsite. Cement would be delivered to stockpile on site, for which a regular delivery of one truck (two movements) per day can be expected, since such deliveries can be planned in advance and delivered to the site on a regular basis over the course of construction. On this

basis, an average of two to four truck movements (total in & out of site) delivering cement to stockpile can be expected across much of the construction period, once earthworks are complete, say over a two year period, with peak daily deliveries limited to not more than ten trucks per day (20 truck movements) on any one day.

On the other hand, in the event that the rock does not meet specification or for other contractual reason, and the concrete is not batched on site, then it can be expected that ready-mixed concrete will be delivered to site. Such deliveries will be required to be on a 'just in time' basis and can be expected to generate relatively high numbers of truck deliveries over the days of concrete pours. Such traffic will have to be carefully managed.

For the peak period of concrete construction at the dam, a maximum of 40 concrete trucks per day (80 truck movements/day) can be expected. Careful traffic management along the unsealed section of Lee Valley Road and into the site will be necessary on these occasions. From a pavement loading perspective, the total number of movements equates to an average of around 12 concrete truck movements per day over the full 2.5 year period of construction.

6.3 Steel & Other Deliveries

There will also be reinforcing and structural steel and sundry other deliveries for the various construction activities including the coffer dams, main dam and spillway etc . However, it is expected that these deliveries will be scheduled outside the busiest delivery periods associated with the concrete pours. On average, over a 2.5 year construction period, some 3-4 truck movements per day can be expected for these activities.

6.4 Consumables

Other truck movements to and from the site will be required, including:

- mobilisation of earth-moving equipment;
- delivery of fuel and oil;
- cement (if concrete is batched on site);
- cranes;
- sub-contractor vehicles;
- service vehicles.

Trucks associated with the transport of consumables are expected to vary up to around ten truck movements per day, or an average of four truck movements per day together with around 20 light vehicle movements (associated with sub-contractor and service vehicles) per day across the course of the project.

6.5 Staff & Construction Personnel

A preliminary estimate indicates that there might be an average of 34 construction personnel on site throughout the construction period, and expected to rise to double the average (68pp) at the height of construction activity. Additionally, it can be expected that there will be a further three professional staff (two engineers and one client representative, typically) related to management, design and inspection activity, and up to six professional staff on site on any one day.

It can be expected that staff and construction personnel will be drawn from Brightwater and from the wider Nelson/Tasman regions.

Given the limitations of the access road into the site and the limited availability of suitably level land for on-site parking for construction personnel, it will be imperative to minimise the number of vehicles delivering personnel to the site.

From experience elsewhere, it can be expected that there will need to be a Travel Plan that provides for most if not all construction personnel to delivered to site by van-pooling or other means, such as from a convenient central point in Brightwater. On this basis, it can be assumed that the Travel Plan will provide for a minimum of 6 persons per vehicle, on average, for an average of six and a maximum of 12 vehicles (12 and 24 vehicle movements, respectively) carrying construction personnel to and from the site at the start and end of work, each day. It will also be desirable for as many professional staff as possible to car/van-pool as well. Allowing for an average of two per car, an average of eight and maximum of 15 vehicles (16 and 30vpd, respectively) can be expected.

6.6 Construction Traffic Summary

In summary, an average of 16 truck movements per day and 20 light vehicle movements (including all staff, construction personnel and service personnel) throughout a 2.5 year construction period can be expected, ie a total of 36vpd. More importantly, on any peak day, a total of up to 130vpd (80 truck + 50 light vehicle movements) might be expected, in the event that there is no concrete batching on site, or a peak of (20 + 50) = 70vpd if batching occurs on site and in the event that the peak staff movements occurred on the same day as peak truck movements during a concrete pour.

7. District Plan Provisions

This assessment considers the transport related matters associated with the proposed dam development alongside the general transportation provisions of the TRMP and as specified in Council's current Engineering Code of Practice. Chapter 11 of the TRMP describes the objectives & policies in relation to transportation matters. Those that are relevant in this instance include:

> ***11.1.2: To ensure that land uses generating significant traffic volume****: (a) are located so that the traffic has access to classes of roads that are able to receive the increase in traffic volume without reducing safety or efficiency; and (b)are designed so that traffic access and egress points avoid or mitigate adverse effects on the safety and efficiency of the road network*

In this case, the land use itself generates little traffic once commissioned, and the only significant traffic volume occurs during construction. With the exceptions of the unsealed section of Lee Valley Road (a rural Access Road) and the unsealed private access road into the site, the remainder of the access route to the site is readily capable of accommodating the construction traffic without reducing safety and efficiency. The narrow unsealed sections this will therefore require to be actively managed throughout construction so as to maintain traffic safety. Although there will be reduced efficiency as a result, this is a temporary effect that will be confined to the construction phase of the development. There can be only one access and egress point onto the end of the public road. Again this will avoid any adverse effects on the safety and efficiency of the road network in the long term, and will be managed over the short term during construction.

Because there will only be the occasional maintenance vehicle once the dam is commissioned, none of the other transport objectives, policies or rules are relevant.

8. Construction Traffic Management Framework

The following describes the nature of a Construction Traffic Management Plan (CTMP) and also develops a framework for the development of a CTMP by the contractor that is tailor-made for this specific development. A CTMP is a key component for the management of traffic effects from a construction project of this nature. It is prepared with the involvement of the contractor(s) in consultation with community representatives, stakeholders, and Council prior to construction, and submitted to the Council for approval before physical works begin.

It is expected that copies of the approved CTMP will be distributed to stakeholders prior to construction commencing. A CTMP is a living document and is updated as required to incorporate such things as changes in the project schedule as construction progresses. Updates are required to be sent to all holders of the CTMP.

The CTMP will provide these stakeholders with a clear understanding of the confirmed construction programme, traffic volumes to be expected during each stage, any significant improvements to be undertaken on the route, and the management measures being implemented.

The CTMP Framework will address:

a) construction programme and traffic volumes expected during each phase;

b) driver protocols;

c) over-size loads, if any;

d) road improvements (if any);

e) traffic management measures to be implemented along any section of the route;

f) temporary road closures (if any);

g) monitoring and communication arrangements.

Specific details of the expected structure and content of the CTMP are described, as follows.

8.1 Construction Programme and Traffic Volumes

The first part of the CTMP will present the details of sources and delivery routes for key materials such as aggregate, concrete (or cement) reinforcing steel and the like, including how much traffic will use particular portions of road, as well as the approximate times. In particular, it will provide the detailed schedule of the various work stages as the construction process proceeds. From this, the various parties will be able to understand the type and frequency of vehicles to expect, and any delays that may arise.

8.2 Driver Protocols

In addition to the driving standards imposed by law, all drivers involved in the project will be subject to additional protocols. These will at least include reducing speed to minimise dust over any unsealed sections of roadway, and may include other protocols as agreed among the stakeholders.

The protocols will be strictly enforced along with all other aspects of on-site health and safety. Enforcement may include the use of a vehicle tracking system in the vehicles of any drivers who are alleged to have breached the driver protocols.

8.3 Over-size Loads

If relevant, such as for items of large plant and/or supply of pre-cast items for instance, the CTMP will address the movement of overweight and/or over-dimension loads. Although such transport will be undertaken by specialist contractors operating under permits specific to the project, it remains helpful to repeat the details in the CTMP to assist interested parties in understanding what to expect, including any associated delays as may arise. Accordingly, this part of the CTMP may include:

- times and locations when movement is prohibited, and an indication of the times of day when deliveries are anticipated;
- piloting procedures;
- contingency plans for breakdowns, bridge or pavement failures, severe weather conditions, accidents, or roadworks;
- provisions for co-ordination with other parties, including emergency services.

Including these details in the CTMP will assist regular road users in knowing how to respond to the presence of piloted over-size loads. Depending on timing, this portion of the CTMP may be prepared as an addendum to the initial CTMP.

8.4 Road Improvements

The CTMP will provide details of the design standard, construction programme and temporary traffic management arrangements for the upgrade (widening or reconstruction) of any section of Lee Valley Road through to the site. If any such works are deemed necessary prior to construction commencing at the dam, it is possible that this part of the CTMP will be prepared in advance of the rest, depending on timing of the enabling works.

In addition to what is recorded in the CTMP, detailed plans will be prepared in consultation with adjoining landowners and Council engineers, to be subsequently submitted to the Council Transportation Manager for approval on behalf of the road controlling authority for the design and reconstruction of any section of the local road, and in respect of any resource consent conditions.

8.5 Active Traffic Management

The CTMP will include details of the specific traffic management arrangements that are to be implemented along the narrow section of Lee Valley Road from the intersection with the access to Taylors Quarry through to the end of the public road and along the narrow private road from the end of the public road through to the site of the works. These detailed arrangements are to be prepared by an approved STMS under the direction of a Chartered Engineer for the approval of Council, and actively managed by approved STMS personnel throughout the full course of the dam construction.

It is anticipated that this section of the route will operate within a reduced speed zone, so as to maintain safe traffic flow throughout the period of the dam construction.

A number of temporary traffic management strategies are possible and it will be the responsibility of the contractor to develop all of the necessary design and obtain the necessary Council approval(s). Because there will be no appreciable change in the traffic environment from what currently exists, once the dam is commissioned, it is not currently envisaged that the road will be upgraded to a higher geometric standard than currently exists, other than possible localised improvements at bends and fords or with the provision of passing bays. Temporary traffic management strategies will need to consider the operational requirements not only of traffic associated with the dam, but also the local commercial operators (principally forestry) and adjoining land owners and any other road users who rely upon the narrow section of Lee Valley Road that will require to be managed. The section beyond the gate is private now, and there is no public access beyond a locked gate, so the temporary traffic management measures required over this section to manage the one-way flows as needed, will apply to dam construction traffic, only.

Because of the complexities of managing such an extensive length of public road (beyond the seal) involving a range of users over an expected two to three year period of time, it may be desirable to close it to other than the above traffic for the duration of construction. This in itself will require separate approvals through the Council's Transportation Manager. It is expected that options for the management of the road during construction may include a manned booth at either end of the road, and/or either radio contact with all users including adjoining land-owners, signage, temporary traffic signals or the like to be designed and managed by approved STMS personnel to the approval of Council.

8.6 Traffic Management of Local Property Access

With the large increase in the number of trucks during construction, it will be necessary to develop protocols with the local land-owners in order to minimise any transport related effects on forestry, farming, or quarrying operations and the like. T&T advise that the construction of the dam will require realignment of access roads at the dam site and within the reservoir. This may restrict access to the existing road users during the realignment. In that event, temporary closure of sections of roads may be required during the realignment. WWAC will need to consult with the landowners and existing users to agree the closures and realignments as may be needed.

8.7 Monitoring

The CTMP will provide a detailed schedule of the various elements of monitoring of the public roads. This will include:

a) traffic generation levels;

b) safety and effectiveness of temporary traffic management;

c) extent of any delays associated with one-way routing of traffic, temporary road closures or the like;

d) road pavement condition;

e) public feedback.

The schedule will also include the specific criteria to be measured, the method of monitoring, the frequency with which monitoring will be undertaken, trigger levels for intervention, and the corresponding response.

8.8 Communication Protocols

Communication protocols will be critical to the success of the CTMP. This includes providing information to the community, receiving responses back, and communication with vehicle drivers associated with the project, both staff and contractors.

Specific contact arrangements will be made with adjoining farmers or other land-owners, the quarry, and the local forestry managers and for any other members of the community to contact the project team in a timely manner, as needed. Information, including planned forestry harvesting, quarry delivery demands and the like will then be communicated to the traffic management team and/or project drivers enabling them to anticipate the occurrence and actively manage the roadway and/or schedule their journeys, as appropriate.

Finally, the CTMP will record a list of people and organisations that the CTMP will be distributed to. All amendments and updates to the CTMP will then be forwarded to those named on the list.

9. Assessment of Traffic Effects

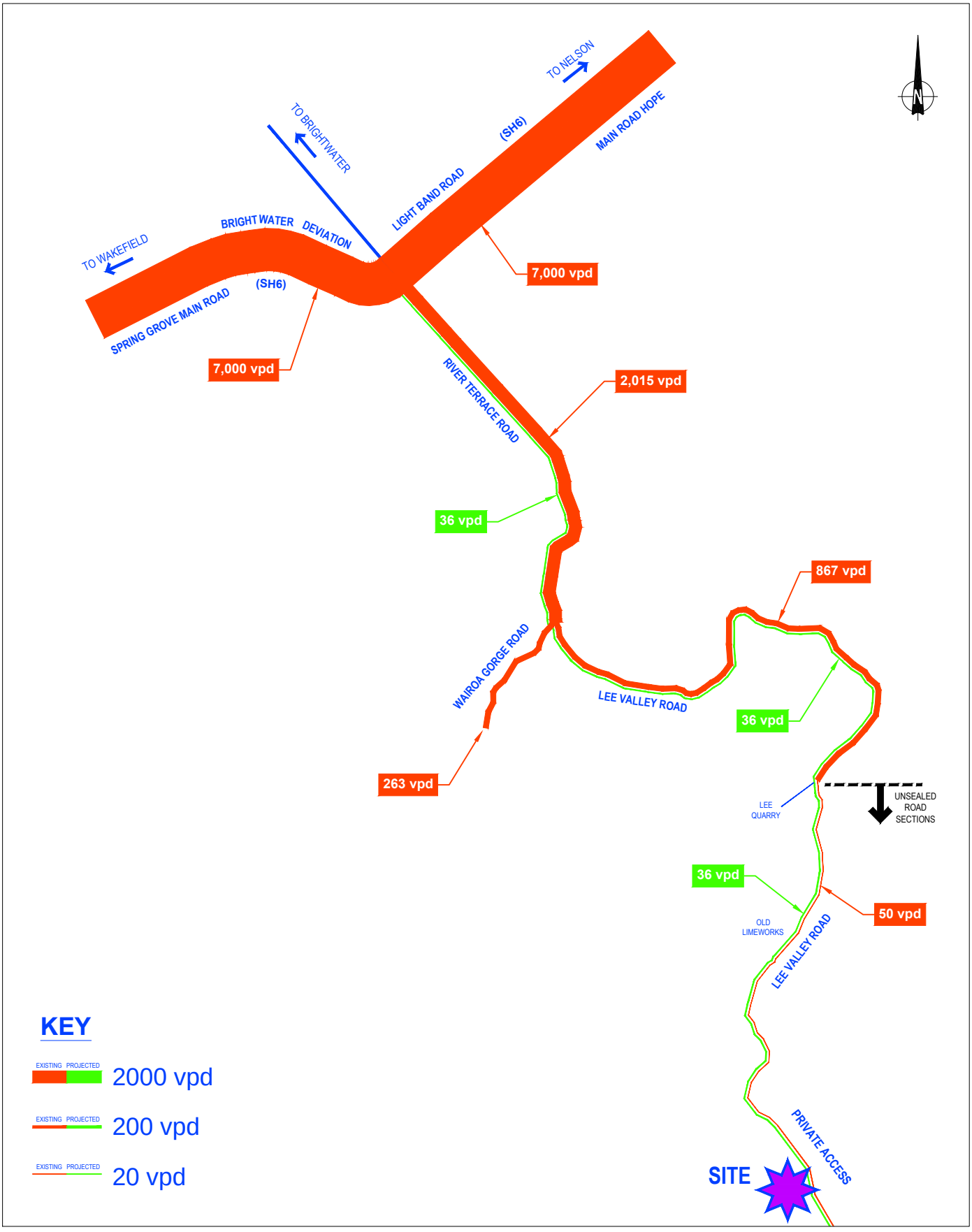
As described in an earlier section of this report, and as is typical of any major construction project such as this, there will be very significant numbers of heavy vehicles as well as staff traffic movements throughout construction. It will be assumed that a Travel Plan is in place, as recommended, to minimise both travel to and from the site and parking issues on site. For assessment purposes, a conservative estimate that allows for all concrete to be delivered, ready-mixed, to site will result in the highest traffic demands has been adopted. On that basis, as described, the peak daily number of concrete truck movements is 80vpd together with other (light vehicle) traffic.

These expected average and peak flows need to be evaluated alongside the existing underlying traffic flows along the haul route from the state highway. For that purpose, a projected traffic volume map has been developed for the average day and peak day, respectively, in **Figures 3 and 4**.

As shown in Figure 3, the additional traffic generated by the dam construction will be almost un-noticeable along River Terrace Road (Collector Road), representing an average increase of 2.5% – 3% across the construction period. Along the sealed section of Lee Valley Road, average traffic flows will increase by around 6%, so again will not generally be noticeable alongside the routine traffic, including quarry and forestry vehicles, and well within the road capacity. On the unsealed public section of Lee Valley Road however, even at average flows, the traffic will amount to an estimated 70% increase in traffic flows. Given its narrow, winding alignment that is unsuited to the two-way movement of the higher volumes of traffic expected during construction, particularly of trucks, the additional traffic is significant and will require to be actively managed, as described, and effectively controlled through an approved CTMP in order to meet the safety and operational requirements of all road users. Similarly, if the narrow alignment of the private access road into the site is not to be made two-way, then this will also need to be managed as part of the CTMP.

By comparison, as shown in Figure 4, the additional peak daily traffic generated by the dam construction will be noticeable at around 6.5% over existing flows along River Terrace Road (Collector Road), but still well within the capacity of this Collector road. Along the sealed section of Lee Valley Road, average traffic flows will increase by around 15%, so again will be noticeable alongside the routine traffic, including quarry and forestry vehicles, and at some 1000vpd on peak days will remain within the road's capacity. On the unsealed section of Lee Valley Road beyond the quarry, however, the peak traffic will amount to more than a 200% increase in the traffic flows. This additional traffic is significant and will require to be actively managed, as described, and effectively controlled through an approved CTMP.

In summary, from the highway through to the turn-off to Taylors Quarry, the underlying traffic volumes on the local road network are well within the capacity of these two-lane two-way sealed carriageways. Furthermore, the anticipated increase in traffic during construction is able to be safely and conveniently accommodated on these roads.



Wednesday, 25 September 2013 20mm

LEE VALLEY DAM ACCESS, TASMAN DISTRICT

PROJECTED AVERAGE TRAFFIC VOLUME MAP

TDG

3

SCALE: N.T.S

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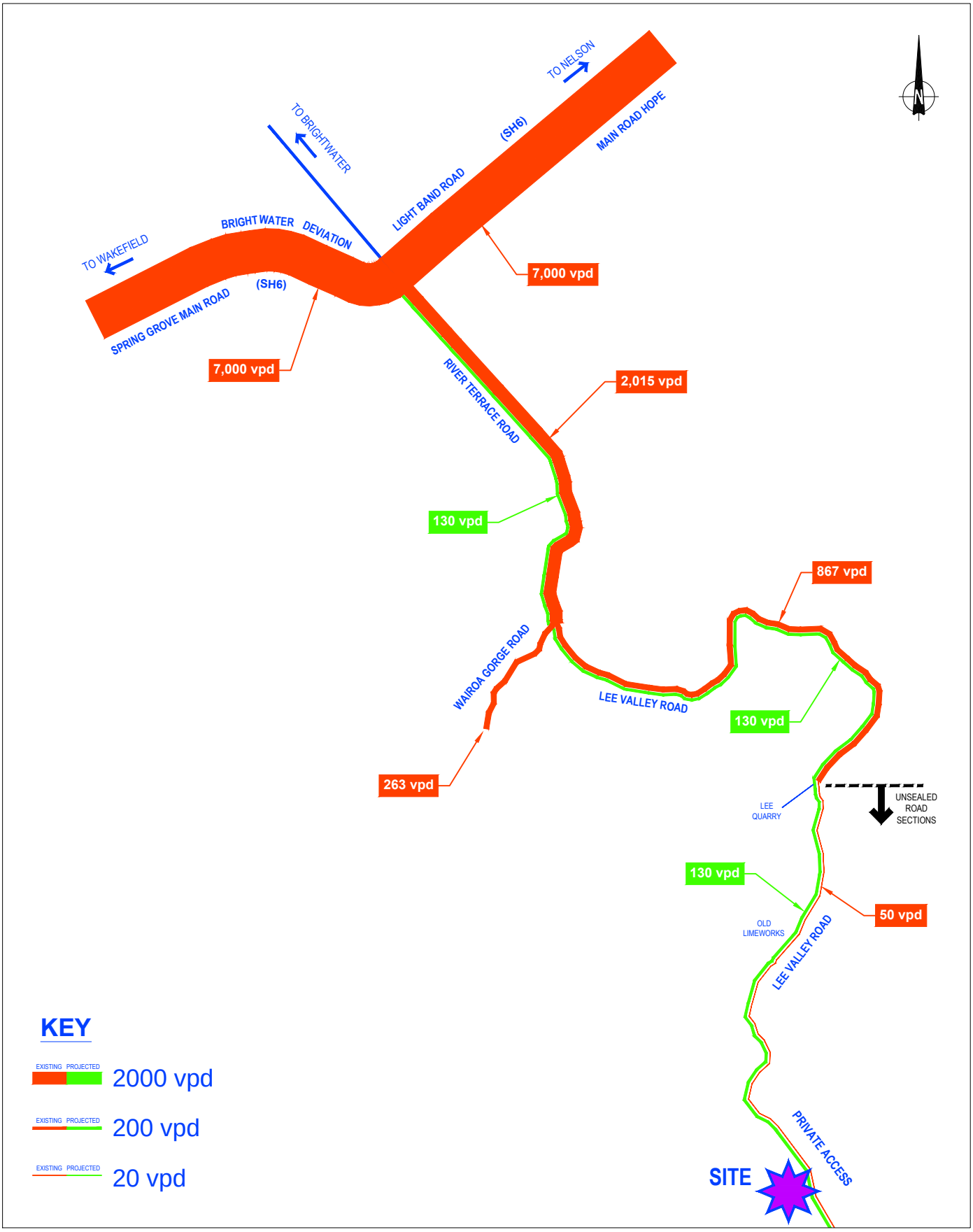

Wednesday, 25 September 2013 20mm

LEE VALLEY DAM ACCESS, TASMAN DISTRICT

PROJECTED PEAK TRAFFIC VOLUME MAP

TDG

4

SCALE: N.T.S

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The balance of Lee Valley Road through to the access to the site that typically carries low traffic volumes of less than 50vpd has a narrow carriageway having a winding alignment with an unsealed pavement of unknown strength. It is anticipated that the implementation of the CTMP may require that this section of the road be closed to all traffic other than that associated with the dam construction, two local farms, adjoining forestry operations, and possible activity at the site of the old lime-works, for which this road is the sole means of access.

The dam and the construction site are not to be open to the public during construction and there will be no vehicle access for the public. Therefore, it is not expected that there be any adverse impact on the wider public from closing the road for part or all of the duration of construction, if closure were to be approved by Council.

Although routine maintenance by Council of the section of unsealed road up to the gate is currently adequate to meet public safety and operational standards, the current level of maintenance is unlikely to be adequate during construction. Beyond the gate, agreement for any work will be needed with owners of private land. At the very least it can be expected that more regular grading and running course aggregate, if not more frequent localised dig-outs and strengthening will be needed over the course of construction. At the end of construction, the contractor will be responsible for returning the road to as good or better condition than at the start of construction. To this end, it is recommended that a detailed condition survey be undertaken and jointly agreed between Council and the contractor before and after the dam construction. This will need to include whatever pavement strength testing is necessary, as the strength of the pavement is not known.

Similarly, along the extended length of private road prior to the dam development site, if the existing one-lane carriageway is not to be upgraded, then it too will need to be actively managed under the CTMP in order to ensure its safe and efficient operation throughout construction. Furthermore, it can be expected that the existing private unsealed road will require strengthening and/or heavy maintenance over the course of the construction contract in order to accommodate the large number of trucks in particular that can be expected. There are few if any suitable passing locations along its length so that it is expected that it will be necessary to carefully manage all of this traffic.

Provided that the existing roading constraints as described are appropriately addressed by way of an approved CTMP, and that the pavement strength is adequate, then it is concluded that the traffic effects of the dam will be minor, and of a duration that is limited to the construction phase, only.

10. Conclusions

As described in the preceding report, there will be a substantial increase in traffic over the construction period for the dam. This traffic build-up will be proportionately highest at the southern end of Lee Valley Road and along the existing private road into the site, where existing traffic flows are lightest, and where the existing narrow unsealed carriageway is not designed to accommodate the volume of traffic associated with the construction of the dam, as proposed. Beyond the construction phase, the traffic effects will be negligible and not noticeable within the day to day traffic fluctuations that already occur.

The construction traffic will therefore need to be comprehensively managed along the narrow unsealed sections of public and private access road to the construction site itself, where it can be expected that the internal roading system will be specifically designed to accommodate the actual construction traffic as conveniently as possible.

It is recommended that all of this traffic be managed by way of a Construction Traffic Management Plan (CTMP) that has been specifically prepared under the direction of a chartered professional engineer by a person with the necessary STMS qualifications and experience for that purpose, and that this be a condition of resource consent.

With such provisions, all of the anticipated traffic effects associated with the proposed dam are able to be effectively mitigated by active traffic management designed in conjunction with other road users and approved by Council, as proposed.

Beyond the unsealed road sections, the additional traffic during construction is readily able to be accommodated across the wider road network without more than minor, if any effects.

11. Recommended Condition of Consent

Subject to consent being granted to the construction and operation of the proposed Lee Valley Dam, it is recommended that such consent include a specific condition that:

Prior to commencement of the construction of the dam, including the delivery of heavy construction plant to the dam, the main contractor is responsible for preparation of a Construction Traffic Management Plan by a suitably qualified and experienced STMS professional to the approval of Council's Transportation Manager, and for subsequent implementation in full accordance with the CTMP.

Traffic Design Group Ltd
October 2013

Appendix 1

Indicative Construction Quantities and Programme

Job #	27425.1
Date	12/08/2013
Author	EJH
Checked	
Date	

Assumptions

Assumes 6/7 working days

Vehicles/day have been estimated based on construction schedule

Large deliveries has been multiplied by two to account for items that have been missed

Material	Quantity	unit	Estimated Vehicle numbers	Vehicle trips	vehicles/day	peak rate (v/day)	
from offsite							
Concrete (from offsite)	14025	cu.m	2805	5610	5	30	
Cement (if onsite batching)	261	tonnes	26.1	52.2	1	5	
Reinforcing steel	1388	tonnes	138.8	277.6	1	10	
One-off deliveries - Articulated trucks		vehicle loads	50	100	1	5	valves, bridge steel beams, establishment, screws, earthmov
One-off deliveries - 8 wheeler trucks		vehicle loads	1560	3120	2	5	
TOTAL			4579.9	9159.8	10		
onsite fill movements							
Bulk Fill	557400	cu.m	**46450**				

2.5 years		782	

Deliveries			
Steel beams	58000 kg	6	trucks
	29000	3	trucks
4 valves		4	trucks
40t crane		2	
Earthmoving plant		8	

Truck Capacities	
Moxy	12 cu.m
Concrete truck	5 cu.m
Articulated Truck	10 tonnes
8 Wheeler	

Workers	
Construction average	34
Construction peak (smoothed)	68

Post Construction
Monthly inspection
3-6 Monthly road maintenance

Summary

9,000 trips (return journey = 2 trips) during the construction period (approximately 12 trips per day, if evenly spaced)

50,000 on site trips