

REPORT

Twizel Solar Plant - Cumulative Traffic Effects Assessment

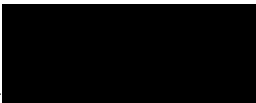
for Nova Energy Ltd

Rev B - 31/08/2026



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	Reviewed	
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1 SUMMARY

BTW has undertaken an Integrated Traffic Assessment (ITA) for the Twizel Solar Project, August 2025. This report relies on that ITA and considers the potential for cumulative traffic effects arising from the recent approval of another solar farm in the general area (Haldon Solar Project). This assessment should be considered as an addendum to the ITA.

This report, prepared by BTW for the Twizel Solar Project, assesses the traffic effects of the Twizel Solar Project in conjunction with the traffic effects of Haldon Solar Farm.

For the purpose of this assessment, it is assumed that both solar projects are built concurrently in order to identify the highest possible level of cumulative effects. However in reality, this may not be the case for reasons including commercial imperatives, the availability of construction workers, available accommodation and machinery required.

Assessment summary

Both projects will generate a higher volume of trips during a short-term construction period and a significantly lower volume for ongoing maintenance. While both sites are located relatively close to each other, they are separated by a road network containing State Highway 8 and local roads, approximately 130km of road network. The intersection of Haldon Road and State Highway 8 is shared by both sites with associated trips for Twizel Solar Farm attributing to through movements and all turning movements attributed to Haldon Solar Project

During the peak hour, the estimated average delay for a right turn vehicle out of Haldon Road is less than 10 seconds (level of service A) when including turning movements from Haldon Solar Project, existing movements, and additional through movement from Twizel Solar Project. The estimated residual midblock capacity on State Highway 8 is estimated at 1082 pc/lane/hour, being 66% of the maximum capacity. Accordingly, the associated impact of concurrent construction of both projects to safety and capacity along the network and at intersections is considered to be minimal.

Recommendations

It is considered that potential cumulative traffic effects should be managed as follows:

- The Twizel Solar Project should include a construction traffic management plan as part of the construction phase which should identify preferred travel routes and suitable timing of site deliveries and consider other construction projects that may be occurring over the same period. This is already included in the draft conditions of consent as Condition 27.

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2 INTRODUCTION

BTW has undertaken an Integrated Traffic Assessment (ITA) for the Twizel Solar Project, in August 2025¹. This report relies on the ITA and considers the combined traffic effects of the subject solar farm (Twizel Solar Project) and Haldon Solar Farm, both of which are located in the same district (Figure 2.1).

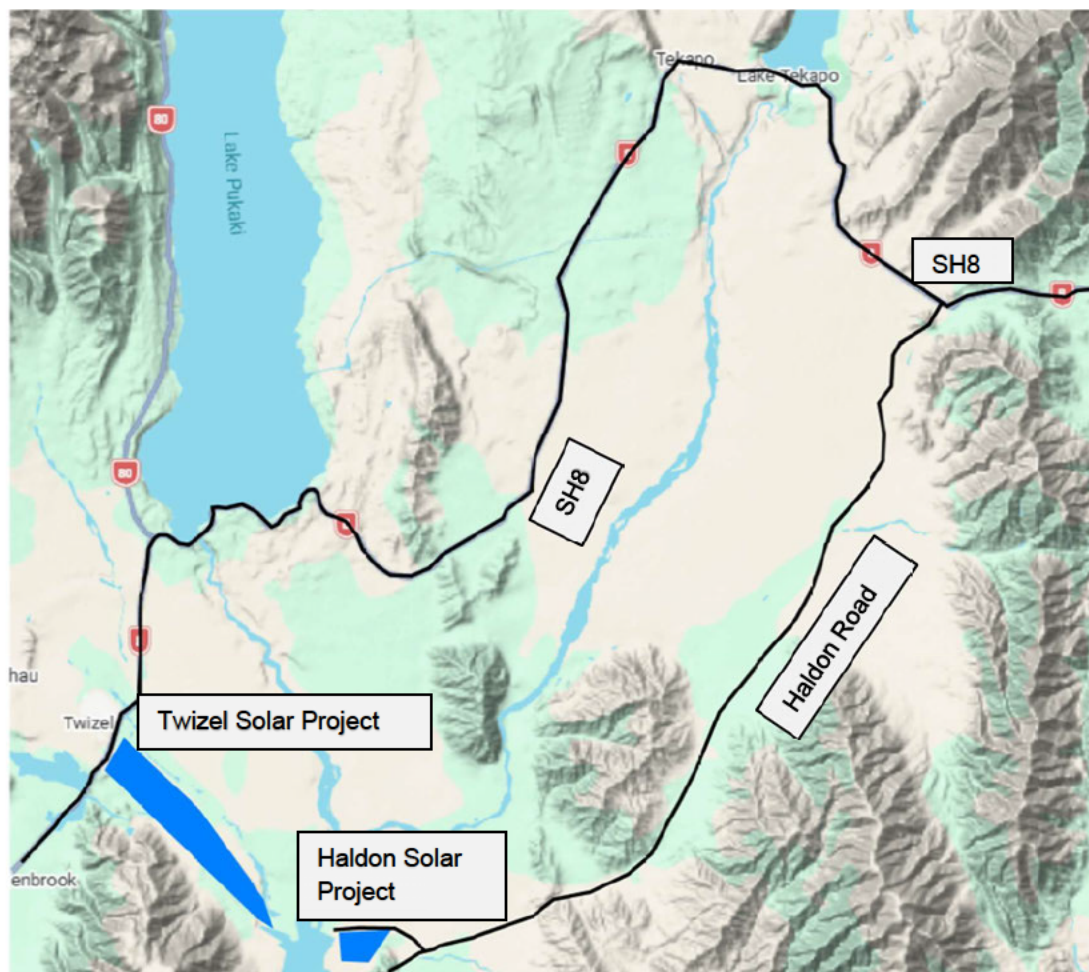


Figure 2.1: Site Location Plan

This report considers a conservative scenario whereby both projects are granted consents (Haldon Solar Farm has been granted consent in August 2026) and are constructed simultaneously.

2.1 Report Limitation

The cumulative traffic assessment for this report is based on the impact to the road network and targeted intersections along the travel routes as these are the key metrics concerning any traffic effects. . This report, prepared by BTW for the Twizel Solar Project, is based on trip data and

¹ Integrated Traffic Assessment, Twizel Solar Farm, Btw Company, Rev 1, 22 August 2025

ITAs submitted as part of the Fast-track Approvals Act (FTAA) consent application submissions for the respective projects.

3 PROJECT SUMMARIES

3.1 Twizel Solar Project

3.1.1 Proposed Development

Twizel Solar Project site is located east of Twizel with direct access off State Highway 8, Figure 3.1.

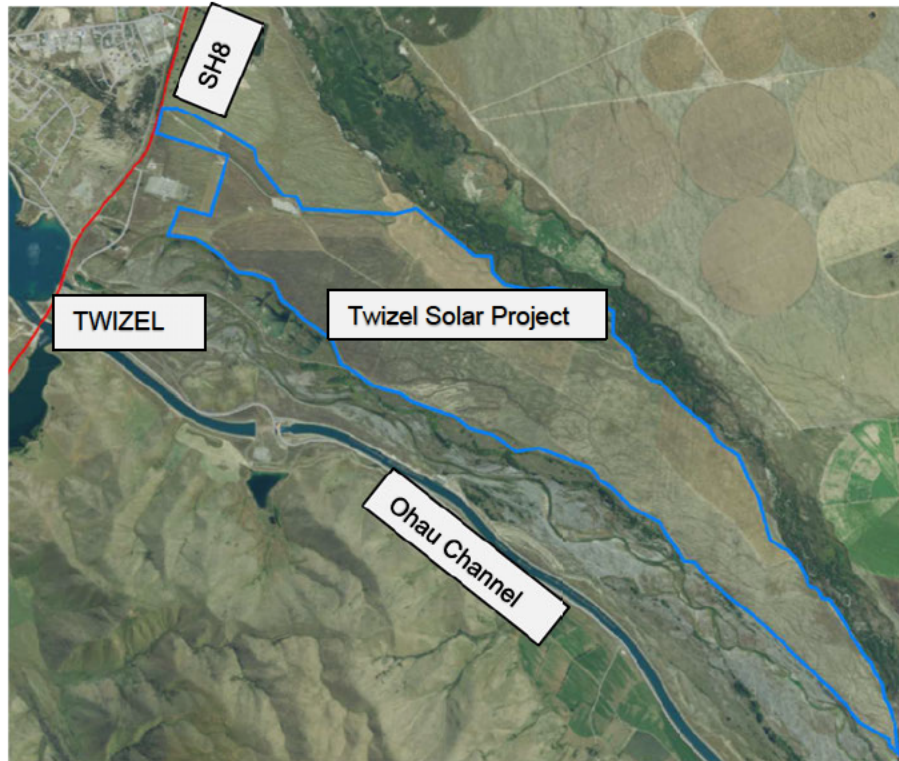


Figure 3.1: Locality Plan, Twizel Solar Project

Full details of the proposed development are outlined in the ITA², and are summarised below.

- Development will be separated into a construction phase and operation/maintenance phase.
- The site will undergo an earthworks and site establishment operation, in which the land profile will be modified to accommodate platforms for new plant and road layout.
- Extent of site development will be approximately 565 ha in size; not all of the available land on the site will be developed.
- The development will include an upgraded access on State Highway 8, accommodating a right turn bay and a lane for left turn in movement.
- Trips generated by the site during the construction phase will broadly be separated to staff/construction workers, delivery of plant and earthworks (material delivery and removal). The volume of trips during this phase will be higher than what is expected during the maintenance phase.

² Integrated Traffic Assessment, Twizel Solar Farm, Btw Company, Rev 1, 22 August 2025

- Trips generated during the maintenance period will be infrequent, typically between one and three trips per month.

3.2 Haldon Solar Farm

3.2.1 Proposed Development

Haldon Solar Farm is located adjacent to Lake Benmore and is accessed via a series of local roads including Haldon Road and Haldon Arm Road, Figure 3.2.

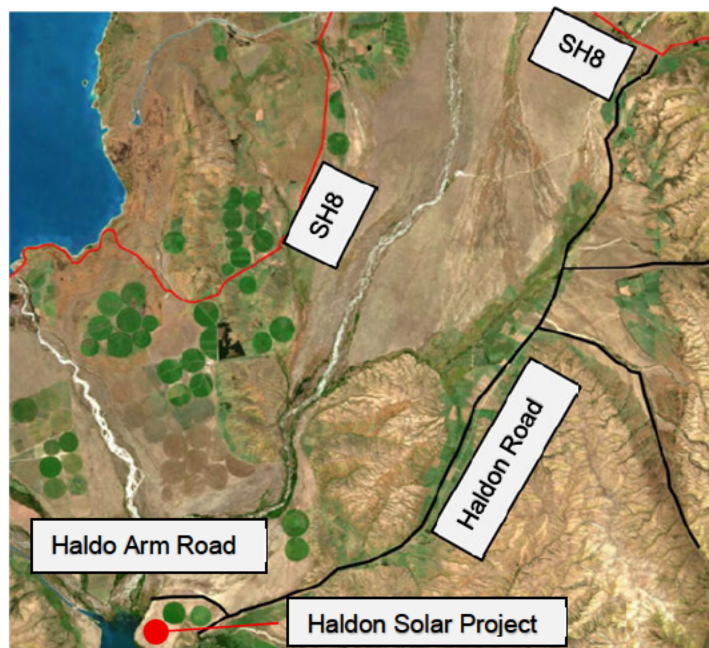


Figure 3.2: Locality Plan, Haldon Solar Project

Full details of the proposed development are outlined in the resource consent conditions ³ which also included an ITA produced by Stantec⁴, and are summarised below.

- The project involves the installation of approximately 360,000 solar panels, 48 power transformers, associated accessways and a predator-proof fence.
- The site will undergo an earthworks and site establishment operation, in which the land profile will be modified to accommodate platforms for new plant and road layout.
- Trips generated by the site during the construction phase will broadly be separated into staff/construction workers, delivery of plant and earthworks (material delivery and removal). The associated volume of trips during this phase will be higher than what is expected during the maintenance phase.
- Trips generated during the maintenance period will be infrequent, typically between one and three trips per month.

³ Haldon Station Solar Farm, Record of Decision of the Expert Consenting Panel Under Section 87 of the Fast-Track Approvals Act 2024, 10 August 2026

⁴ Haldon Solar Project, Integrated Transport Assessment, Stantec NZ, Rev 1, 22 April 2025

4 TRAFFIC VOLUMES AND TRIP GENERATION

This report focuses on the trip generation during the construction phase as a conservative approach. The trip demand is sourced from the supplied data for each project.

A summary of each site's traffic volumes are listed below.

4.1 Site traffic volumes

4.1.1 Twizel Solar Project

The summary of the predicted trip generation, as outlined in the ITA by BTW, is detailed in Table 4.1.

Table 4.1: Predicted Trip Generation Twizel Solar Project

Activity	Daily Max	Daily average
Site establishment and accessway construction	15 truck and trailer units (30 movements)	8 truck and trailer units (16 movements)
Movement of Gravel and sand materials to site	25 truck and trailer units (50 movements)	15 truck and trailer units (30 movements)
Plant installation	10 trucks (HCV) (20 movements)	5 HCV (10 movements)
Construction personnel on site	80 light vehicles (LV), 160 movements	40 LV (80 movements)

Based on the table, there is up to 20 movements per day for plant delivery and up to 50 movements per day for construction material and earthworks. The movement for the construction material (and daily staff) is likely to be localised; however, the larger or specialised plant may be sourced from the nearest port or large centre that could manufacture or process the units.

Accordingly, the route for plant delivery could be from Timaru or the Christchurch District. The likelihood of all plant being delivered at the same time is low, expected to be up to 2 units per hour in the peak periods.

The volume and composition of the vehicles during the peak hour periods will be managed by the contractor through a Construction Traffic Management plan. However, for the purpose of this report the following assumptions have been made:

- 80% of the construction personnel/staff will arrive/leave in the morning and afternoon peak periods, over a two-hour period for each peak, equating to 32 movements per hour on average.
- Maximum of two delivery vehicles for plant in the peak hour.
- Maximum of four earthwork vehicles in the peak hour.

This equates to approximately 34 localised vehicles in the peak hour (personnel and earthworks vehicles) and 2 vehicles in the greater region (plant delivery).

4.1.2 Haldon Solar Farm

The summary of predicted trip generation, as outlined in the ITA by Stantec, is detailed in Table 4.2.

Table 4.2: Predicted Trip Generation Haldon Solar Farm

Activity	Trip Demand per day
Earthworks	30 trips (60 movements) - HCV
Product Delivery	10 trips (20 movements) -HCV
Onsite Staff	Approx 150-200 Staff onsite, Trip generation reduced based on group transportation 50 trips (100 movements) -LV

The trip generation is similar to what is predicted for the Twizel Solar Plant. Based on the table, there are 20 movements per day for plant delivery and 60 movements per day for construction material and earth works, with up to 100 staff movements.

The extent of the movements associated to staff and earthworks operations are likely to be local with product delivery to be from the nearest port or manufacturing centre (Timaru or Christchurch). The contractor is expected to manage the network movements through an appropriate construction management plan.

For the purposes of this report the following assumptions have been made:

- 80% of the construction personnel/staff will arrive/leave in the morning and afternoon peak periods, over a two-hour period for each peak, equating to 40 movements per hour on average.
- Maximum of two delivery vehicles for plant in the peak hour.
- Maximum of four earthwork vehicles in the peak hour.

This equates to approximately 44 localised vehicles in the peak hour (personnel and earthworks vehicles) and 2 vehicles in the greater region (plant delivery).

4.2 State Highway 8 and Local Roads

There are two key locations along State Highway 8 that will have an associated increase in turning movements directly related to the proposed developments, illustrated in Figure 4.1 (point A and B). The associated trips will also increase the volume of through movements along the State Highway network.

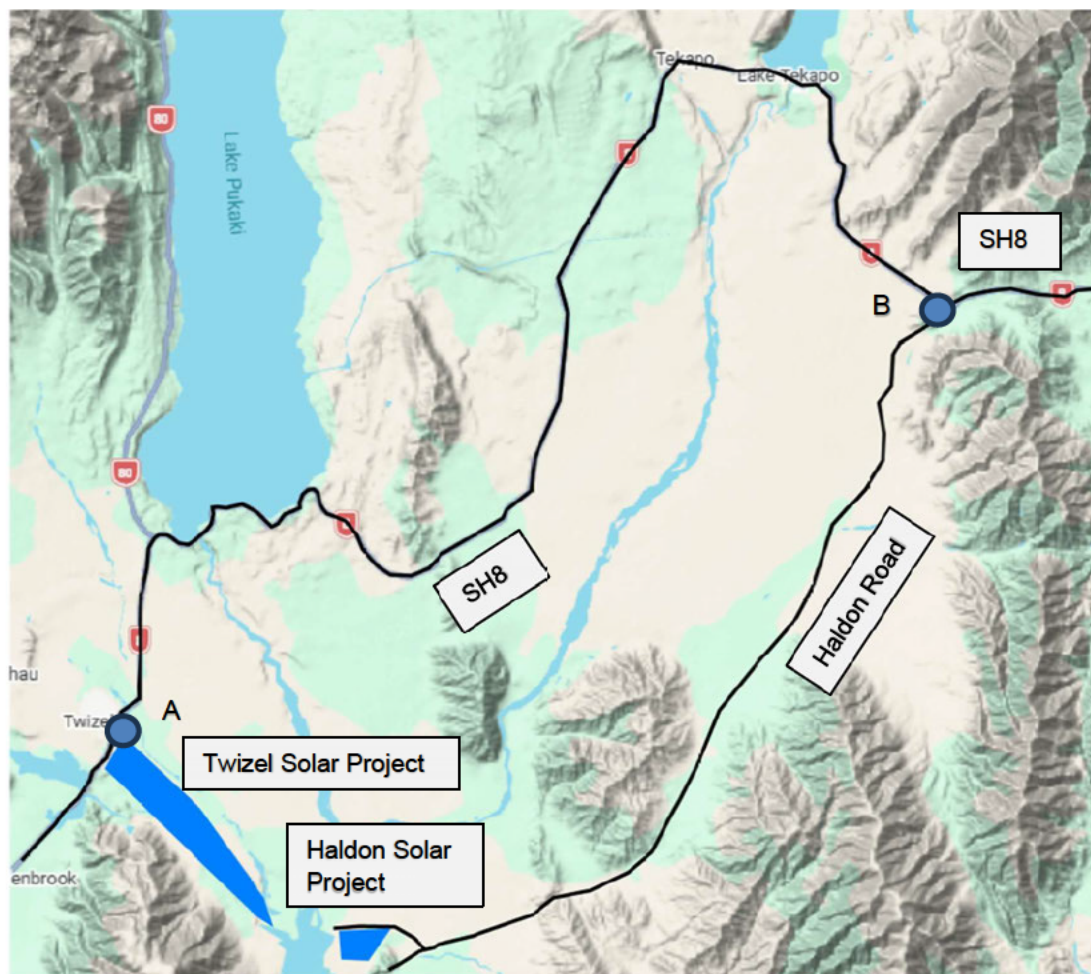


Figure 4.1: Key Assessment Locations, State Highway 8

The existing daily volumes are summarised in Table 4.3 (sourced from Mobile Roads) and represent the 2023 reported volumes on State Highway 8.

Table 4.3: Traffic Volumes, State Highway 8 (2023 Data)

Site Reference	Description Reference	State Highway Data
A	Access to Twizel Solar Farm	3945vpd, 18.5% HCV
B	Travel route to/from Haldon Solar Farm	2958vpd, 11.5% HCV

Based on the results outlined in the table, the volume of traffic on State Highway 8 varies along the network, increasing when in closer proximity to Twizel. Similarly, the volume of heavy commercial vehicles (HCV) also increases near Twizel.

For the purposes of this assessment, a peak hour factor of 15% was adopted with a 2% growth rate. Two periods are considered for assessment, present day (2026) plus an additional 10-year traffic growth (2036) for sensitivity purposes, summarised in Table 4.4: .

Table 4.4: Estimated Peak Hour Traffic Flow, State Highway 8 – all traffic

Site Reference	2026 Peak hour (Vehicles per hour, two way combined)	2036 Peak Hour (Vehicles per hour, two way combined)
A	628	765
B	471	574

The results in the table indicate a predicted peak hour flow on State Highway 8 varies between 574 vph and 765 vph (two way) in 2036.

5 TRAFFIC ASSESSMENT

The common travel route for the two sites is along State Highway 8, however Haldon Solar Farm is accessed via a series of local roads. While both sites are located in relatively close proximity to each other (Figure 5.1) they are separated by over 130 km of road network, 80 km of which is State Highway 8.

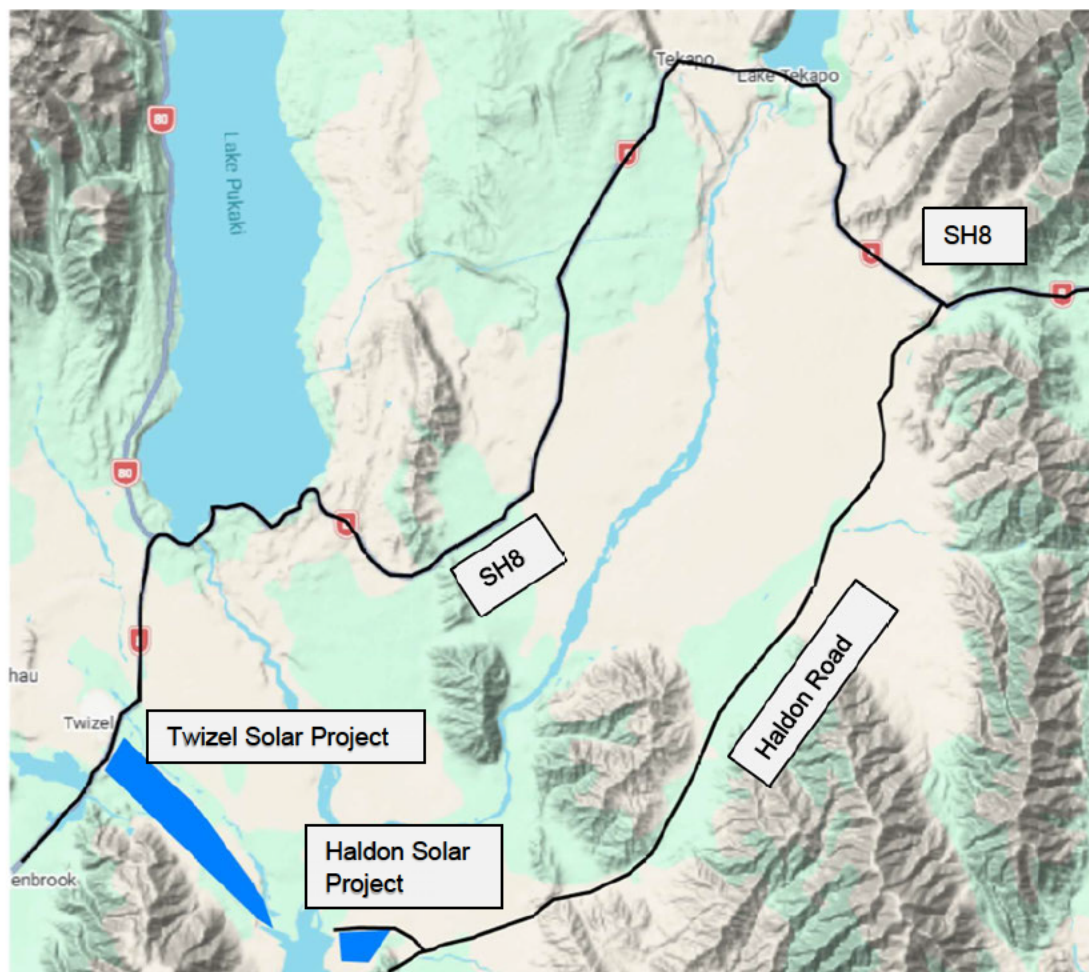


Figure 5.1: Travel Route to Sites

5.1 Baseline Capacity, Midblock Sections

Midblock capacity is based on passenger car (pc) equivalents, whereby a light vehicle is 1 pc and a heavy vehicle (HCV) is between 2.5 and 3 pc (assumed to be 3 for this report). The baseline capacity for midblock sections is 2000 pc/hour/lane, which is reduced by the following factors:

- Lane width (baseline 3.5m).
- Operating speed (baseline 100 km/h).
- Volume of HCV movements (baseline 0% HCV).

While the lane width and posted speed is similar along the length of State Highway 8 (3.5 m lanes and 100 km/h posted speed limit), the observed volume of HCV movements varies. Therefore, the only capacity reduction is associated with the volume of HCV movements, as outlined in Table 5.1.

Table 5.1: Estimated Midblock Capacity – State Highway 8

Site Reference	SH 8 Location	HCV%	Estimated Maximum Midblock Capacity (pc/lane/hour)
A	Access to Twizel Solar Project	18.5%	1630
B	Travel route to/from Haldon Solar Farm	11.5%	1770

The results outlined in the table indicate a reduced midblock capacity adjacent to Twizel, which is proportionate to the reported volume of heavy commercial vehicles.

5.2 Residual Capacity, State Highway 8

The residual capacity on State Highway 8 is a function of the maximum theoretical capacity and the associated reduction due to the existing traffic flow on the network. Two traffic flows have been considered for this report, a present-day flow (2026) and a ten-year future flow (2036) as documented in Table 4.4. For each flow an equal split was assumed in the peak hour, the estimated residual capacity is outlined in Table 5.2.

Table 5.2: Residual Midblock Capacity (Peak Hour)

Site Reference	SH 8 Location	Residual Capacity (pc/lane/hour)
A	Access to Twizel Solar Project	1200 (2026), 74% 1106 (2036), 68%
B	Travel route to/from Haldon Solar Farm	1480 (2026), 84% 1417 (2036), 80%

The results outlined in the table indicate the lowest residual midblock capacity is 1200 pc/lane/hour in 2026 and is further reduced to 1106 pc/lane/hour in 2036. In all cases the residual capacity is 68% of the baseline maximum capacity or greater.

5.3 Impact of Development Flows

Both projects will have a negative impact on the midblock capacity on State Highway 8.

As a worst-case scenario, this would peak if both sites were constructed simultaneously. In reality, this may not be the case for reasons including commercial imperatives, the availability of construction workers, available accommodation and machinery required.[]

The exact travel routes for both sites are indeterminant and subject to several factors including the contractor's management plan, location of accommodation and location of building supplies.

For the assessment the following movement pattern at Haldon Road intersections has been assumed:

- All associated movement for the Haldon Solar Farm will travel via Haldon Road/State Highway 8 intersection.

- All associated movements for the Twizel Solar Project will maintain travel along State Highway 8, up to the specific access point off the state highway.

Table 5.3 outlines the estimated residual midblock capacity based on both sites being simultaneously in the construction phase.

Table 5.3: Residual Midblock Capacity During Site Development (2036)

Site Reference	Location	Development Flows (peak hour)	Residual Midblock Capacity pc/ln/hour (2036)
A	Access point to Twizel Solar Farm	30 LV, 6 HCV (two way), 48 pc (24 pc each way)	1082 (66%)
B	Haldon Road/State Highway 8, access to Haldon Solar Farm	40 LV, 6 HCV (two way), 58 pc (29 pc each way)	1388 (78%)

The results in the table indicate a worst-case scenario of 1082 passenger car equivalent per lane per hour (pc/ln/hour). This equates to a residual capacity of 66% (estimated max capacity of 1630 pc/ln/hour at site A). Reiterating that one light vehicle is equivalent to 1pc and a heavy commercial vehicle is between 2-3pc depending on the configuration.

5.4 .Impact on Intersections

5.4.1 Haldon Road/State Highway 8

The intersection analysis at Haldon Road and State Highway 8 is based on observed flows with assumed growth rates and peak hour factors, and the estimated future trips associated with the proposed developments.

The reported volume of traffic on Haldon Road is 181 vpd (mobile roads⁵, 2018 data). Applying an assumed 2% growth rate, and a peak hour factor of 15% results in an estimated peak hour volume of 40 vph (two way). For State Highway 8, the estimated 2036 peak hour volume at this location is 574 vph (Section 4.2, Table 4.4).

Both projects will increase traffic volumes at this intersection, with Haldon Solar Farm accounting for all the additional turning movements at this location. Accordingly, the increase in traffic movements is 46 turning vehicles and 36 through movements (peak hour flow).

The critical movement at this intersection is right turn from Haldon Road onto State Highway 8, which conflicts with three opposing movements (through movements in both directions and right turn into Haldon Road). The corresponding gap-acceptance parameters for this movement is 6 seconds (critical gap) and 4 seconds (follow-up time).

The level of service at the intersection is assessed based on first principles outlined in Austroads and the Highway Capacity Manual (HCM), the results for the critical movement (right turn out) is outlined in Figure 5.2.

⁵ <https://www.mobileroad.org/>

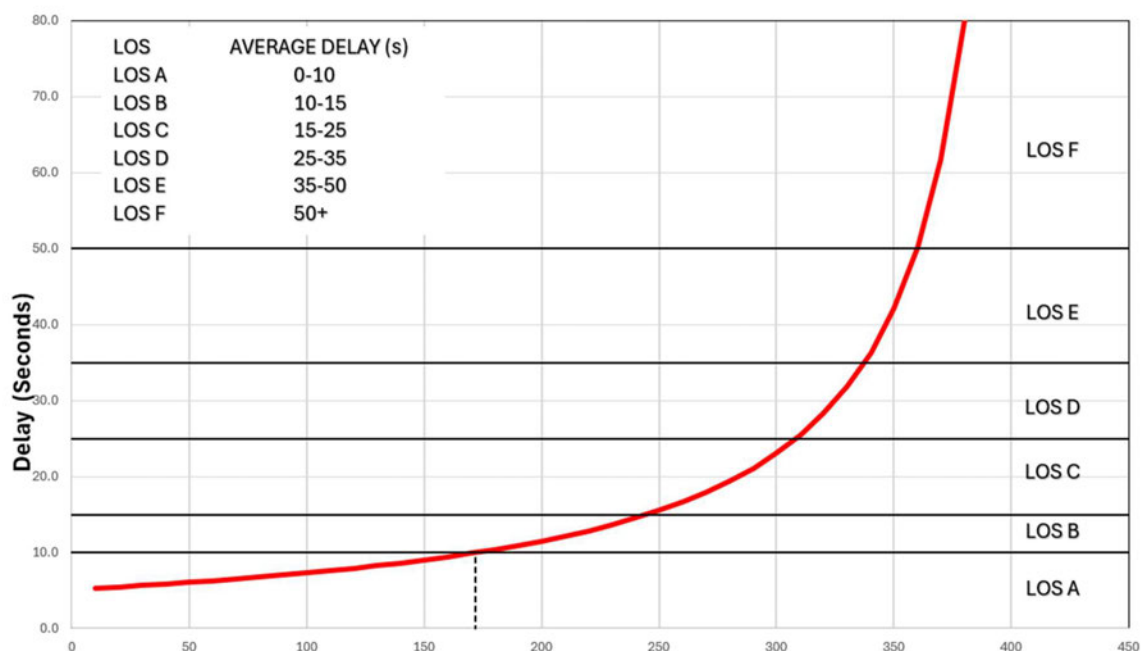


Figure 5.2: Level of Service, 2036, Haldon Road Intersection, right turn movement

The figure illustrates the level of service at the intersection is likely to remain at LOS A (average delay less than 10 seconds) in 2036. The point of change to LOS B is when the volume of right turn movements is approximately 170 vph which is greater than the combined two-way total of the existing traffic volume on Haldon Road and the estimated increase due to Haldon Solar Farm.

6 SUMMARY AND RECOMMENDATIONS

6.1 Summary

- This report considers the combined traffic effects of the Twizel Solar Project and the Haldon Solar Farm based on a conservative scenario of both projects being constructed simultaneously. The sites are both located in the Mackenzie District in the South Island, between Twizel and Lake Tekapo.

Each project will have a construction phase and an operations/maintenance phase.

The associated trip demand and impact on the road network is highest during the construction phase. During the operations and maintenance periods, the likely trips are low and mostly infrequent light vehicle movements.

When including future traffic flows (2036 growth scenario) and a worst-case scenario of simultaneous construction phases at both sites, the theoretical midblock capacity along State Highway 8 is at least 66% of the maximum capacity.

The associated volume of construction vehicles generated by all parties may impact the intersection performance and midblock capacity, however the effects are not considered to be noticeable.

Based on a conservative scenario of both projects being constructed simultaneously, the overall impact on traffic, safety and operation on the network is considered to be low. Provided the recommendations below are actioned, the cumulative traffic effects are considered to be acceptable, and within the operational capacity of the network.

6.2 Recommendations

The following recommendation is made to mitigate the potential cumulative effects of construction traffic:

- The Twizel Solar Project should include a construction traffic management plan as part of the construction phase which should identify preferred travel routes and suitable timing of site deliveries and consider other construction projects that may be occurring over the same period. This is already included in the draft conditions of consent as Condition 27.