RC245775 Darfield Solar Farm

Transport Assessment Review

Prepared for	Selwyn District Council
Job Number	SDC-J086
Revision	A
Issue Date	20 February 2025
Prepared by	Mat Collins, Associate Transportation Engineer
Reviewed by	Dave Smith, Technical Director

1. Introduction

Abley Limited (Abley) was engaged by Selwyn District Council (Council) to review the transport planning engineering aspects of a resource consent application for a solar farm at 1352 Homebush Road, Darfield. The proposed solar farm is illustrated in Figure 1.1.

The key aspects relating to transport matters are:

- A primary “south access” on Homebush Road, approximately 330m from the SH73/Homebush Road intersection, which will be upgraded to comply with Council’s vehicle crossing standards.
- A secondary “east access” on Loes Road, approximately 1100m north of the Homebush Road/Loes Road intersection.
- Construction phase:
  - 12 – 18 months in duration
  - Internal access formed with compacted gravel
  - Up to 120 onsite parking spaces during the construction phase, accessed via the “south access”
  - Up to 60 heavy vehicle movements (two-way) per day and 12 heavy vehicle movements (two-way) per hour
  - Up to 240 light vehicle movements (two-way) per day and 100 light vehicle movements (two-way) per hour, assuming that construction workers arrive/depart with an average of 3 construction workers per vehicle.
  - A Construction Traffic Management Plan will be prepared and submitted to Council.
- Operational phase:
  - Potential for glare effects on surrounding roads.
  - No dedicated staff onsite, however up to three staff could be onsite during normal operation, generating six vehicle movements (two-way) per day.

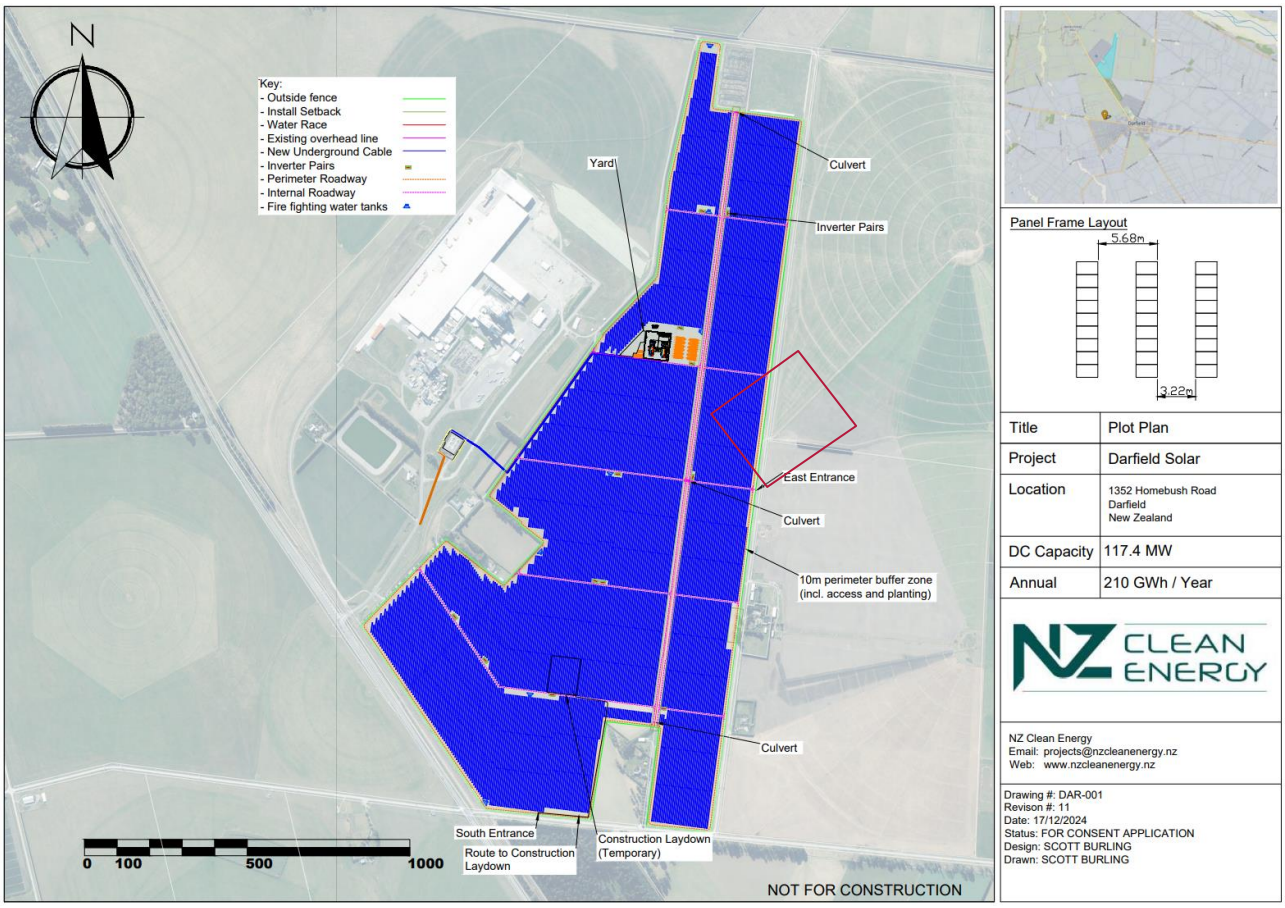

Figure 1.1 Proposed solar farm (Source: Plot Plan, prepared by Scott Burling, dated 17 December 2024)

In preparing this review Abley has considered the following documents and correspondence:

- AEE, prepared by Mitchell Daysh, dated 6 September 2024.
- Transport Assessment, prepared by Don McKenzie Consulting, dated 4 September 2024.
- Level Crossing Safety Impact Assessment, prepared by Don McKenzie Consulting, dated 3 September 2024.
- Glint and Glare Analysis, prepared by Dave Mansergh, dated 25 June 2024.
- S92 response letter, prepared by Mitchell Daysh, dated 17 January 2025, including:
  - Transport response letter, prepared by Don McKenzie Consulting, dated 16 January 2025
  - Plot Plan, prepared by Scott Burling, dated 17 December 2024.
  - Glint and Glare response letter, prepared by Dave Mansergh, dated 9 December 2024
  - Proposed Condition 22: Glint and Glare Adaptive Management Plan
- Meeting notes from 4 February 2025, meeting with NZTA, Applicant's consultants, and Abley.
- S92 response letter 2, prepared by Mitchell Daysh, dated 10 February 2025.

2. Discussion of transport matters

Abley requested further information on 31 October 2024, related to the following topics:

- Safety effects at the Homebush Road level rail crossing, due to increased vehicle movements during the construction phase.
- Safety effects at the SH73/Homebush Road intersection, due to increased turning movements during the construction phase.
- Glare effects on surrounding roads during the operational phase.

We discuss these topics in the following subsections.

2.1 Homebush Road level rail crossing

We requested details of the Level Crossing Safety Impact Assessment (LCSIA) that had been submitted to KiwiRail. Don McKenzie provided the So far as is reasonably practicable (SFAIRP) report, approved by KiwiRail, which makes several recommendations for managing construction traffic interactions with the Homebush Road rail level crossing.

We note that the proposal does not infringe any District Plan Rules or Requirements relating to level rail crossings, therefore we accept the response from the applicant as this is a matter for the applicant to address with KiwiRail.

We recommend that the following advice note is included under Condition 8, consistent with the advice within the Transport Chapter of the District Plan:

> ***Advice note**: Separate to any requirements under the Resource Management Act 1991, there may be other legislative requirements that regulate access or crossing rights or rail infrastructure, including the Homebush Road level rail crossing. Further advice should be sought from KiwiRail.*

2.2 SH73/Homebush Road intersection

Section 5.3.3 of the Transport Assessment discusses the effects of right turn movements, from SH73 into Homebush Road, during the construction phase. It concludes that no mitigation is required unless right turns exceed 80 vehicles per hour based on:

- NZTA not requiring short Channelised Right Turn bays (CHR(s)) and only requiring Channelised Right Turn bays (CHR) once turning movements exceed the Austroads Guide warrant identified in Austroads Guide to Traffic Management Part 6 Intersections, Interchanges and Crossings Management (AGTM06)
- Approximately 160 two-way through vehicle movements per hour on SH73 between 7am and 8am
- Right turn movements will be highest at this time, as workers arrive at the site at the start of the working day
- Using the above inputs, the Transport Assessment concluded that no mitigations are needed, as shown by the green line in Figure 2.1.

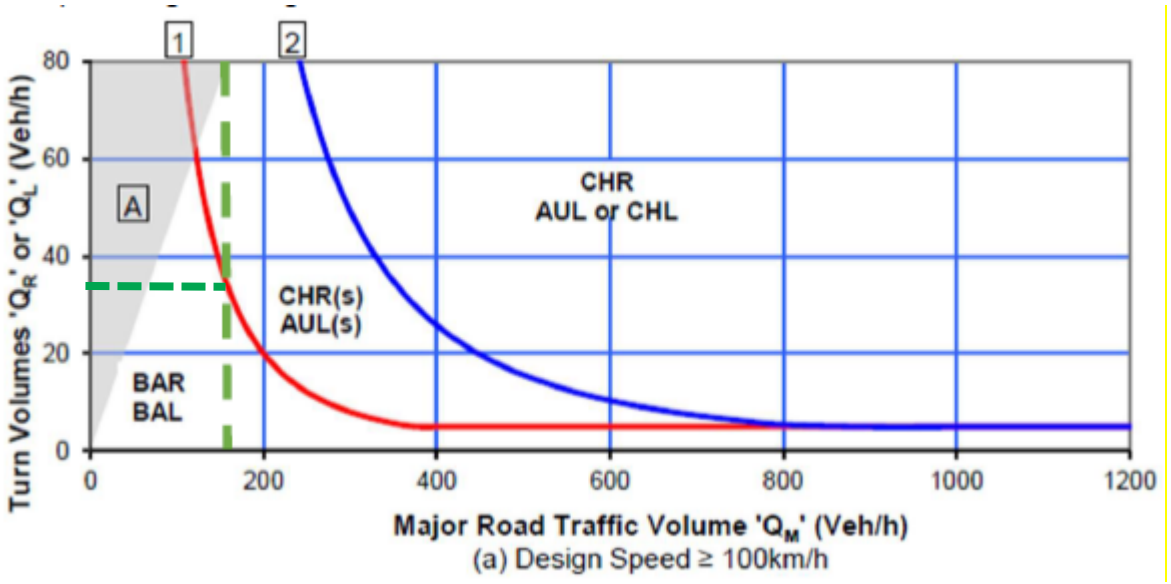

Figure 2.1 AGTM06 100 km/hr turning warrant assessment, reproduced (with additional line added) from the Transport Assessment.

However, we had concerns that:

- We disagree with the TA conclusion that short Channelised Right Turn bays (CHR(s)) are not necessary. In our view these (shown by the red line in Figure 2.1) are typically the threshold at which infrastructure improvements (or in the case of traffic management applications temporary speed reductions) are desirable. When the higher threshold of a full CHR is met (the blue line in Figure 2.1), more extensive improvements are generally sought.
- Specifically the vertical green line intersects the red line at approximately 35 vehicles per hour. This is the point at which a channelised right turn treatment is required based on the warrant assessment. We have added a dark green horizontal line to the graph to demonstrate this.
- The Transport Assessment only assesses the 7am – 8am period, when vehicle movements on SH73 are lower. After 8am hourly traffic volumes on SH73 are closer to 250 to 300 two way vehicle movements per hour, as shown in Figure 2.3. At this volume a CHR(s) and a CHR would be required when right turns exceed approximately 10 veh/hr and 40 veh/hr respectively
- The intersection is on a long and straight section of SH73 with a speed limit of 100 km/hr, and operating speeds of more than 100 km/hr are possible including the potential for overtaking manoeuvres of slower vehicles.
- SH73 has a higher proportion of unfamiliar users (e.g. tourists)
- Users of SH73 may not anticipate higher turning movements at the SH73/Homebush Road intersection during the construction phase
- Right turning drivers will need to anticipate queueing space and stopping at the Homebush Road level rail crossing, which is approximately 38m queuing distance between the level rail crossing and the SH73 intersection. This is likely to increase the time it takes for right turning movements, particularly heavy vehicles, as drivers have additional decision making requirements
- Drivers travelling north on SH73 would be required to stop on SH73 if there is a right turning vehicle into Homebush Road, as there is no seal widening/lane widening at the intersection that would otherwise allow these drivers to pass to the left of the right turning vehicle, refer to Figure 2.2.

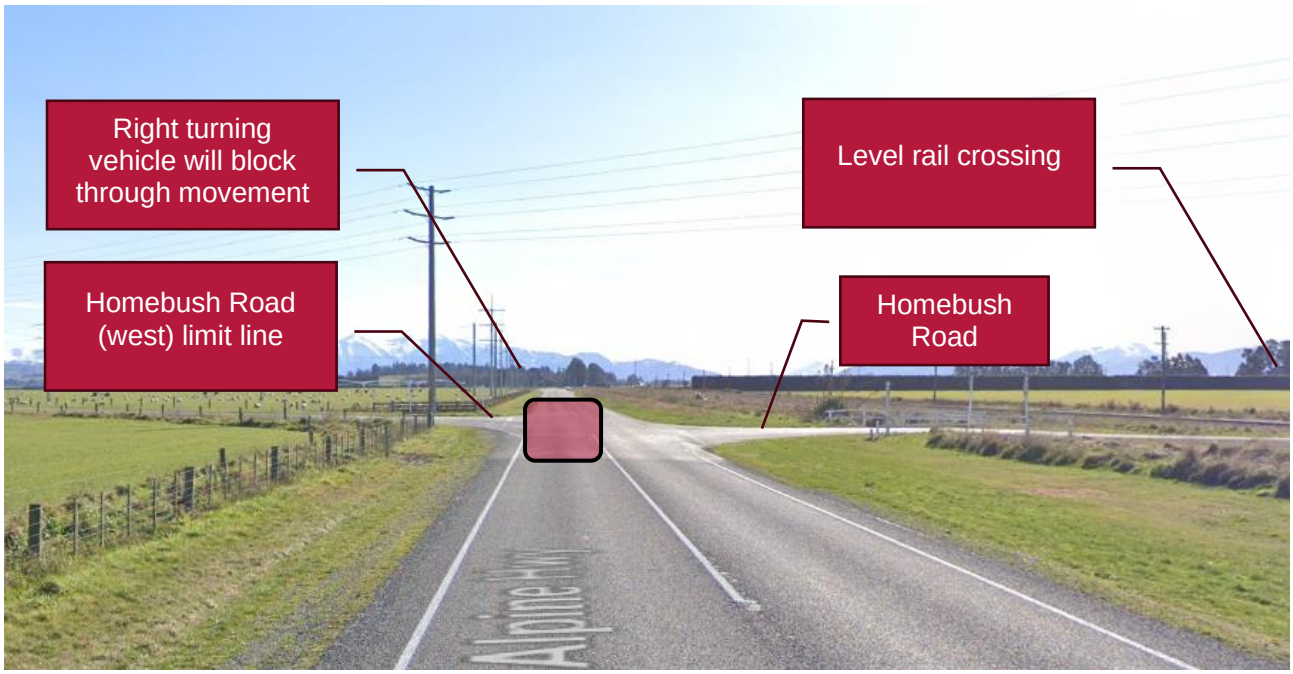

Figure 2.2 SH73 travelling north, showing lane blockage from right turn vehicle (Source: Google Maps).

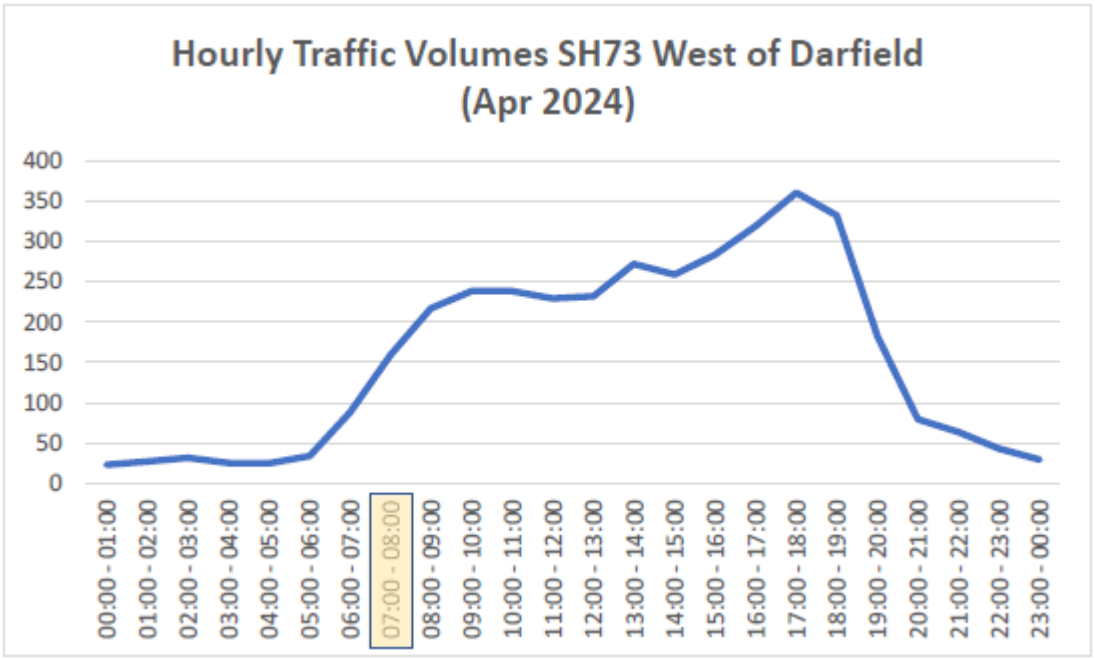

Figure 2.3 SH73 hourly traffic volumes (Source: Transport Assessment, Figure 10).

A meeting was held on 4 February 2025 to discuss this matter, attended by Kate Bonifacio and James Long (NZTA), Don McKenzie (Don McKenzie Consulting), Tracey Morse (Clean Energy) and Mat Collins (Abley). At this meeting, NZTA staff confirmed that they had agreed to an 80 veh/hr turning limit at the SH73/Homebush Road intersection without requiring mitigation. Mat Collins expressed his view that, at a minimum, a Basic Right Turn treatment (BAR) was required, and NZTA staff supported this view.

Following this meeting, Don McKenzie confirmed that the applicant would provide seal widening in accordance with NZTA Planning Policy Manual Diagram E, shown in Figure 2.4, which provides for a BAR.

Further correspondence between Ableys staff and NZTA staff confirmed that NZTA considers that the seal widening is the only mitigation needed, and that the 80 veh/hr turning movement limit was no longer required.

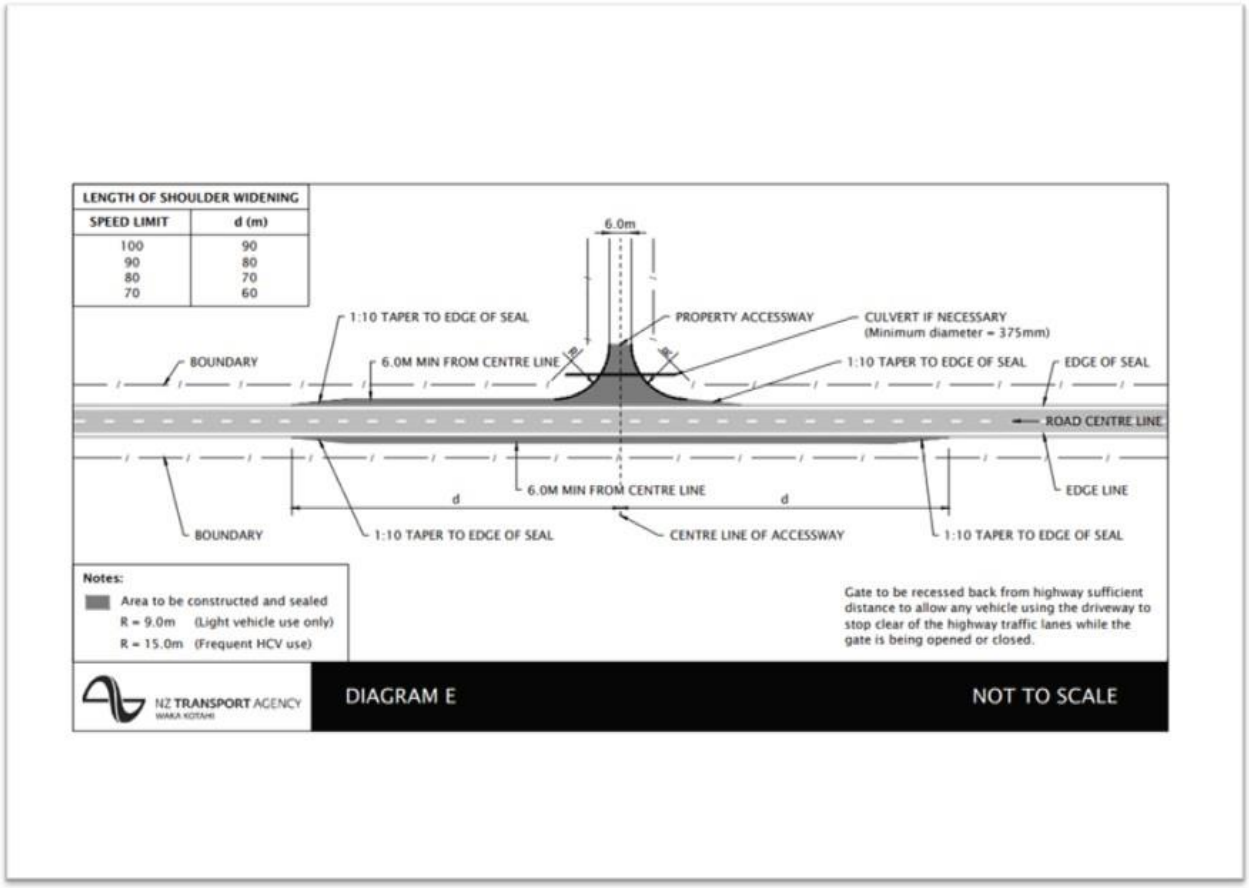

Figure 2.4 NZTA Planning Policy Manual Diagram E.

The seal widening goes some way towards addressing our concerns about safety effects that the SH73/Homebush Road intersection, but in our view additional mitigations should be provided, such as warning signage and temporary speed limit reductions and this can be achieved through the implementation of a construction Traffic Management Plan (TMP).

The matter of temporarily reducing the speed limit during the times at which a large number of vehicles are turning right during the construction period is in our view an important measure to reduce road safety risks. The Austroad warrant for right turn bay in a 100 km/hr environment shown in Figure 2.1 is best practice guidance as to when the road safety risk of not providing a right turn bay reaches unacceptable levels. As the green line on the x-axis (corresponding to the proposed 80 right turning vehicles per hour) passes beyond the red curve, the guidance recommends a channelised right turn treatment. Specifically, the BAR treatment proposed by the applicant does not go far enough to mitigate road safety risk as the number of right turners exceeds what is considered to be acceptable.

The Austroads guidance helpfully includes a similar warrant for speed environments between 70km/hr and 100 km/hr, which has a more generous (higher) threshold in terms of right turn movements. This is because in a lower speed environment, drivers passing Homebush Road will be able to more easily react to a right turning vehicle ahead of them. At a slower operating speed they have more time to

identify the hazard, decelerate accordingly and use the basic right turn treatment offered by the applicant. The corresponding Austroads warrant graph which reflects posted speed limits of 80 km/hr and 90 km/hr is included in Figure 2.5. The green line shows the applicant's proposed 80 right turning vehicles per hour between 7-8am.

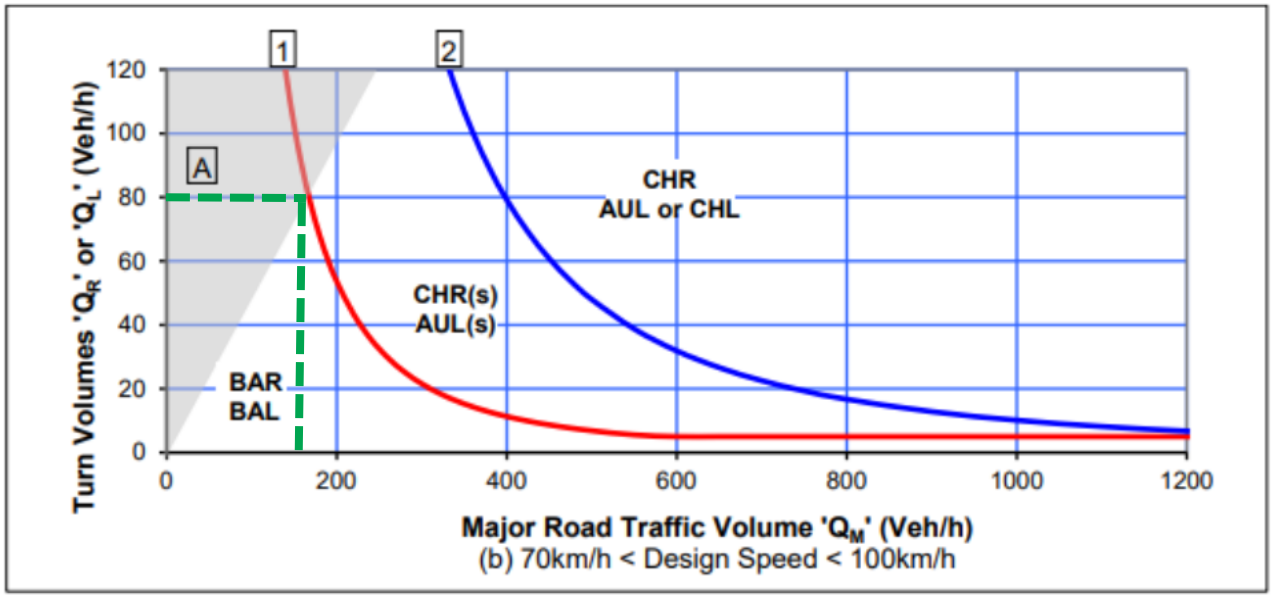

Figure 2.5 AGTM06 80 km/hr turning warrant assessment

Unlike the applicant's 100 km/hr assessment in Figure 2.1 it is noted that the green line does not extend past the red curve in Figure 2.5. This means that the short channelised right turn treatment is not required if a slower speed environment were adopted. We recommend that at the times that more than 35 right turning vehicles are anticipated per hour, a temporary speed reduction is implemented on SH73 in the vicinity of the intersection to mitigate the road safety risk and align with the Austroads guidance. This can in our view simply be included as part of the CTMP and in practical terms would require the installation of a temporary variable messaging sign (VMS) either side of the intersection for the duration of construction. NZTA's Speed Management Guide[1] provides information relating to the installation of temporary or semi-permanent infrastructure including variable speed limit signage which is typically installed in the vicinity of schools but would also be appropriate in this context.

However, as NZTA is the Road Controlling Authority and is comfortable with only requiring seal widening, we understand that we (and Council) are in a difficult position to require additional mitigations within NZTA's corridor.

To address this difference of opinion, we recommend that the CTMP condition is amended to allow NZTA and the applicant's experts to further consider mitigations in the lead up to, and during, the construction phase.

Our recommended amendments to the CTMP condition are in red underline text below.

> *8. The CTMP shall include, but not be limited to:*
>
> *(a) Construction traffic routes;*
>
> *(b) Measures to control the numbers of vehicles turning right into Homebush Road off SH 73 such that they do not exceed 80 vehicles per hour;*

[1] https://www.nzta.govt.nz/assets/resources/speed-management-guide-road-to-zero-edition/speed-management-guide-road-to-zero-edition.pdf

(c) Measures to manage traffic at the Homebush Road railway crossing;

(d) Nature and duration of any temporary traffic management proposed including the ongoing use of temporary warning signage and a temporary speed reduction on SH73 to 80 km/hr near the SH73/Homebush Road intersection, to be operational at times when the number of right turning vehicles exceeds 35 vehicles per hour. It is noted that any such traffic management measures would be subject to the approval of NZTA; and

(e) Measures to prevent, monitor and remedy tracking of debris onto public roads and dust onto sealed sections; and

(f) provision of sufficient onsite access and manoeuvring space, and parking spaces.

xx. Prior to the commencement of construction on the site, the Consent Holder shall upgrade the SH73/Homebush Road to include seal widening on the western side of SH1, in accordance with NZTA Planning Policy Manual Diagram E, at the expense of the Consent Holder.

Advice note: Separate to any requirements under the Resource Management Act 1991, there may be other legislative requirements that regulate works within the State Highway corridor. Further advice should be sought from NZTA.

2.3 Glare effects

The Glare Assessment report identified that multiple sections of the surrounding transport network could be affected by glare effects, refer to Figure 2.6 below. We note that the Glare Assessment report defines:

- "Yellow glare" as "Potential to cause temporary after-image"
- "Green glare" as "Low potential to cause after-image".

The Glare Assessment report went on to recommend tracking adjustments and/or additional screening measures to mitigate this effect.

The Landscape and Visual Assessment report recommended 2–3m high planting along the southwestern, southern and parts of the eastern and northern site boundaries to mitigate glare effects. However, it was unclear if this was sufficient to mitigate the glare effects identified in the Glare Assessment report. Further, there was the potential for glare effects to be unmitigated prior to planting achieving the required height.

Figure 2.6 Locations where glint and glare are most likely to occur at different times of the day and year (reproduced from Glare Assessment)

In the Glint and Glare response letter, Dave Mansergh stated that:

- Yellow glare will be mitigated by screening and ensuring that the PV Arrays in the locations expected to produce yellow glare are installed at minimum height
- Any effects of green glare that are identified as a traffic safety issue by Mr McKenzie will be addressed through tracking management (if necessary)
- Along Auchenflower Road the height of the mitigation planting/screening only needs to be 2m high to mitigate the glare from the proposed solar farm
- At the SH73/Homebush Road intersection a minimum height of 3m is required to mitigate the effects of yellow glare in the intersection. Green glare is still expected to occur for up to five minutes per day between 7am and 9am from April until October.
- Mitigation can be achieved instantly through the establishment of a shade cloth fence until the mitigation planting becomes established and reaches the required height.
- That Glare condition (Condition 22) included in the application documents be replaced with a more adaptive approach.

In the Transport response letter, Don McKenzie provided further commentary noting the low number of vehicle movements on Auchenflower Road and Homebush Road (where there could be residual Green glare effects).

We generally accept the responses from Mr Mansergh and Mr McKenzie, and understand that there are uncertainties in accurately predicting glare impacts ahead of time, and consider that a condition of consent that allows an adaptive approach is appropriate. However, we have recommended some changes to the proposed consent, as shown below in red, to address the uncertainty of “Green glare” effects to road users.

22 Glint and Glare Adaptive Management Plan

The Consent Holder must prepare and implement a Glint and Glare Adaptive Management Plan (GGAMP) to address any substantiated adverse glint and glare impacts on affected parties and/or the surrounding road network as identified in the Glint and Glare Analysis Report (dated 25 June 2024). The GGAMP must include the following:

(a) *Details of screening to be established in line with the Glint and Glare Analysis Report (dated 25 June 2024) as updated by the memo: Darfield Agrivoltaic Development: Request for Additional Information (S92) Response, Mansergh Graham, Dated 9 December 2024. For the avoidance of doubt, temporary screening is required to a height of 3 metres to mitigate effects of "Yellow glare".*

(b) *Contact Information: The GGAMP must provide contact details for the Consent Holder and their agent responsible for addressing glint and glare complaints, ensuring that affected parties have a direct line of communication for reporting issues.*

(c) *Reporting Procedures: The plan must include procedures for reporting glint and glare issues by affected parties, including Road Controlling Authorities and KiwiRail for any road or rail network affected by "Yellow glare" or "Green glare". This includes:*

   i. *The process for lodging a complaint.*

   ii. *The timeline within which the Consent Holder must acknowledge receipt of the complaint.*

   iii. *A detailed timeline for the investigation and response process, ensuring that any substantiated glare issues reported are addressed promptly and effectively within a specified timeframe.*

   iv. *Adaptive Management Strategies: The GGAMP should detail a range of possible mitigation solutions to address reported glint and glare issues. These solutions may include but are not limited to, physical alterations to the solar farm setup, installation of screening or landscaping to block or diffuse glare, and adjustments to the operational procedures of the solar farm (such as tracking management).*

(d) *Monitoring and Evaluation: The Consent Holder must implement a monitoring regime to assess the effectiveness of the mitigation measures implemented under the GGAMP, including any road or rail network affected by "Yellow glare" or "Green glare". This includes feedback from affected parties on the resolution of reported glare issues.*

(e) *Duration of the Plan: Unless otherwise authorised by the Consent Authority, the GGAMP must be implemented for whichever is the greater duration of the following:*

   i. *A period of three years following the mitigation planting obtaining the minimum 3m height;*

      Or

   ii. *For a year following any remedial action undertaken.*

   During this period, the Consent Holder is obligated to respond to and manage glint and glare complaints as per the procedures outlined in the GGAMP.

(f) *Review and Reporting: The Consent Holder must submit an Annual Report to the Consent Authority if requested, summarising the glint and glare complaints received, actions taken, and the effectiveness of the mitigation measures implemented. The Annual Report may also recommend whether ongoing management of glint and glare issues is required along with any relevant supporting information.*

Advice Note

An adaptive management plan offers a flexible and responsive approach to managing glint and glare that may arise from the approved agrivoltaic activity, recognising the inherent challenges and uncertainties in accurately predicting glare impacts ahead of time. This approach allows for real-time monitoring and addressing of actual impacts as they occur, rather than relying solely on predictive models that may not fully capture the dynamic and variable nature of sunlight and its interactions with the environment. By focusing on adaptive measures, the plan can more efficiently respond to affected parties' concerns, ensuring that mitigation strategies are directly tailored to the specific conditions and experiences of those impacted.

3. District Plan Compliance Assessment

The proposal complies, or can comply, with the majority of transport aspects of the Partially Operative Selwyn District Plan.

In summary, the proposal infringes the following rules:

- TRAN-R7 Rural Vehicle Movements and Associated Parking. At times during the construction phase, the activity could generate:
  - up to 60 heavy vehicle movements (two-way) per day and 12 heavy vehicle movements (two-way) per hour
  - up to 240 light vehicle movements (two-way) per day and 100 light vehicle movements (two-way) per hour.
- TRAN-R8 High Trip Generating Activities. At times, more than 50 vehicle movements per hour will be generated during the construction phase of the project.

3.1 TRAN-R7 Rural Vehicle Movements and Associated Parking

During the construction phase, the activity will generate more than 60 equivalent vehicle movements per day. Matters of discretion that are relevant to the site are limited to TRAN-MAT10.1, which provides discretion over any works required to upgrade the adjacent road to the formation standards listed in TRAN-SCHED3 Road Formation and Operational Standards.

TRAN-SCHED3 identifies that Local Roads in the GRUZ must have a carriageway width of 6.7m to 7m wide. The Transport Assessment identifies that the carriageway width is approximately 6.5m wide, however we consider a degree of estimation and variability in width means the carriageway generally complies with TRAN-SCHED3. However, an increase in heavy vehicle movements during the construction phase could result in increased carriageway wear and tear.

We therefore recommend that Council's Planner, in conjunction with Council's Roading Manager, consider whether the following condition of consent should be applied:

xx. Prior to the commencement of construction on the site, the Consent Holder shall arrange a site meeting with the Council Roading Manager to agree on the existing condition of Council assets on the Homebush Road and Loes Road.

The Consent Holder shall include a monitoring plan to monitor and report on any damage to public roads, berms, drains, or other Council assets along the Homebush Road and Loes Road, as a result of the construction activities.

The monitoring plan shall be provided to Council for certification at least twenty (10) working days prior to the commencement of construction.

Should the monitoring plan show that damage has occurred, Council shall be notified within 24 hours of its discovery (or immediately where the damage presents a safety hazard). The costs of rectifying such damage and restoring the asset to its original condition will be met by the Consent Holder.

3.2 TRAN-R8 High Trip Generating Activities

At times, more than 50 vehicle movements per hour will be generated during the construction phase of the project. Matters of discretion are specified in TRAN-MAT8. We consider that access and on-site manoeuvring areas, and travel demand management, can be addressed through the CTMP. Refer to our discussion in Section 2.2.

3.3 Other matters

The Transport Assessment assesses several Transport Rules and states that these can comply with District Plan, noting that the final site design is yet to be confirmed. We recommend that this is secured through amendments to Condition 6 as follows:

> *6. Prior to the commencement of construction on the site, the vehicle crossings on Homebush Road and Loes Road which will be used for access during construction shall be formed and sealed in accordance with Diagram E10.D of the Operative District Plan (Rural Volume), at the expense of the Consent Holder. The Consent Holder shall ensure that all vehicle accessways, parking, manoeuvring and loading areas comply with TRAN-R5 and TRAN-R6 of the Partially Operative District Plan.*

4. Conclusion

This technical note outlines a review of the transport effects of a resource consent application to construct and operate a solar far. The proposal does not comply with TRAN-R7 and is classified as a high trip generation activity per TRAN-R8.

We consider that the transport safety and efficiency effects within the site and adjacent local road network can be managed through the following conditions of consent and advice notes:

- An advice note regarding the Homebush Road level rail crossing, as discussed in Section 2.1
- Amendments to Condition 8 CTMP, as discussed in Section 2.2
- Amendments to Condition 22 for the Glint and Glare Adaptive Management Plan, as discussed in Section 2.3
- Amendments to Condition 6 to address accessway, parking and manoeuvring areas as the site design is developed, as discussed in Section 3.3

We remain concerned that there may be safety effects at the SH73/Homebush Road intersection that may not be adequately mitigated. This could be addressed by introducing a temporary speed limit reduction on SH73 when right turn movements from SH73 into Homebush Road exceed 35 vehicles per hour. However, as NZTA is the Road Controlling Authority and is comfortable with only requiring seal widening, we understand that we (and Council) are in a difficult position to require additional mitigations within NZTA's corridor. To address this difference of opinion, we recommend that the CTMP condition is amended to allow NZTA and the applicant's experts to further consider mitigations in the lead up to, and during, the construction phase.

Further, we recommend that Council's Planner and Council's Roading Manager consider whether a condition of consent is required to monitor potential damage to Council roading assets on Homebush Road and Loes Road, as discussed in Section 3.1.

Auckland
Level 1/70 Shortland Street
Auckland 1010
Aotearoa New Zealand

Wellington
Level 1/119-123 Featherston Street
Wellington 6011
Aotearoa New Zealand

Christchurch
Level 1/137 Victoria Street
PO Box 36446, Merivale
Christchurch 8146
Aotearoa New Zealand

hello@abley.com
+64 3 377 4703
abley.com