16. LIGHTING

Overview

This chapter assesses the potential effects of the proposed lighting for the construction and operation of the Project. The Project is located within a semi-rural environment (with some existing residential and commercial/industrial properties). Therefore, it is not necessary for the proposed motorway to be fully illuminated. On sections where lighting is required for road safety, being conflict points, intersections and on/off ramps, associated local roads, overbridges and underpasses that have significant pedestrian use, there will be an increased level of illumination, which will comply with the relevant road lighting Standard AS/NZS 1158. It is considered that compliance with Standard AS/NZS 1158 appropriately balances the safety of road users and effects on the surrounding environment.

There will be some visual differences to residents as a result of increased light levels. However, it is considered that overall, the lighting effects which include spill light, glare, sky glow and headlight sweep on the surrounding environment, will be minimal. As a result, no specific measures are considered necessary to mitigate potential lighting effects. The operational lighting for the Project will achieve satisfactory illumination for road safety, as well as effective mitigation of light pollution in the immediate surrounds.

Construction lighting effects will be temporary in nature. Potential light spill and glare effects will be managed through the measures outlined in the CEMP.

16.1. Introduction

This chapter assesses the potential effects of the proposed lighting for the construction and operation of the Project on road users and residents. It takes into consideration potential effects such as spill light, glare, sky glow and headlight sweep that may result from vehicle headlights and proposed lighting installations. Some road lighting is essential for road and pedestrian safety reasons, but it will be carefully designed to comply with relevant road lighting standards (as discussed in Section 16.2 below).

This assessment is based on preliminary design concepts only. Some of the finer technical details cannot be included until final construction designs are in place. The final lighting design will be in general accordance with the Lighting Concept Drawings included in the Plan Set (Volume 5). The full assessment of potential lighting effects of the Project is provided in Technical Report 19 (Volume 3).

16.2. Relevant standards and district plan provisions

The series of standards used for designing road lighting in New Zealand is the Australian/New Zealand Standard AS/NZS 1158 Road Lighting ("AS/NZS 1158"). AS/NZS 1158 is considered to be the appropriate standard for lighting roads in New Zealand as it provides design requirements and

recommendations prepared by committees and lighting experts, government bodies, road users and other sectors.

The Australian Standard AS 4282:1997 "Control of Obtrusive Effects of Outdoor Lighting" ("AS 4282") has also been considered in the assessment of lighting effects. It should be noted that this Standard has not been adopted in New Zealand, and it specifically excludes road lighting. However, it provides some guidance on what spill light and glare effects are acceptable.

As notices of requirement for designations are being sought, the Project is not required to comply with any lighting standards or provisions in the Selwyn District Plan or the Christchurch City Plan.

16.3. Description of existing environment

The Project alignment runs largely through 'greenfields' land with no existing road lighting, except where CSM2 merges with CSM1. Once CSM1 is complete, the road lighting in this location will be provided via 12.6m sectional steel lighting columns, installed in a 'Dual Staggered' arrangement.[74]

Given the semi-rural nature of the environment, there is existing road lighting at the following intersections:

- 'Flag lighting' at the intersection of Waterholes and Hamptons Roads;
- Lighting at the intersection of Main South Road, Curraghs and Robinsons Roads; and
- Overhead distribution poles at Shands and Marshs Road intersection.

Residents living near to these light installations will therefore be used to some lighting in their immediate vicinity.

16.4. Proposed lighting

Since the Project is located in a semi-rural environment, it is not proposed to fully light the motorway or Main South Road. Lighting is only required where it is needed for road traffic and pedestrian safety. It is proposed to install lighting at the following sections of the Project:

- Main South Road carriageway from Rolleston and Weedons Road interchange to approximately chainage 3900;
- Intersection lighting will be used at MSRFL, intersections and roundabouts at Weedons Road and Weedons Ross Road;
- Intersection and local road lighting for Weedons Road and Levi Road;
- Intersection flag lighting will be used at MSRFL intersection with Berketts Road;
- Intersection flag lighting will be installed at the intersection of Waterholes and Hamptons Roads;
- Intersection lighting at the roundabout with Robinsons Road / Curraghs Road including lighting within Curraghs Road overpass;

[74] 'Dual Staggered" arrangement means two rows of lighting columns offset from each other either side of the carriageway.

- Intersection lighting at the roundabout with Waterholes Road / Dawsons Road and Main South Road;
- CSM2 carriageway from 0 to 1400 chainage, including all on/off ramps, the MSRFL and CSM2 junction, overbridges, underpasses, link roads and intersections;
- CSM2 carriageway from approximately 4250 chainage to the CSM1 tie-in;
- Shands Road interchange and intersections with Shands and Marshs Roads, including underpass lighting at Shands Road and Marshs Road;
- Springs Road underpass, Halswell Junction Road underpass, and the half-interchange;
- CSM2 off ramp and the new roundabout at the junction of Halswell Junction Road and John Paterson Drive; and
- New local road for John Paterson Drive.

The proposed lighting will be in accordance with AS/NZS 1158.1.1 to a V3 subcategory[75] or the equivalent standard that applies at the time the Project is constructed. In some sections, no lighting is required. Subcategory V3 will generally be applied to all conflict areas, interchange connections, underpasses and interchanges.

The lighting column arrangement for the main carriageway will be designed as "Dual Staggered". The light fixtures will be directed onto the carriageway aimed away from houses to reduce glare and spill light. The Project will use semi-cut off (Type 2) light fittings for the main carriageway, and full cut-off (Type 3) light fittings will be used in more sensitive areas, such as on/off ramps, and overbridges to further reduce spill light effects.

Lighting of adjoining sections of local SDC and CCC local roads will be to V3 or V4 standards, as appropriate. At John Paterson Drive, new lighting will match the existing lights. All underpasses will be lit to comply with the appropriate category of AS/NZS 1158.1.1.

It is not proposed to install lighting at the CSM2 Hamptons and Trents overbridge as this is not a requirement of the applicable standards. However, some ducting will be installed in the event that lighting is needed in the future.

It is proposed to light cycle ways (as described in Section 4.8 of Chapter 4) to comply with AS/NZS 1158.3.1 (subcategory P3).[76] The exception to this is the new section of the Little River Rail Trail cycleway between Marshs Road and CSM2, which like the remainder of the Rail Trail cycleway, will be unlit.

16.5. Assessment of effects

The potential adverse effects typically associated with lighting, being spill lighting, glare, sky glow and head light sweep, have been assessed for each of the key sections and elements of the Project (motorway traffic, interchanges, underpasses, overpasses and pedestrian/cycle ways) against AS/NZS 1158.

[75] Subcategory V3 applies to motorways/roads that are mainly for vehicle use with no or few pedestrians.
[76] Subcategory P3 applies to pedestrian or cycle orientated roads and pathways.

16.5.1. Operational effects

There will be some visual differences to residents due to the increased light levels on existing dark surrounds. For example, the location for the proposed Weedons Road interchange is not currently lit, although there is minimal 'flag lighting' within the area. Therefore, the installation of lighting will alter the overall appearance of the area. Residential houses, farm land and commercial properties in the immediate area will be exposed to greater levels of illumination, where previously there were none.

For some sections of the Project, no lighting is required. Therefore, some residences located adjacent to the alignment will remain unaffected by any adverse lighting effects.

For the Project as a whole, potential spill lighting will be managed through the use of appropriate light fixtures (luminaires or light fittings). These light fittings project light efficiently to the areas where they are needed. Modelling carried out for spill light levels indicate that the effects on nearby residences will be minor or of no effect. The expected light spill levels are compliant with AS/NZS 1158 and detailed in Technical Report 19.

Modelling has also been carried out to assess potential glare effects. The results of this modelling indicate that glare will be kept below the maximum threshold levels specified in Standard AS/NZS 1158.

Any contribution to sky glow that the Project may have will be mitigated through the use of lights that limit 'Upward Waste Light Ratio' (UWLR) in compliance with AS/NZS 1158. The lights proposed for the Project are fully compliant with this Standard.

More specifically, an assessment of the potential adverse lighting effects on sensitive receptors has been undertaken for the following proposed locations:

- Main South Road and CSM2 junction; and
- Shands Road/ Marshs Road Interchange.

The anticipated adverse effects for the Main South Road /CSM2 junction, the Shands Road interchange and the Springs and Halswell Roads underpasses are similar. New on/off ramps and additional general lighting are likely to increase levels of spill and glare lighting onto adjoining properties. Light fittings designed to reduce light spill and glare will be used for these areas to minimise the effects. Lighting columns located near the on/off ramps will be installed on the outside curves facing back towards the main carriageway. This will help minimise the effects of spill and glare lighting. Levels of light spill, glare and upward light will comply with Standard AS/NZS1158.

Because Robinsons Road / Curraghs Road is an underpass at a different grade to the main carriageway, the new lighting effect will be no worse than it is now. In fact, effects are likely to be improved (reduced) due to luminaire selection of full cut-off (Type 3) and / or because of the installed tilt angle of luminaires. The existing lighting on this intersection will either be

removed/relocated or incorporated into the new layout so any lighting effects will not be cumulative to what is there now.

Overall, the effects of operational lighting for the Project will be no more than minor, because the concept lighting design complies with AS/NZS 1158.

Any effects from headlights are considered to be minimal because vehicles will not generally be moving directly towards residential properties. Furthermore, for the majority of the route, the distances between residences and the road provide a sufficient buffer to further minimise any potential for adverse effects from headlight sweep.

16.5.2. Construction effects

Temporary lighting will be required in the main construction areas for any work carried out during the hours of darkness and/or for security reasons. This lighting will be designed to comply with the relevant District Plan rules, along with the requirements contained in Standard AS 4282. Any temporary road lighting required for realignment or construction reasons will be designed to comply with AS/NZS 1158. As a result, spill lighting, glare and upward waste light is not anticipated to cause nuisance to surrounding residents or motorists. The details of these lighting requirements will be contained in the CEMP. Accordingly, any adverse effects from lighting on vehicles or residents will be appropriately managed during construction.

16.6. Measures to avoid, remedy or mitigate effects

16.6.1. During operation

All road lighting has been designed to comply with the requirements of AS/NZS 1158. As a result, the potential effects of the road lighting will be no more than minor and no further mitigation measures are proposed. More specific information on the proposed lighting design can be found in Technical Report 19.

The proposed landscape mitigation planting for the Project will provide an additional visual barrier that will further reduce lighting effects.

16.6.2. Construction phase

Construction lighting is temporary in nature. Any potential adverse effects will be mitigated through the CEMP. The CEMP contains the following mitigation measures in respect to lighting:

- careful location of site offices and equipment in relation to any nearby residential areas; and
- use of lighting fixtures that do not produce spill, glare or upward light above the relevant standards (AS4282).

16.7. Conclusion

Road lighting is essential for road and pedestrian safety reasons. The effects of the proposed lighting for the operation of the Project on the surrounding environment will be no more than minor, provided that the final lighting design is prepared in general accordance with the concept lighting design (set out in the Concept Lighting Drawings included in the Plan Set (Volume 5)), and complies with the requirements of AS/NZS 1158. While no further mitigation measures are proposed, the landscape mitigation planting for the Project will assist to further reduce any adverse lighting effects arising from head light sweep. Construction lighting and any temporary lighting will be designed to comply with the relevant Standards and District Plan requirements, and lighting details will be contained in the CEMP.