

# KiwiRail Holdings – Palmerston North Regional Freight Hub - S92 Requests and Responses – Lighting

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Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	12 February 2021	Final response	I. Campbell			

The following expert responses are opinions based on my previous experience as a lighting designer.

## Question

Q 3) *Please provide an updated lighting layout showing light contours and the boundary of the NoR*

Following the addition of the sound barriers into the lighting software (AGi32) model, new obtrusive (spill and glare) calculations were completed, and the results were exported onto the drawings. The existing lighting drawings were updated, and two extra drawing sheets added to the set to include the spill light and glare calculation results. These are included as Appendix C to the updated design report included as Attachment 1 to this memo. Drawing Fig. 210 contains the spill lighting calculations and drawing Fig. 211 contains the glare calculations. The design areas for which the calculations were completed were the vertical surfaces corresponding to the building faces that are in immediate line of sight with the Freight Hub.

Q4 ) *Please provide the following, in relation to the lighting layouts:*

- (i) *The lighting calculations for the worst-case effects situation, which is with a maintenance factor of 1.0 (i.e. the initial values without depreciation for luminaire/LED aging and dirt accumulation).*

Following the addition of the sound barriers into the lighting software (AGi32) model, new obtrusive (spill and glare) calculations were completed using a maintenance factor of 1.0. Refer to drawings Fig. 210 and Fig. 211 included as Appendix C to the updated lighting design report and sections 4.6.1 and 4.6.2 of the report for further information.

- (ii) *Obtrusive lighting calculations for vertical illuminance spill light and luminaire maximum luminous intensity on the window line of surrounding residential properties (these could be simplified by a common calculation plane along the line of the closest dwelling).*

Vertical planes (corresponding to the front faces of all surrounding residential buildings) were added to the AGi32 lighting design software based on building outlines converted from GIS into AutoCAD. While the glare calculations indicate that some building vertical planes will receive in excess of 60,000 cd during curfew hours between 11pm and 6am (compared to the AS/NZS 4282 maximum glare limit of 1,000 cd), this can be mitigated during detailed design. Refer to the updated drawings included as Appendix C and Section 4.6.2 in the updated design report for further information.

To mitigate the glare the following measures can be adopted during detailed design:

- Use proprietary glare shields (rear, sides and/or front as required).
- Adjust luminaire mounting parameters (orientation, aiming angles and/or tilts as required).
- Select lower output luminaires, however this may require additional poles.
- Select alternative luminaires from other supplier(s).
- Specify a control system that turns off specific groups of floodlights that are not required during curfew periods based on operational requirements e.g. only the floodlights in areas that are operating would be on and all other floodlights would be off. This could be done by any combination of timers, movement detectors or 3-position (auto/off/on) control switches located in each of the operational areas.

- (iii) *Identify whether any of the proposed acoustic barriers along the site boundaries are considered to provide a level of mitigation of light effects to surrounding residential dwellings (if this mitigation is to be considered then these should be included in the lighting model).*

The acoustic barriers shown in the indicative landscape plan (Appendix C as lodged) have been added to the lighting AGI32 model and the assessment was updated. The results of the updated modelling are set out in Section 4 of the updated Lighting Design Report and in Appendix C. The assessment found that outcome is that the barriers while mitigating spill light do not provide adequate mitigation of the glare effects due to the barriers having heights of 3m to 5m whereas the LED floodlights are mounted at approx.22m on poles.

- (iv) *Calculation of the Upward Light Ratio in accordance with AS/NZS 4282:2019.*

The calculated UWLR of 0.003 is well under the maximum Zone A2 requirement of 0.01. Refer to the updated lighting design report section 2.6.3.

- (v) *Identify how the lighting addresses the requirements of North East Industrial Zone ('NEIZ') assessment criteria (h)(iii).*

The assessment criteria (h) (iii) are set out below:

*(iii) The extent to which lighting appropriately signals entrances and provides necessary visibility to these and any other areas that may be accessed after dark.*

All entrances to the Freight Hub site (from the external perimeter road) will be lit in accordance with the NZ road lighting standards during detailed design. This will facilitate safe egress for all vehicles entering and exiting the site. Indicative lighting around entrances from the adjoining road network are shown on the landscape plans.

- Q 5) *Please identify and assess any effects of train headlight sweep resulting from site train movements within the site, with particular regard to surrounding residential dwellings.*

At this stage a formal lighting assessment of train headlight sweep resulting from site train movements within the site is not able to be undertaken. To provide an indicative assessment a review of the general height of locomotives operating on the NIMT was undertaken. This review indicated that the locomotives are around 3.7m, with headlights at the bottom and top of the front of the locomotive (see below) and directed downward similar to vehicle headlights. The assumptions about the level of the rail yard in Technical Report A as lodged, is that the RL of the rail hub would be around 50m (plus or minus 0.5m). Typically, the top of the noise mitigation feature is at a minimum RL55m. Therefore, it is considered that because of the noise barriers it is unlikely that this will be an issue for most surrounding residents. The exception could be where properties or levels of dwellings are higher than the top of the noise barrier and residents can see into the yard. In these instances, they would see a light source moving but headlight sweep is unlikely to be an issue.



- Q6) *With reference to Technical Report A - Design, Construction and Operation, please provide the following clarifications*

- (i) *3.2 Key Elements, 3rd to last bullet point, states: "Overhead lighting in all yards with the possibility of providing underside lighting on tracks". What will this underside lighting on tracks consist of?*

Reference to the possible inclusion of underside lighting arose from the conversations with staff currently operating the existing Palmerston North Yard about the benefit of being able to have permanent lighting on tracks and this has not been developed further at this time. This will be reviewed in more detail at the detailed design stage.

The Design, Construction and Operation Report also references underside lighting (located at a low level) in the Arrival and Departure yard This could potentially be used to aid train inspections prior to train departure or to ensure a safe walking area between rakes of wagons. The following is an example of the latter.



Again, this aspect will be reviewed in more detail at the detailed design.

- (ii) *4.1 Luminaire and Mounting Parameters: there appears to be a typo error in the mounting height quoted for Type K luminaire. We expect this should be 22.078m. Please confirm.*

We clarify that the pole height is 22.4m however the luminaire sits below this height at 22.078m. It is normal to refer to the mounting height in lighting calculation.

- (iii) *Throughout the Lighting Design Report reference is made to 'low level lighting'. What is this referring to?*

There is some confusion around the text "low level lighting".

The lighting design refers to low level security lighting within the site on the internal roads (refer Fig 67, note 6 in the lodged lighting design report now Fig 200 in the updated drawings attached as Appendix C to the updated design report attached to is response). Security lighting within the site will be dealt with during detailed design in accordance with KiwiRail operational requirements.