

Before the Board of Inquiry
Waterview Connection Project

in the matter of: the Resource Management Act 1991

and

in the matter of: a Board of Inquiry appointed under s 149J of the Resource Management Act 1991 to decide notices of requirement and resource consent applications by the NZ Transport Agency for the Waterview Connection Project

Statement of evidence of Geoffrey Waller (Lighting) on behalf of the
NZ Transport Agency

Dated: 4 November 2010

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INDEX

INTRODUCTION..... 3

SCOPE OF EVIDENCE..... 4

EXECUTIVE SUMMARY 4

BACKGROUND AND ROLE..... 5

SUMMARY OF ASSESSMENT OF LIGHTING EFFECTS..... 5

POST-LODGEMENT EVENTS..... 9

COMMENTS ON SUBMISSIONS 9

PROPOSED LIGHTING CONDITIONS 11

ANNEXURE A: MEMORANDUM FROM AUCKLAND CITY COUNCIL (17 AUGUST 2010) 12

ANNEXURE B: PROPOSED LIGHTING CONDITIONS (AS LODGED)..... 13

ANNEXURE C: AMENDED PROPOSED LIGHTING CONDITIONS..... 14

STATEMENT OF EVIDENCE OF GEOFFREY WALLER ON BEHALF OF THE NZ TRANSPORT AGENCY

INTRODUCTION

- 1 My full name is Geoffrey Ashton Waller. I am an Associate of Beca Carter Hollings & Ferner Limited (*Beca*). I am a professionally qualified illumination engineer and lighting designer and have worked in this field for 34 years.
- 2 I am a Registered Lighting Practitioner (*RLP*) for both Australia and New Zealand as approved by the Illumination Engineering Society of Australia & New Zealand (*IESANZ*), a Fellow of the IESANZ, and hold New Zealand (No Limits) Electrical Registration. I also have UK Electrical Registration and am a CEI Registered Electrical Engineering Technician and UK IIE Member. I am, at present, the only Registered Lighting Practitioner in New Zealand.
- 3 I am Beca's illumination engineer and am involved with lighting projects throughout New Zealand, as well as internationally including Australia, Singapore and other Beca offices worldwide.
- 4 I was the lighting designer for the Auckland Skytower and was involved in its original resource consent application and also the lighting designer for its sister tower in Macau. My more recent experience has been undertaking lighting design and assessment on behalf of the applicant for the Wellington ASB Stadium, and as the peer reviewer for the Whangarei District Council in relation to the resource consent application for the Northland Events Stadium. I also acted as the expert lighting witness for the Eden Park Floodlights Resource Consent hearing.
- 5 My relevant professional experience includes the following:
 - 5.1 SH20 – Manukau link to SH1;
 - 5.2 Newmarket Viaduct;
 - 5.3 Auckland Central Motorway Junction Stage 2 Lighting;
 - 5.4 Auckland Harbour Bridge Roadlighting upgrade;
 - 5.5 SH3 Bell Block Bypass (New Plymouth);
 - 5.6 South Eastern Arterial Verification;
 - 5.7 Eastern Transport Corridor Motorway Overbridge;
 - 5.8 Northwestern Motorway Rosebank-Patiki Interchange; and

5.9 Auckland City Public Lighting Study (2002/2003).

6 My evidence is given in support of notices of requirement and applications for resource consents lodged with the Environmental Protection Authority (*EPA*) by the NZ Transport Agency (*NZTA*) on 20 August 2010 in relation to the Waterview Connection Project (*Project*). The Project comprises works previously investigated and developed as two separate projects, being:

6.1 The State Highway 16 (*SH16*) Causeway Project; and

6.2 The State Highway 20 (*SH20*) Waterview Connection Project.

7 I am familiar with the area that the Project covers, and the State highway and roading network in the vicinity of the Project.

8 I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Consolidated Practice Note (2006), and agree to comply with it. In preparing my evidence, I have not omitted to consider material facts known to me that might alter or detract from my opinions expressed.

SCOPE OF EVIDENCE

9 My evidence will deal with the following:

9.1 Executive summary;

9.2 Background and role;

9.3 Summary of assessment of lighting effects;

9.4 Post-lodgement events;

9.5 Comments on submissions; and

9.6 Proposed lighting conditions.

EXECUTIVE SUMMARY

10 My role was to prepare the preliminary lighting design and to perform an assessment of the Project's lighting effects. My assessment demonstrated that the Project lighting will meet the requirements of the relevant District Plans, Bylaws and Standards, and that the effects of the lighting will be minor or less than minor.

11 I have reviewed the submissions lodged on the Project that are relevant to lighting. Submitters' concerns include spill lighting, skyglow and the effects of the Project lighting on residential areas or riparian habitats. Having reviewed the submissions, I can confirm

that the proposed lighting conditions, as attached to my evidence, respond to these submitters' concerns appropriately and that the effects of the Project lighting will be minor or less than minor.

BACKGROUND AND ROLE

- 12 The NZTA retained Beca as part of a consortia team to assist with investigation and reporting on the Project, including scheme design engineering, environmental and planning professional services.
- 13 Before the Causeway (SH16) and Waterview Connection (SH20) projects were merged, each project had a separate team working on it. In late 2009, the "Westlink Team" (comprising Beca, URS and Tonkin and Taylor) which had been working on SH20, was combined with Aurecon (formerly Connell Wagner) which was working on the SH16 project. At that point, I was asked to prepare a preliminary lighting design for the eastern sections of the Project, being the upgrade of SH16 from St Lukes to Waterview and the new proposed SH20 section from Waterview to the Maioro Street Intersection.
- 14 I was then asked to prepare an Assessment of Lighting Effects Report (*Report*) in relation to the lighting of the whole Project, including the western section from Waterview to the Te Atatu Interchange on SH16. Mr Taylor from Aurecon peer-reviewed my Report.
- 15 My Report was lodged with the EPA in August 2010 as part of the overall Assessment of Environmental Effects (*AEE*) (specifically, Part G, Technical Report No. G.10).
- 16 That Report was accompanied by a set of Preliminary Lighting Plans (Drawing Nos. 20.1.11-3-D-C-161-100 to 119) (*Plans*), also contained in the AEE (see Part F, Drawing Set F.11). The Plans show the lighting proposed for the Project by the NZTA.

SUMMARY OF ASSESSMENT OF LIGHTING EFFECTS

- 17 In this section of my evidence I will briefly outline the methodology used in my lighting assessment and describe the key points of my Report.

Methodology used in preparing my report

- 18 When preparing my Report, I had regard to the requirements of the Waitakere City District Plan, the Auckland City (Isthmus Section) District Plan (*District Plans*), Auckland City Bylaw Part 13.5, Australian Standard AS 4282: Control of the Obtrusive Effects of

Outdoor Lighting, and Standard AS/NZS 1158: Roadlighting (*the Standards*).¹

19 My assessment considered the lighting effects of the Project during both its construction and operational phases, in each of the nine Project Sectors. For each Sector, my Report detailed the:

19.1 Existing lighting environment;

19.2 Proposed construction lighting (including temporary road and construction yard lighting);

19.3 Effects of the operational lighting on road users and residents; and

19.4 Recommended mitigation measures.

Potential adverse lighting effects

20 There are three main lighting effects that can have varying degrees of intrusiveness to vehicles and residents adjacent to the Project. These are:

Spill lighting

21 If luminaires are not correctly selected for the appropriate beamspread and properly aimed, there is a percentage of light that is not efficiently used to light its target. The result is wasted "light spill" which can fall into areas where not wanted. However, with the advent of computerisation, modern luminaires can be accurately designed and aimed to minimise this spill light component.

Glare

22 Glare is the brightness of a light in contrast to the background on which it is viewed, and is measured in "Threshold Increments" for road users and "Glare Rating" for elsewhere. A light looks brighter and has more glare when viewed against a black background, than when viewed in bright surroundings. Glare may be disabling and prevent adequate vision for completing a task. Disabling glare can be (and has been) eliminated from this Project. Discomforting glare is usually tolerable, although a nuisance, as it tends to draw the eye towards the light source. Glare is considered controlled if it is calculated below the 20% maximum of Threshold Increment (*TI*) in AS/NZS 1158 and AS 4282 for below a permissible Glare Rating of 50.

Skyglow

23 Skyglow manifests as a glow above a road when humidity is high. The effect is difficult to mitigate as it results from the reflection of

¹ Refer to page 5 of Technical Report G.10 for discussion of the various statutory and planning instruments.

light off the road onto water particles suspended in the air giving a glow effect. Skyglow can be reduced by using darker coloured surfaces and the specification of street luminaires that provide good optical control.

Assessment of lighting effects: Construction phase

- 24 During construction, there will be a number of construction yards that will be temporarily lit, and these will be operational all the hours of darkness.²
- 25 There will be strict controls around the lighting of these construction yards. For example, there will be a 10 metre buffer zone between any equipment requiring light and residential boundaries. Lighting will be designed to be below 100 lux. Asymmetrical floodlights with horizontal glass visors that are not raised more than 3 degrees above the horizontal plane will be used for general yard lighting.³ Glare shall be kept below the recommendation given in AS 4282 – 1997 “Control of the Obtrusive Effects of Outdoor Lighting” Tables 2.1 and 2.2.
- 26 The contractors will be required to use floodlights, either portable or temporary, mounted so that they do not cause glare by aiming lighting above the horizontal plane if directed towards any residences or towards public roads.
- 27 I consider that with the above requirements in place (as contained in proposed designation conditions), the potential lighting effects from the construction yards will be minor.

Assessment of lighting effects: Operational phase

- 28 In order to assess the predicted levels of spill lighting, a sample of residences closest to the Project was selected from each of the Sectors adjacent to residential areas.⁴
- 29 For each of the selected residences, spill lighting was modelled, taking into account the distance of the residence from the lighting columns. The expected vertical light level at the windows of the sampled residences did not exceed 2.74 lux, which is considered a minor effect. To give an indication of light levels, a bright full moon is 0.5 lux, Aotea Square about 10 lux.

² A plan showing the location of these construction yards is contained in Appendix G of Technical Report G.10.

³ Lighting plans for all construction works or construction facilities will be independently verified by a lighting specialist and then lodged with the Auckland Council for review and comment prior to night time works commencing. Refer to page 9 of Technical Report G.10 for further discussion.

⁴ Sectors 3, 4 and 8 were not included as they are not adjacent to residential areas. Refer to page 11 of Technical Report G.10 for the spill lighting modelling results.

- 30 For all Sectors, glare has been assessed as not exceeding 10% of the Threshold Increment, well below the 20% permitted by the Standards. Luminaires will be typically designed for roads which by their nature are designed to efficiently minimise spill light outside the carriageway areas.
- 31 Some residents will be exposed to different lighting effects than they are currently. For example, the Great North Road Interchange will have elevated lit ramps and the area will look brighter than previously when viewed from residences in Point Chevalier. Similarly, the internally lit northern tunnel portal will be visible after dark to residences in Point Chevalier that are in a direct sight line with that portal. However, residents in this area are familiar with the existing lighting and so the added lighting ambience will be of a lesser significance.
- 32 At present, there is no road passing through Sector 9 and the environment is relatively dark. The new motorway will exit the tunnels through the southern portal, passing through the Alan Woods Reserve and on south to the Maioro Street Interchange. At night, residents in this area will see the lit carriageway. However, there will be no significant spill lighting effect due to the use of fully-cut off luminaires on 20m columns. (Fully cut off luminaires allow no light above the horizontal plane, minimising spill lighting and glare). Additionally, the use of 20m columns is more optically efficient, allowing luminaires to be aimed downwards and reducing spill lighting and glare.

Mitigation

- 33 As it is proposed that the Project lighting will comply with the relevant Standards, during both the construction and operational stages, no further mitigation is required.

Conclusions in my assessment⁵

- 34 Roadlighting is a compromise between the provision of adequate safety lighting for road users and the minimisation of adverse lighting effects on non-road users. In my opinion, that compromise has been achieved with the lighting design for the Project.
- 35 The lighting of the Project, during both construction and operation, will be compliant with the relevant District Plans, Bylaw and Standards. Spill light, glare, and skyglow will be minimised through prudent lighting installation design, the use of semi cut-off and fully cut-off luminaires that are appropriately aimed to their targets, 20m high columns that reduce spill light and glare, a 10m buffer zone between construction yards, and residences and the use of asymmetrical floodlights with horizontal glass visors in those construction yards.

⁵ See page 34 of Technical Report G.10.

- 36 For the reasons set out in my Report, I consider the lighting effects of the Project to be minor or less than minor.

POST-LODGEMENT EVENTS

- 37 At the time of lodgement of the Report and associated Project notices and applications, the Auckland City Council (*the Council*) required a higher illuminance modification to AS/NZS 1158 (Modified Category P3) for areas considered to be mainly for pedestrians, such as the pedestrian / cycle ways in the Project. However, the Council has since reverted to the lesser illuminance levels as recommended in AS/NZS 1158 (being Category P3).⁶ This change means that the entire pedestrian / cycle way will be lit to 1.75 lux, a reduction from the previous 3 lux required by the Council.⁷

COMMENTS ON SUBMISSIONS

- 38 I have read the submissions lodged on the Project that raise lighting or related issues relevant to my area of expertise. Submitters have raised a variety of lighting concerns, including light spill and skyglow.⁸ As these issues have already been addressed in my Report⁹ and in my evidence, I do not propose to address them again here.
- 39 Accordingly, in this section of my evidence, I will address submissions that raise issues not previously covered.

Auckland City Council

- 40 In its submission, the Auckland City Council (ACC) sought as a condition the following:¹⁰

"Lighting spill The provision of international best practise (sic) in catering for light spill, throughout the whole route including interchanges, with plans to be submitted for the approval of Auckland Council."

⁶ See Memorandum from the ACC's David Dick to all Street Light Specifiers and Designers dated 17 August 2010 (copy attached to my evidence as **Annexure A**). This was brought to my attention post-lodgement.

⁷ See section 6.3.6, page 13 of Technical Report G.10. This change does not affect the Project lighting plans or conditions.

⁸ These include Submitter Nos. 014,185, 186, 191, 202, 203, 213, 225 and 230. For example, the request that "the negative light spill effects on the community and the environment are avoided". My Report and evidence already describes how any lighting effects are to be mitigated by environmentally friendly, latest technology, luminaries.

⁹ See section 6, (pages 8-13) and sections 7-14 of Technical Report G.10 for an assessment of the lighting effects in each of the Project sectors and the corresponding mitigation measures for each of those sectors.

¹⁰ Submitter No. 111 at section 4.9.

- 41 The Project lighting (including at the interchanges) is best international practice, using the latest technology luminaires, and designed to meet the relevant requirements of Roadlighting Standard AS/NZS 1158 and to comply with the relevant District Plans and Bylaws. When these requirements are met, it is my opinion that any adverse effects of the Project lighting will be minor or less than minor.
- 42 The ACC's submission also noted that "a full lighting assessment is expected as part of a future Outline Plan of Works" (*OPW*). However, that full assessment has in my opinion already been provided (and I note it has been peer reviewed).¹¹

Lighting effects of Construction Yard 7

- 43 Unitec New Zealand¹² has submitted concerns specific to the potential adverse effects of Construction Yard 7 (*the Yard*) (which will be operational 24 hours a day) on the adjacent Unitec Residential Village (*Village*), including the effects of perimeter lighting.
- 44 In response to Unitec's concerns, I visited the site on 1 November 2010. The Village is to the south of the Yard. It is on the opposite side of Oakley Creek, and is shielded from the Yard by mature trees. In addition to the distance and physical obstacles between the Village and the Yard, there will be strict controls around the lighting of construction yards. The proposed lighting conditions will require that before any construction yard is operational, a Temporary Construction Management Plan is submitted to an independent qualified illumination engineer and then reviewed by the Auckland Council to ensure that the Plan complies with the relevant District Plan, Bylaws and Standards. In my opinion, with these measures and safeguards in place, the adverse lighting effects of Construction Yard 7 on the Unitec Residential Village will be minor or less than minor.

Effects of lighting on residences and riparian habitats

- 45 Two submitters expressed concern that the Project lighting could "flood residential areas or riparian habitats with light throughout the night" and sought to "reduce skyward light pollution and be energy efficient".¹³
- 46 Light spill will be minimised through the use of fully cut-off luminaires on the motorway in sensitive areas such as where the

¹¹ Further, I understand that the NZTA does not propose to lodge a future OPW (certainly not for lighting) given the extent of detail already provided for the Project.

¹² Submitter No. 160, at para 2.4.

¹³ Submitter Nos. 185 (North Western Community Association) and 191(R & H Docherty).

motorway passes close to residential boundaries, or on the Causeway where riparian habitats could be adversely affected. Fully cut-off luminaires direct light down, minimising light spill.¹⁴ In my opinion, the effects of the Project lighting on residences and riparian habitats will therefore be minor or less than minor. The luminaires used on the Project will be latest technology luminaires which are energy efficient.

Cycleway lighting

- 47 In response to Denis Ng's submission (No. 14), I can confirm that the lighting levels of the cycleway and street lights during the Project construction and operation will be compliant with the relevant District Plans, Bylaw and Standards and will be no greater than existing.

PROPOSED LIGHTING CONDITIONS

- 48 In the documentation lodged with the AEE, the NZTA included a set of Proposed Consent Conditions (see Part E, Appendix E.1). This included proposed lighting conditions, attached to my evidence as **Annexure B**.
- 49 Following lodgement, the proposed lighting conditions have been amended for clarity and I recommend those amendments as being appropriate. An amended version of the proposed lighting conditions is contained in **Annexure C** to my evidence.



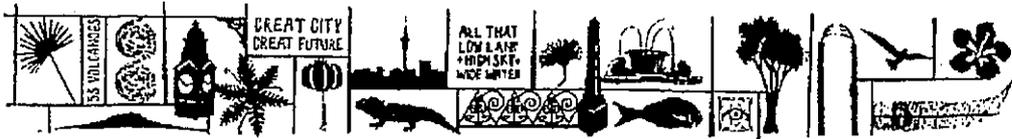
Geoff Waller
November 2010

Annexures:

- A Memorandum from ACC dated 17 August 2010
- B Proposed Lighting Conditions (as lodged)
- C Amended Proposed Lighting Conditions

¹⁴ See section 6.3.1, page 9 of Technical Report G.10.

**ANNEXURE A: MEMORANDUM FROM AUCKLAND CITY
COUNCIL (17 AUGUST 2010)**



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Memo

17 August 2010

To: Street Light Specifiers and Designers
From: David Dick

Subject: Street Lighting Design Standards.

A number of Auckland City Council documents refer specifically to design lighting levels for public lighting. Some of these publications have based the minimum illuminance levels on standards that have now been superseded or updated.

Auckland City Council adopted standard AS/NZS 1158 'Lighting for Roads and Public Spaces' as the design standard for street lighting. In 2003 Beca consultants reviewed the standard and recommended some modified illuminance levels, namely for P category roads and pedestrian crossings. Since then the AS/NZS 1158 set of standards has been revised several times. The latest set has added 1158.4 (part 4) which details lighting requirements for pedestrian crossings. This was not developed in 2003. Part 4 pays particular attention to vertical illuminance levels rather than relying on the horizontal component only. This ensures better safety for pedestrians.

All other sections of 1158 have received revisions (including 1158.3.1 – for P roads), with the oldest revision in 2005.

Over-lighting of roads can be more dangerous to drivers and pedestrians in some situations than under-lighting.

It is now appropriate to use the current complete set of the AS/NZS 1158 lighting standards as the Council standard for all street lighting design. Please take particular note of the following:-

Light colour.

Lights specified shall generally be HPS (golden yellow light). In some areas however white light is to be specified. These are:-

- The city centre and other main centres.
- Commercial areas with heavy pedestrian use in the night.
- Areas of significant tourist, historical, amusement and entertainment interest
- Public transport facilities and areas with security cameras
- Major intersections
- Pedestrian crossings signalised and non-signalised.
- Devices intended to slow traffic.

Lighting around trees.

Trees in public roads are a frequent occurrence, and can cast significant shadows on both the roadway and footpath areas. Engineering judgement is required when modelling trees when calculating illuminance, as it is not usually possible to model trees accurately.

Where possible, long outreach arms to extend the luminaire from the tree canopy onto the carriage way, and a short back arm with a low wattage luminaire to light the footpath is a good compromise solution.

Obtrusive light.

Residents are particularly sensitive to spill light onto residential properties. It is important to Council that it is a good neighbour, and therefore limits spill light from the public road onto abutting properties. AS/NZS 1158 and AS 4282 set out maximum levels of spill light onto properties. The Council bylaw 13.5 limiting spill light details maximum illuminance and glare requirements. This specifies a maximum of 10 lux on the horizontal or vertical plane at any residential boundary between 10pm and 7am. Council will check that these maximum specified levels are not exceeded both at the design stage and after construction.

Please note the following points.

Devices intended to slow traffic (such as speed bumps). AS/NZS 1158 part 3.1 clause 3.2.6.2. Each device is to be provided with a minimum illumination of 3.5 lux. Please note this is an absolute value, and is not in addition to any general road lighting illuminance.

These devices shall be provided with white light. Changing the nearest existing light to white will normally suffice. Where complete roads have calming devices installed at regular intervals along the road/street the whole street or section should be changed to white light.

For pedestrian refuges in P category streets the minimum horizontal illuminance shall be not less than 3.5 lux. Please note this is an absolute value, and is not in addition to any general road lighting illuminance.

Attached is a summary of the requirements for pedestrian crossings and refuges specified in AS/NZS 1158 2009 part 4.

END

ANNEXURE B: PROPOSED LIGHTING CONDITIONS (AS LODGED)¹⁵

	Operation
L.1	<p>Lighting shall be designed and screened to minimise the amount of lighting overspill and illumination of residential areas, in general accordance with the Waterview Connection Lighting Plan (Drawing Set F.11, Drawing No. 20.1.11-3-D-C-161-100 to 119), and shall demonstrate that:</p> <ul style="list-style-type: none"> a) All motorway lighting shall be designed in accordance with "Roadlighting Standard AS/NZS1158; b) All other lighting shall be designed in accordance with relevant rules provided in Rule 14 of the Waitakere City District Plan or Part 13 of the Auckland City Bylaw (April 2008); c) Fully cut off luminaires shall be used on SH20 from the Southern Tunnel Portal to the Maioro Street Interchange to minimise lighting overspill, as shown on Drawing Set F.11, Drawing No. 20.1.11-3-D-C-161-117 to 119.
	Construction
L.2	<p>A Temporary Construction Lighting Management Plan shall be prepared prior to commencement of any night time works for all construction zones and construction yards. The Temporary Construction Lighting Management Plan shall be independently verified by a lighting specialist and provided to the [Auckland Council] for review and comment 15 days prior to any night time work commencing.</p> <p>The Plan shall include, but not be limited to:</p> <ul style="list-style-type: none"> a) The layout and arrangement of all temporary lighting required for night time works, and shall show how this avoids the "Light Spill Restriction Zone" identified on the Construction Yard Plans (Drawing Set F.6, Drawing Numbers 20.1.11-3-D-C-161-100 to 112) submitted with the application; b) Provision for a 10m buffer between the night time work and any residential boundary at all times to minimise potential for light spill; and c) General operating procedures outlined in the CEMP.
L.3	<p>Asymmetrical floodlights with glass visors that are not raised more than 3 degrees above the horizontal plane shall be used for any temporary construction night time lighting requirements. Alternative temporary lighting arrangements may be used, subject to the prior approval of the [Auckland Council], where it can be demonstrated that the proposed lighting is similar or better to asymmetrical floodlights with glass visors</p>

¹⁵ See Technical Report G.31, page 41.

ANNEXURE C: AMENDED PROPOSED LIGHTING CONDITIONS¹⁶

	Operation
L.1	<p>Lighting shall be designed and screened to minimise the amount of lighting overspill and illumination of residential areas, in general accordance with the Waterview Connection Lighting Plan (Drawing Set F.11, Drawing No. 20.1.11-3-D-C-161-100 to 119), and shall demonstrate that:</p> <ul style="list-style-type: none"> a) All motorway lighting shall be designed in accordance with "Roadlighting Standard AS/NZS1158; b) All other lighting shall be designed in accordance with relevant rules provided in Rule 14 of the Waitakere City District Plan or Part 13 of the Auckland City Bylaw (April 2008); c) Fully cut off luminaries shall be used on SH20 from the Southern Tunnel Portal to the Maioro Street Interchange to minimise lighting overspill, as shown on Drawing Set F.11, Drawing No. 20.1.11-3-D-C-161-117 to 119.
	Construction <u>Zones</u> and Construction Yards
L.2	<p>A Temporary Construction Lighting Management Plan(s) shall be prepared <u>for all construction zones and construction yards</u> prior to commencement of any night time works <u>within the construction zones and construction yards</u>. The Temporary Construction Lighting Management Plan shall be independently verified by a lighting specialist and provided to the [Auckland Council] for review and comment 15 days prior to any night time work commencing.</p> <p>The Plan shall include, but not be limited to:</p> <ul style="list-style-type: none"> a) The layout and arrangement of all temporary lighting required for night time works, and shall show how this avoids the "Light Spill Restriction Zone" identified on the Construction Yard Plans (Drawing Set F.6, Drawing Numbers 20.1.11-3-D-C-161-100 to 112) submitted with the application; b) Provision for a 10m buffer between the night time work and any residential boundary at all times to minimise potential for light spill; and c) General operating procedures outlined in the CEMP.
L.3	<p>Asymmetrical floodlights with <u>horizontal</u> glass visors that are not raised more than 3 degrees above the horizontal plane shall be used for any temporary construction night time lighting requirements. Alternative temporary lighting arrangements may be used, subject to the prior approval of the [Auckland Council], where it can be demonstrated that the proposed lighting is similar or better to asymmetrical floodlights with glass visors. <u>Glare shall be kept below the recommendation given in AS 4282 – 1997 "Control of the Obtrusive Effects of Outdoor Lighting" Tables 2.1 and 2.2.</u></p>

¹⁶ Note: underlined text has been inserted, strike-through text has been deleted from the Proposed Lighting Conditions (as lodged) to show the changes proposed.