WAIHI NORTH PROJECT EARLY WORKS AREAS

Lighting Management Plan

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Revision: C

Quality Assurance Statement

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Distribution

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1. Intent

This Lighting Management Plan (LMP) has been prepared for OceanaGold New Zealand Limited (OGNZL) to manage lighting associated with the Waihi North Project (WNP) early works areas:

- Area 1 (Wharekirauponga/WKP surface exploration)
- Area 2 (Willows Surface Facilities Area)
- Area 5 (Water Treatment Plant upgrade)

The purpose of the LMP is to ensure that lighting used during construction and operational activities complies with the resource consent conditions related to exterior lighting, and is designed, installed, and managed to minimise adverse effects on surrounding residents, sensitive ecological areas, and the night sky while maintaining safety and operational effectiveness.

This plan has been prepared in accordance with Rule 54A of the consent conditions for the Waihi North Project and is consistent with the Lighting Assessment (AEE) and the National Light Pollution Guidelines for Wildlife (v2.0, May 2023).

2. Management Plan Certification Process

The Lighting Management Plan (this plan), required by the consent conditions, must be submitted to the Hauraki District Council at least 20 working days prior to the commencement of construction. Prior to the submission of the Lighting Management Plan, the consent holder must provide the Council with 10 working days' notice of the document being submitted.

The Lighting Management Plan may be subject to amendment through the life of the project. The consent holder must submit the updated or revised document to the Council for certification as soon as practicable following identification of the need for an update or revision by either the consent holder or the Council.

Prior to the submission of any amendment to the Lighting Management Plan, the consent holder must provide the Council with 5 working days' notice of the document(s) being submitted. Any amendments are to be agreed by the Council in writing prior to implementation of any changes. Any changes must be within scope of the consent, and once implemented would result in an outcome that is similar to, or better than that described in the original plan.

All works must be implemented and maintained throughout the duration of the construction activity in accordance with the certified Lighting Management Plan to the satisfaction of Council and at the expense of the consent holder.

3. Scope

This plan applies to all OceanaGold employees, contractors, and visitors working in Areas 1, 2, and 5 during both construction and operation. It covers:

- Fixed, mobile, and temporary construction lighting
- Operational lighting for facilities and plant areas
- Lighting mitigation measures to avoid spill light, glare, and skyglow
- Audit, monitoring, and complaints procedures

4. Legislation and Resource Consent Requirements

Legislation applicable to this project is outlined below:

- Health and Safety at Work Act 2015
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016
- Health and Safety at Work (Worker Engagement, Participation and Representation) Regulations 2016
- Conservation Act 1987
- Resource Management Act 1991

In addition to the above legislation, the project must comply with all resource consent conditions issued for the activity, in particular condition 54A of the resource consent, which pertains to the lighting management plan.

Refer also to OceanaGold's internal register for a complete list of relevant legislation, codes of compliance, codes of practice, Standards and Guidelines.

Ensure legislation is current at time of use.

5. Roles and responsibilities

Roles and specific responsibilities associated with each are summarised below in Table 1.

Table 1 - Roles and Responsibilities

Role	Responsibility
Project Manager	Implements and enforces this plan.
	Authorises any personnel to perform any duties under this procedure and ensures they are competent to carry them out.
	Ensures no lighting options are used without undergoing a formal approval process.
	Undertakes a light monitoring program during construction to ensure compliance with this plan.
Construction Site Manager	Ensures all personnel comply with this plan.
	Ensures all pre-start inspections and checklists are completed.
	Ensures any changes to this plan are communicated to all relevant personnel when they occur.
	Conducts random spot checks to confirm this plan is being followed and adhered to at all times.
Employee/Contractor/ Visitor	Confirms their own fitness for work at the commencement of every shift.
	Follows the rules of this plan.

Role	Responsibility
	Ensures all lights are switched off when not required and all light barriers are in place.
Lighting Professional	Prepares the Lighting Management Plan as a suitably qualified and experienced professional.

6. Lighting management plan

The LMP defines requirements for all fixed, mobile, and construction artificial lighting to ensure lighting effects are minimised and comply with the performance standards in Rule 54A and AS/NZS 4282.

The Hauraki District Council resource consent contains the following conditions regarding the lighting management plan:

> ***54A Lighting Management Plan***
>
> *At least 20 working days prior to the commencement of activities authorised by this consent, the Consent Holder shall submit a Lighting Management Plan to the Hauraki District Council for written certification under Condition C5 of Schedule One. The Lighting Management Plan must:*
>
> *a. Set out the requirements for all fixed, mobile, and construction artificial lighting to be used, including:*
>
> *(i) Set out the Plan's objective which is to minimise the adverse effects of lighting on fauna, dwellings and roadways*
>
> *(ii) Reference applicable legislation and standards*
>
> *(iii) Identify Consent Holder key roles and responsibilities*
>
> *(iv) Requirements for lighting design, selection, orientation and installation to balance operational and safety requirements with best practice lighting design in cognisance of Hauraki District Plan requirements, AS/NZS 4282: 2023 "Control of the obtrusive effects of outdoor lighting" and The Australian Government's "National Light Pollution Guidelines for Wildlife"*
>
> *(v) Require plant location and luminaire directions to minimise spill light and glare effects (i.e. aim lights away from dwellings, roadways and sensitive ecological areas).*
>
> *(vi) Limit the intensity/output of light fittings.*
>
> *(ix) Install blinds to windows and glass doors where site support facilities (e.g. Portacoms) are to be used after dark.*
>
> *b. Identify how lighting throughout the project will be minimised as far as practicable, so it meets the permitted standards of the relevant Hauraki District Plan zone.*
>
> *c. Identify where light shields should be used and require all lighting to be down facing to minimise effects on the night sky.*
>
> *d. Identify specific operational requirements.*
>
> *e. Include Lighting Audit Requirements and Periodic Review.*
>
> *f. Be prepared by a suitably qualified and experienced lighting professional.*
>
> — Hauraki District Council resource consent conditions (Appendix B2 – Conditions for the Hauraki District Council Land Use Consent), Fast Track decision 5 February 2026, Condition 54A.

6.1 Plan Purpose

To balance operational safety and efficiency with the protection of amenity, ecology, and night sky values.

6.2 Lighting Design Philosophy

Lighting implementation shall follow the best practice lighting design principles, as set out in the National Light Pollution Guidelines for Wildlife. Namely:

- Start with natural darkness and only add light for specific purposes.
- Use adaptive light controls to manage light timing, intensity and colour.
- Light only the object or area intended – keep lights close to the ground, directed, and shielded to avoid light spill.
- Use the lowest intensity lighting appropriate for the task.
- Use non-reflective, dark-coloured surfaces.
- Use lights with reduced or filtered blue, violet and ultraviolet wavelengths.

These principles are illustrated below in Figure 1.

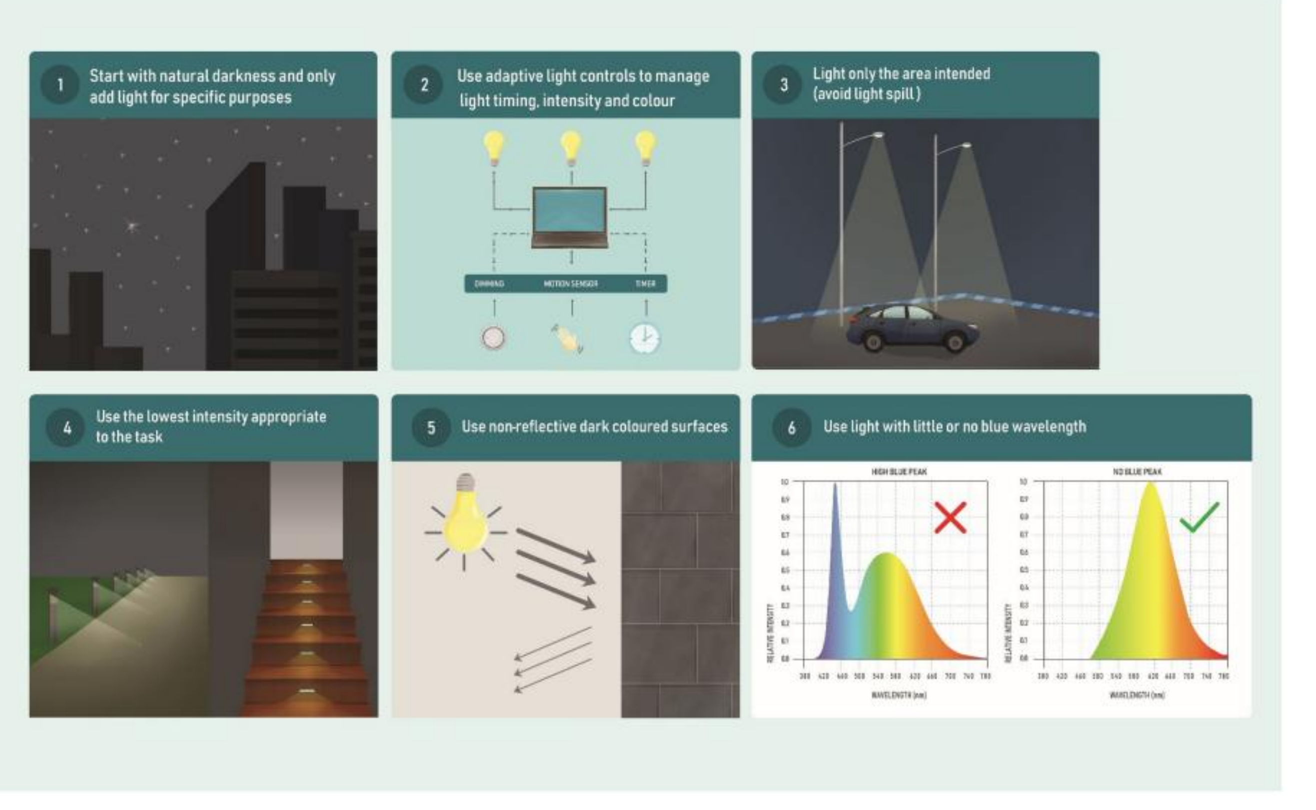

Figure 1 - Principles of best practice lighting design from the National Light Pollution Guidelines for Wildlife 2023 (Figure 4 in Guidelines)

Furthermore, as far as reasonably practicable, all lighting shall comply with the spill light requirements of the Hauraki District Plan of a maximum of 8 lux "at any point on or directly above the boundary of any adjacent site or road" (Reference: Hauraki District Plan, Section 8.2.5.3 (2)).

6.3 Requirements for Fixed, Mobile, and Construction Artificial Lighting

Where fixed, mobile, and construction artificial lighting is required, a task/location specific lighting drawing shall be prepared for each of the typical construction scenarios requiring lighting, in accordance with this Lighting Management Plan identifying the lighting proposed. Where controls such as dimming or shields are required for conformance, then details shall be included on the drawing. Any potentially adverse lighting effects shall be mitigated by measures including:

- Careful plant location and luminaire aiming to minimise spill light and glare effects i.e. aim lights away from dwellings, public roadways, and sensitive ecological areas.
- As far as reasonably practicable, aiming of luminaires away from external locations i.e., into the site.
- Reduction of the intensity / output of lighting fittings where practicable.
- The use of spill light shields and cut-off optics to minimise spill and glare where necessary.
- Downward aiming of luminaires as far as reasonably practicable (parallel with the ground)
- Installation of blinds to windows and glass doors where site support facilities (i.e. Portacoms) are to be used after dark.
- Turning off all artificial lighting when not required.
- Use of warm-colour-temperature lighting with a correlated colour temperature (CCT) of ≤3000K to minimise blue light emissions and reduce potential effects on wildlife and the night sky.
- **For Areas 2 and 5**, vertical illuminance (Ev) at the defined site boundary shall, as far as reasonably practicable, comply with the tolerance limits specified in AS/NZS 4282:2023. Refer to Table 2 for the applicable environmental zone parameters.
- **For Area 1 (WKP)**, due to the temporary and operationally dynamic nature of lighting on drilling platforms and the absence of a conventional fixed site boundary within the DOC conservation estate, compliance with AS/NZS 4282:2023 Zone A0 limits shall be demonstrated through implementation of the lighting design philosophy and mitigation measures outlined in Sections 6.3 and 6.4.1. Routine measurement and recording of lux levels at the frog fence boundary is not required, provided that the mitigation measures in Section 6.4.1 are implemented.
- The Upward Light Ratio (ULR) of all installed luminaires shall comply with the limits specified in AS/NZS 4282:2023. Refer to Table 2 for the applicable environmental zone parameters. Compliance may be verified through manufacturer luminaire photometric data and/or product datasheets (e.g., IES files), without requiring field measurement.
- Luminous Intensity (I) of the installed luminaires shall comply with the limits specified in AS/NZS 4282:2023. Refer to Table 3 for the applicable environmental zone parameters.
- Building facades shall not be illuminated and illuminated signage shall not be used.
- Completion of a risk analysis for any lighting proposed, to ensure health and safety is not compromised and effects to neighbours are minimised. The risk analysis shall take into account, as a minimum, task duration, need for vehicle safety lighting, need for work to occur outside daylight hours, location of works relative to sensitive areas, traffic management needs, and safety and health requirements.

6.4 Area-Specific Lighting Requirements

Lighting requirements have been tailored for each project area to ensure compliance with resource consent conditions and to minimise potential adverse effects on surrounding communities, sensitive habitats, and the night environment. The following outlines specific lighting design and operational measures for each area.

6.4.1 Area 1: Wharekirauponga (WKP)

The lighting requirements in Area 1, WKP comprise lighting for both the camp areas and the drilling platforms. Both the camps and the drilling platforms are contained on raised platforms with surrounding frog fences (polythene barriers). The drill platforms also include a sump area at the edge of the site boundary which require illumination.

Lighting in Area 1 (WKP) shall be managed with particular care due to its location within the Department of Conservation estate and proximity to ecologically sensitive habitats. The measures below ensure that lighting supports safe operations while minimising light spill and ecological disturbance.

- On the drill platforms, provide task lighting only for drilling operations and wayfinding; portable, low-output LED lights, illuminating only the object or area intended.
- Lights to be kept as low to the ground as reasonably practicable.
- Luminaires selected and installed to minimise effects on fauna; use light shields and cutoff optics as required to ensure minimal lighting of surrounding forest or waterways.
- As the WKP site exploration works are to be completed on the DOC conservation estate, there is not a conventional boundary from which to take illuminance readings for compliance.
- Lights to be mounted within the frog fence boundary of each area and shall not be mounted on the surrounding trees.
- As far as reasonably practicable, lighting shall be directed inwards towards the site. Where this isn't practicable, e.g. for the sump areas, the lights shall be mounted as low to the ground as reasonably practicable and shall include shielding to minimise spill light into the surrounding bush.

6.4.1.1 Verification of compliance - Area 1: (WKP)

Due to the temporary, portable and task-based nature of lighting at the WKP drilling platforms, formal as-built lighting drawings are not typically prepared for Area 1. Lighting configurations may change frequently to suit operational requirements.

For Area 1, compliance with this Lighting Management Plan shall be verified through confirmation that the lighting design intent and mitigation measures outlined in Sections 6.3 and 6.4.1 are in place, including (as a minimum):

- Lighting is limited to task and safety requirements only.
- Luminaires are positioned as low as reasonably practicable.
- Luminaires are directed inwards toward the work area where practicable.
- Shielding and cutoff optics are used where necessary.

- Luminaires are not mounted outside the frog fence boundary or mounted on surrounding trees.
- Lighting is turned off when not required.

6.4.2 Area 2: Willows Surface Facilities Area

Lighting at the Willows Surface Facilities Area shall be designed to provide safe and effective illumination for site operations while preventing light spill and glare beyond the site perimeter.

- Use fixed, directional luminaires with shielding; avoid spill beyond Willows Road.
- Lighting positioned to minimise glare and visibility off-site.

6.4.3 Area 5: Water Treatment Plant

Lighting at the Water Treatment Plant shall support essential safety and maintenance activities only, ensuring that lighting is operated in a manner consistent with energy efficiency and environmental protection objectives.

- Use perimeter lighting for wayfinding only; limit night-time operation to safety/maintenance needs.
- Allow localised task lighting with dimming or switch-off when maintenance is complete.

6.5 AS/NZS 4282:2023 Limits

AS/NZS 4282:2023 establishes quantitative limits for lighting parameters, including vertical illuminance (E_V), upward light ratio (ULD) and luminous intensity (I) based on the sensitivity of the surrounding environment. Note that the Hauraki District Plan does not specify a curfew period, therefore the nominated curfew period of AS/NZS 4282 shall apply, namely the curfew period is taken as between 11:00pm and 06:00am. The applicable environmental zones for each area are as described in the Assessment of Environmental Effects (AEE) - Lighting, included as Appendix B for reference.

6.5.1 Light Technical Parameter Limits

The light technical parameter limits allowable in AS/NZS 4282:2023, including Vertical illuminance (E_V, measured in lux), and Upward Light Ratio (ULR, unitless) are dependent on the environmental zone of the area. Table 3.2 in the standard, summarised as Table 2 below, provides guidance for light technical parameter limits for the different environmental zones.

Area	Environmental Zone	Maximum Vertical Illuminance (E_V), lux		Maximum Upward Light Ratio (ULR)
		Non-curfew	Curfew	
Area 1: WKP	Zone A0 – Intrinsically Dark	0[a]	0.0	0.00
Area 2: Willows Surface Facilities Area	Zone A1 – Dark, or Zone A2 – Low district brightness	2	0.1	0.00-0.01
Area 5: Water Treatment Plant	Zone A1 – Dark, or Zone A2 – Low district brightness	2	0.1	0.00-0.01

NOTES:

[a] For Zone A0 – Intrinsically Dark, E_V shall be as close to zero as reasonably practicable without impacting safety considerations

Table 2 - Summary of Light Technical Parameter Limits for various environmental zones, source AS/NZS 4282:2023, Table 3.2

Area 1 (Zone 0) verification note: For Area 1 (WKP), which is located within the DOC conservation estate, there is not a conventional property boundary for compliance measurement. For this reason, and due to the temporary and portable nature of lighting at the drill platforms, compliance with Zone A0 requirements shall be demonstrated through adherence to the lighting design philosophy and mitigation measures in sections 6.3 and 6.4.1 rather than routine measurement of boundary illuminance levels.

6.5.2 Luminous Intensity Limits

AS/NZS 4282:2023 also provides guidance on the maximum allowable luminous intensities per luminaire. These limits are summarised in Table 3 below

Area	Environmental Zone	Luminous Intensity (I), cd.		
		Non-curfew Level 1 (L1)[a]	Non-curfew Level 2 (L2)[a]	Curfew
Area 1: WKP	Zone A0 – Intrinsically Dark	See note b	See note b	0
Area 2: Willows Surface Facilities Area	Zone A1 – Dark, or Zone A2 – Low district brightness	2,500-7,500	5,000-7,500	500-1,000
Area 5: Water Treatment Plant	Zone A1 – Dark, or Zone A2 – Low district brightness	2,500-7,500	5,000-7,500	500-1,000

NOTES:

[a] Refer to AS/NZS 4282:2023 clause 3.2.5 for guidance on when it is acceptable to use L2 luminous intensity limits.

[b] For Zone A0 – Intrinsically Dark, I shall be as close to zero as reasonably practicable without impacting safety considerations

Table 3 - Summary of luminous intensity per luminaire limits for various environmental zones, source AS/NZS 4282:2023, Table 3.3

6.6 Monitoring and Audit Requirements

6.6.1 Initial Lighting Audit

An initial lighting audit shall be undertaken for each project area within 20 working days of the first installation and operation of exterior lighting, or prior to commencement of night-time works (whichever occurs first).

The purpose of the initial audit is to confirm compliance with this Lighting Management Plan and identify any issues early.

6.6.2 Ongoing Lighting Audits

Lighting audits shall be undertaken to ensure ongoing compliance with this plan. Audits shall be completed by a suitably qualified and experienced lighting professional every 12 months, or periodically when modifications occur.

Lighting measurements undertaken as part of the auditing process may be obtained either through direct field measurements using a calibrated light meter or by validated lighting calculation software that accurately replicates site lighting conditions. The chosen method shall be appropriate to the site circumstances and verified by a suitably qualified and experienced lighting professional to ensure accuracy and consistency with the requirements of AS/NZS 4282:2023.

Annual lighting audits shall include, as a minimum:

- The date of the last audit.
- The details of the measurement method and equipment.
- The details of the area being audited.
- The details of the auditor.
- Summary of findings, corrective actions, and recommendations.
- Documentation of compliance evidence and any deviations.
- Confirmation that the installed lighting is as per the submitted lighting drawings for the area. Note: Formal as-built drawings are not required for Area 1 (WKP), due to the temporary and portable nature of the lighting.
- Confirmation that lights are, as far as reasonably practicable, aimed away from dwellings, public roadways, and sensitive ecological areas.
- Confirmation that luminaires are, as far as reasonably practicable, aimed away from external boundaries.
- Confirmation that the lights are dimmable to reduce intensity when full output is not required.
- Confirmation that the illuminance is at a suitably low level so that work can be completed safely, without disturbance to neighbouring properties. i.e. the lowest intensity appropriate for the task.
- Confirmation that the lights are, as far as reasonably practicable, tilted downwards / at an angle of 0 degrees to the ground with flat glass.
- Confirmation that windows to site support facilities have blinds.
- Confirmation that lighting is turned off when not required.
- Confirmation that the upward light ratios of the luminaires are within the limits for the appropriate environmental zone, or as close as reasonably practicable without impacting safety considerations. With the upper limits of the ULR requirements of AS/NZ S4282:2023 as summarised in Table 2 of this guide.
- Confirmation that a lighting risk analysis has been undertaken.
- For areas 2 and 5:Confirmation that the spill light at the boundary is ≤8lux, as required by the Hauraki District Plan.
- For Areas 2 and 5: Confirmation that the vertical illumination, measured at 1.5 m above the ground, at the boundary is less than the requirements of AS/NZS 4282:2023 for the associated environmental zone of the site, as summarised in Table 2 of this guide. Note that the curfew period shall be taken as 11pm–6am.
- For Area 1 (WKP): Confirmation that the mitigation measures in section 6.4.1 are implemented and effective (including low-mounted, inward-directed, shielded/task-based lighting, and no mounting outside the frog fence boundary).
- Confirmation that the luminous intensity (I, in candelas) of each luminaire complies with the limits set out in AS/NZS 4282:2023, for the relevant environmental zone and luminaire category as summarised in Table 3 of this guide.
- Confirmation that there are no illuminated facades or illuminated signage used.
- Confirmation that the colour temperature of the lighting is, as far as reasonably practicable, ≤3000K.
- Confirmation that all lighting is, as far as reasonably practicable, contained within the operational boundary for the site.

An example form that may be used for the auditing process is included as Appendix A.

The results of each audit shall be submitted to the Environmental Manager and retained within the project's Environmental Management System (EMS) database for recordkeeping and verification purposes.

6.6.3 Lighting Audit Findings and Corrective Actions

Where an audit identifies a non-compliance with this Plan, the non-compliance shall be documented in the audit report.

All non-compliances with this Lighting Management Plan shall be notified and managed as an incident in accordance with Section 7 (Incidents and Reporting), including entry into OceanaGold's incident reporting system.

Where measurable lighting parameters are affected, follow-up verification shall be undertaken following implementation of corrective actions to confirm compliance.

7. Incidents and reporting

All incidents, including near misses, complaints, and confirmed or suspected non-compliances associated with this Lighting Management Plan, shall be reported to OceanaGold's nominated representative(s). Reporting must be completed by the employee, contractor, or visitor involved (or who becomes aware of the matter) using OceanaGold's standard incident reporting system, no later than the end of that shift or visit.

8. Complaints

A complaints register shall be maintained for any complaints received from any member of the community in relation to artificial lighting. As a minimum, the register shall record, where this information is available, the following:

- The date, time, and details of the incident that has resulted in a complaint
- The location of the complainant when the incident was detected

- The possible cause of the incident
- Any corrective action taken in response to the complaint, including timing of that corrective action
- Communication with the complainant in response to the complaint

The complaints register shall be made available to the Hauraki District Council on request.

Appendix A Lighting Audit Form Example

Section 1 – Audit Details

Date	
Area of site being audited	
Date of last audit for the site	
Weather conditions	
Sunset time	
Time that light measurements were taken	
Moon phase	

Section 2 – Lighting Audit Checklist

Audit Item No.	**Audit Question**	**Compliance** **(Yes / No / N/A)**	**Comments / Corrective Actions**
0	Has the lighting installation changed since the last audit?		
1	As far as reasonably practicable, are all lights aimed away from dwellings, public roadways, and sensitive ecological areas?		
2	As far as reasonably practicable, are luminaires aimed away from external boundaries?		
3	Are the lights dimmable to reduce intensity when full output is not required?		
4	Is the illuminance at a suitably low level so that work can be completed safely, without disturbance to neighbouring properties (i.e. the lowest intensity appropriate for the task)?		
5	As far as reasonably practicable, are lights tilted downwards / at an angle of 0 degrees to the ground with flat glass?		
6	Do windows to site support facilities have blinds?		
7	Operational: Is lighting turned off when not required?		
8	Are the upward light ratios of the luminaires within the limits for the appropriate environmental zone, or as close as reasonably practicable without impacting safety considerations? With the upper limits of the ULR requirements of AS/NZS4282:2023 as summarised in Table 2 of the Lighting Management Plan (LMP)		
9	Has a lighting risk analysis been undertaken, balancing operational safety with environmental risk?		

Audit Item No.	Audit Question	Compliance (Yes / No / N/A)	Comments / Corrective Actions
10	Areas 2 and 5: Is the spill light at the boundary ≤8 lux, as required by the Hauraki District Plan?		
11	Areas 2 and 5: As far as reasonably practicable, is the vertical illumination, measured at 1.5m above the ground, at the boundary is less than the requirements of AS/NZS 4282:2023 for the associated environmental zone of the site. With the upper limits for vertical illumination at the boundary as summarised in Table 2 of the Lighting Management Plan (LMP). Note that the curfew period shall be taken as 11pm-6am.		
12	Is the maximum upward light ratio (ULR) of the installed fittings within the limits prescribed by AS/NZS 4282:2023 for the associated environmental zone of the site?		
13	Does the luminous intensity (I, in candelas) of each luminaire comply with the limits set out in AS/NZS 4282:2023, for the relevant environmental zone and luminaire category as summarised in Table 3 of the Lighting Management Plan (LMP).		
14	Are there any illuminated facades or illuminated signs?		
15	Is the colour temperature of the lighting ≤3000K?		
16	Areas 2 and 5: Is the installed lighting the same as the submitted as-built lighting drawings?		
17	Area 1 (WKP) only – Are any luminaires mounted outside the operational boundary (e.g., outside frog fence / mounted on trees)? If yes, are they temporary, justified for safety, and mitigated with shielding/aiming controls?		
18	Area 1 (WKP) only – Is the lighting configuration consistent with the design intent and mitigation measures described in 6.4.1 (i.e. task-based, low mounted, inward-directed, shielded as required)		

Auditor Details

Auditor Name	Position	Date	Signature

Appendix B Assessment of Environmental Effects - Lighting