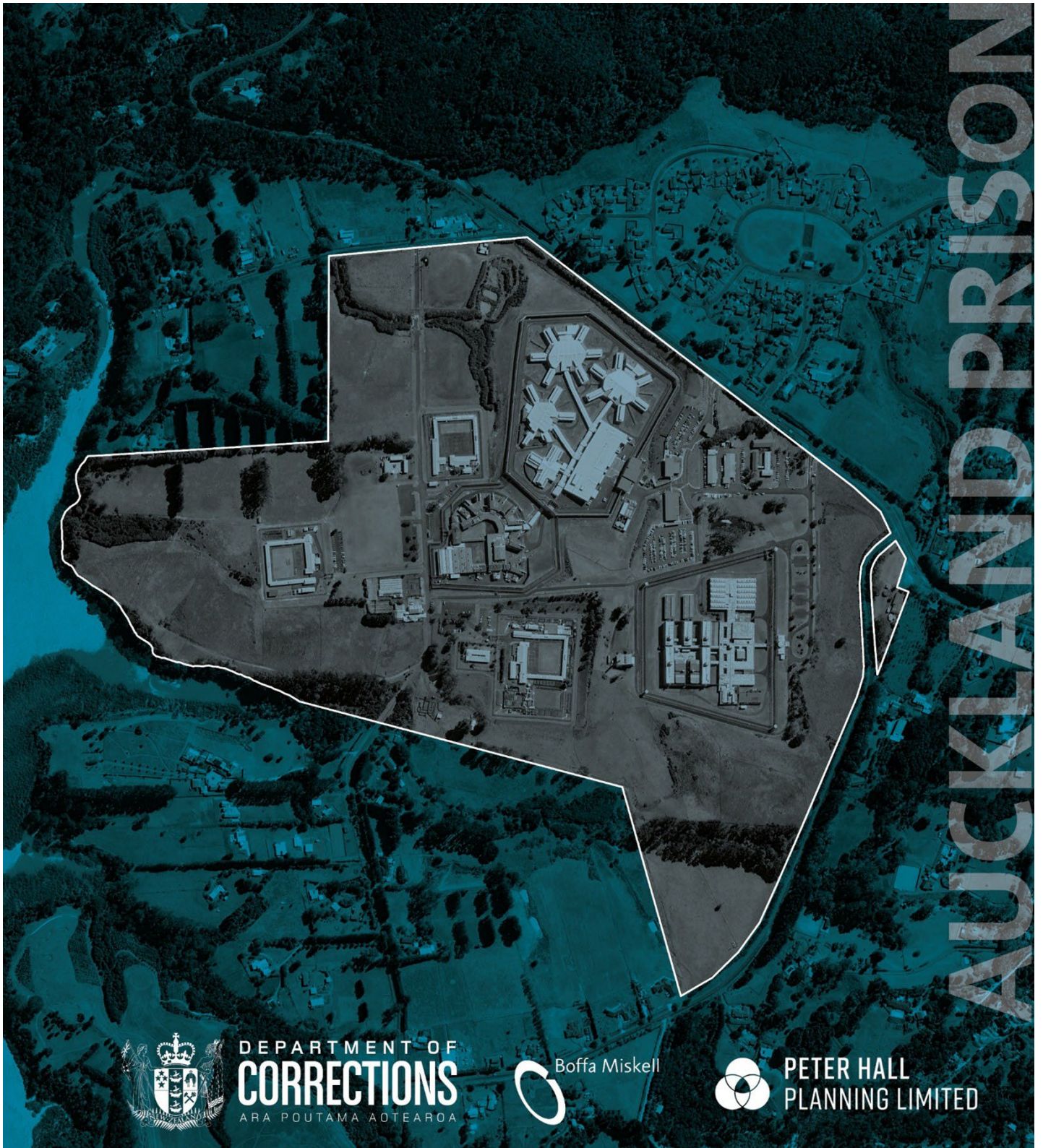


Auckland Prison Capacity Increase

Volume 3 – Appendix 3D
Lighting Assessment



DEPARTMENT OF
CORRECTIONS
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26th March 2026

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Auckland Prison Watercourse works – Construction Lighting Effects Assessment

Introduction

Department of Corrections (Corrections) is seeking an alteration to its designation at Auckland Prison (530 Paremoremo Road, Paremoremo) (the Site) to increase the capacity of prisoners under the Fast track Approvals Act 2024 (FTAA).

In order to provide for that capacity, two watercourses on the Site need to be reclaimed and piped. Corrections is also seeking resource consent and making a request for an outline plan waiver under the FTAA for the piping of these two watercourses and associated works. The watercourses are referred to in this report as Watercourse 1 and 2. This memorandum assesses the associated lighting effects of the proposed watercourse works.

This memorandum has been prepared to accompany the resource consent applications and request for an outline plan waiver (**Volume 3** of Substantive Application). Where stated, this assessment relies on the proposed designation conditions and/or the proposed resource consent conditions (found in **Volume 6, Appendix 6A** and **6B** respectively).

Qualifications and Relevant Experience

This report has been prepared by Russ Charles Kern. I hold certificates in Electrical and Illumination Engineering and I am a member of the Illuminating Engineering Society of Australia and New Zealand Limited (MIES) and I'm currently serving on the New Zealand Lighting Society Membership Committee.

I have an extensive background in lighting design, application, and review, with particular expertise in street lighting, floodlighting, and the evaluation of glare and spill light.

Kern Consultants Limited are specialist electrical and illumination engineering consultants of which I am a director. My qualifications and experience are outlined in **Appendix A: Expert Summary Statement** along with confirmation that this report has been prepared in accordance with the Environment Court's Code of Conduct for Expert Witnesses.

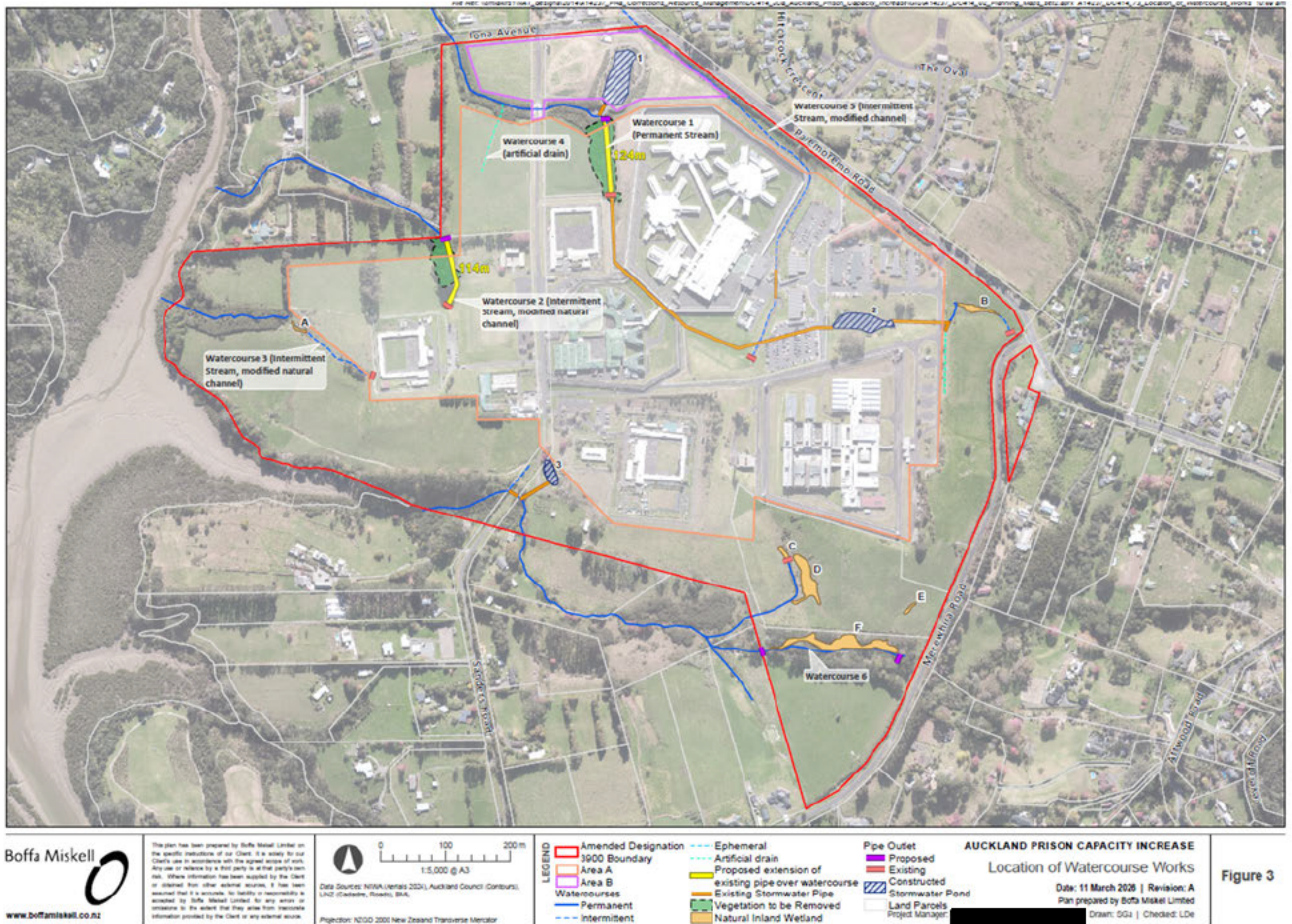


Figure 1 Location of Watercourse Works 1 and 2 on Auckland Prison site

Proposed Works

The proposed location of watercourse works is shown in Figure 1 above and involves the following activities:

- Removal of approximately 3,945m² of riparian vegetation surrounding Watercourse 1 and approximately 2,179m² of vegetation surrounding Watercourse 2.
- Extending the existing pipe networks (including relocating the existing discharge points) for Watercourse 1 (a permanent stream) and Watercourse 2 (an ephemeral stream) to beyond the edge of Area A, involving:
 - 124 metres of piping and reclamation for Watercourse 1 plus an additional 8m length of riprap outlet;
 - 114 metres of piping and reclamation for Watercourse 2, plus an additional 4m length of riprap outlet.
- Earthworks over an indicative area of approximately 2,000m² and volume of approximately 2,500m³ for Watercourse 1, and an indicative area of 2,500m² and volume of approximately 2,180m³ for Watercourse 2 to fill over the extended pipework (refer **Appendix 3A**).

Corrections is proposing to apply for the watercourse works consents as part of its substantive application under the FTAA because the extension of the pipe network for Area A will be necessary irrespective of the future design of new prison facilities, to enable sufficient developable area for prisoner accommodation and associated facilities within Area A. Other resource consents for enabling works (earthworks for build platforms) will be sought at a later date once design details are known.

The indicative construction methodology for the watercourse piping and reclamation is expected to involve the following key steps (refer to Section 3.1 of **Volume 3**):

- Erosion and sediment controls established.
- Removal of vegetation surrounding watercourses.
- Temporary stream diversion and dewatering (as necessary).
- Process for the excavation of unsuitable material and the bedding zone for the proposed pipe (includes removal of any remaining vegetation surrounding the watercourses).
- Process for the installation and compaction of imported material to strengthen subgrade, provide bedding, lay pipe and backfill the barrel of the pipe.
- Install pipe extension (expected to be a 1500mm diameter pipe for Watercourse 1 and a 750mm diameter pipe for Watercourse 2).
- Create new outfall structures and energy dissipation features (such as a riprap apron).
- Backfill material over the pipe to a level generally consistent with the adjacent existing ground levels and associated reinstatement (hydroseeding).

The construction work will occur over a 2-3 month period with earthworks occurring over approximately a 1-2 month period. During the construction period, approximately 10-15 return trips (30 truck movements) per day¹ are anticipated (excluding Sundays and public holidays).

It is expected that most of the work will be completed during daylight hours, however, there may be periods during construction when mobile lighting is used such as task lighting fixed to excavators, rollers etc. Artificial lighting may also be required on construction worker facilities such as site huts during early morning and late evening periods, or for nighttime security.

Existing street lighting located on Iona Avenue at the northern end of Sanders Road is located on existing road reserve, as part of the Auckland Transport road network and will not be altered by the proposed watercourse works proposal.

Lighting Standards

Lighting used in construction activities can incorporate fixed and/or mobile luminaires depending on the application. Each form of lighting, whether permanent or temporary, can generate lighting effects for residents, the night sky or the environment, if not managed correctly.

The proposed designation alteration for Designation 3900 includes proposed lighting conditions that are applicable to new operational exterior and construction lighting across the Auckland Prison site to limit light spill, sky glow, glare and building luminance. The recommended conditions will apply to all new lighting (including operational exterior and construction lighting). They will require:

¹ Two way movements

- New exterior lighting (including operational exterior and construction lighting) to comply with standards for sky glow, light spill, glare source intensity and building luminance, equivalent to the Auckland Unitary Plan permitted activity standards (Condition DES14).
- New lighting poles to be a maximum height of 7 metres in Area B and 10.5 metres in other areas of the site, and any new lighting to be setback a minimum of 20 metres from the Site boundary (except for the Iona Avenue road boundary within Area B) (Condition DES07 and DES09).
- A Construction Lighting Management Plan is prepared and certified by the Council prior to construction, confirming compliance with the designation conditions for external lighting (Condition DES41).
- A Lighting Design Report for operational lighting is prepared and submitted with the Outline Plan of Work to ensure compliance with the designation conditions and achieve good lighting design principles including targeted illumination, regressed lamps, downward direction, internally orientated (i.e. not facing outward toward neighbours), low wattage, and warm coloured lighting (condition DES30).
- Pole mounted lighting outside the secure perimeter (for operational secure perimeter lighting) as the preferred lighting solution, to be demonstrated in the Lighting Design Report as opposed to wall mounted lights to reduce glare, provide a softer visual appearance, and to enable light to be directed back into (towards) the secure facility as opposed to outward towards neighbouring properties.
- A Lighting Design Completion Report is prepared post completion of the new operational exterior lighting to confirm compliance (Condition DES31).

Once the designation alteration is confirmed, the lighting is required to comply with the designation conditions.

Construction Lighting Effects

There are various obtrusive lighting effects that can result from construction lighting. These lighting effects will be highlighted in a construction lighting management plan as required by proposed Designation 3900 conditions (DES41).

The following provides an assessment of the potential effects of construction lighting that could be associated with the proposed works and suggests mitigation measures to manage potential lighting effects.

Spill light Effects

Construction of the watercourse works (and associated vegetation clearance) will occur in a limited area of the Auckland Prison site however, it is close to dwellings located at 43 Iona Avenue and 18 Iona Avenue being 243m and 244m respectively away from each dwelling.

Fixed lighting that may be used on construction related facilities such as portacom site offices can affect neighbouring properties if the light source is not correctly located, aimed, adjusted or screened. Internal lighting in portacom site offices can be mitigated by suitable blinds or screens so that spill light does not affect the environment.

Construction lighting often utilizes temporary lighting or task lighting mounted on machinery such as excavators and rollers. Care is required by machinery operators to ensure that construction lighting does not affect residential neighbours.

Overall, the effects of spill light will be negligible with mitigation measures.

Glare Effects

Proposed Designation 3900 lighting conditions include maximum limits on glare from construction lighting (DES14).

Mobile lighting or task lighting mounted on machinery has the potential to result in glare effects given that it is not fixed in any one location or orientation. Any work carried out by machinery operators at night must ensure that appropriate inductions have been completed to highlight the need for awareness of neighbouring dwellings and the potential effect that mobile lighting can have on residents and the environment.

Measures to reduce glare will be set out in the Construction Lighting Management Plan required by Designation Condition DES41. With the implementation of the Construction Lighting Management Plan, the glare effects will be negligible.

Sky Glow Effects

Luminaires installed with their light source facing above the horizontal can produce direct sky glow effects.

Mobile construction lighting that is not appropriately located, aimed or shielded could affect the nighttime environment if not managed correctly.

Reflected light can also affect the night sky depending on the situation. Reflected light into the atmosphere in wet or foggy situations can result in halos of light around the luminaires.

Given the limited duration of construction activities being undertaken outside of daylight hours, and the ability to correctly locate, aim and orientate fixed lighting, skyglow effects would be expected to be low.

Measures to reduce sky glow will be set out in the Construction Lighting Management Plan required by Designation Condition DES41.

Ecological Effects

The use of light sources with reduced or filtered blue, violet and ultraviolet wavelengths combined with careful aiming of luminaires and mobile lighting will minimise spill light effects on fauna in the vicinity of the construction site.

Appendix C of AS/NZS 4282: 2023 provides information and guidance on the impacts of artificial light on the environment including fauna, and potential impacts should be assessed against this standard and be included in the Construction Lighting Management Plan prior to construction commencing.

Overall, ecological effects are assessed as negligible.

Potential Mitigation Measures

To minimise lighting effects on neighbours and the environment, where construction luminaires can be visible from nearby locations and surrounding ridges, or have the potential to create spill light, glare and sky glow, luminaires should be configured as follows;

- Select appropriate luminaires for the purpose with the correct optics, lamp colour temperature and glare shields;
- Install construction lighting such that their light producing face is horizontal and is not directed against reflective surfaces;
- Orient and aim luminaires away from neighbouring properties, i.e. into the prison site;
- Ensure that light source luminous intensity does not exceed limits set out in AS/NZS 4282: 2023 and AUP lighting category 2 (low brightness) for the Rural - Countryside Living and Coastal – General Coastal Marine zones and encapsulated in DES14 being 500 cd;
- Where mobile plant is used, ensure that operators are aware of the surrounding neighbourhood and light sources are not directed at nearby dwellings;
- Where practicable, the light source output should be reduced to the minimum applicable to the task being undertaken;
- Wherever practical, construction activities should be undertaken during daylight hours;
- Ensure that construction lighting does not affect motorists on Iona Avenue;
- Install blinds to windows and glass doors where site facilities are to be used after dark;
- Complete a risk analysis for any proposed lighting to ensure lighting effects on neighbours and the surrounding environment is minimised and operational health and safety is not compromised;
- Light only the object or area intended, keep mobile or task lights directed toward the ground and shield the light source to minimise effects on the surrounding ecology; and
- All construction staff and visitors should be adequately inducted in lighting best practice prior to entering the construction site.

The Construction Lighting Management Plan will outline the mitigation measures appropriate for the Watercourse works project.

Construction Lighting Management Plan

The Construction Lighting Management Plan (CLMP) will be prepared by a suitably qualified and experienced professional to set out requirements for all fixed/permanent mobile and construction artificial lighting to be used as part of the construction period associated with the watercourse works (and associated vegetation clearance).

The objective of the CLMP is to manage the construction lighting at the Auckland Prison site so as to ensure that the lighting effects during construction are reasonable, significant glare and light spill onto adjoining sites is avoided, safety for road users and aircraft is maintained and loss of night sky viewing is minimised.

In accordance with Designation Condition DES41, the CLMP will be prepared by a suitably qualified and experienced lighting engineer and shall:

- a. Be consistent with Reference to AS / NZS 4282: 2023 Control of the obtrusive effects of outdoor lighting.
- b. Demonstrate how construction lighting will minimise obtrusive lighting effects beyond the Auckland Prison site; and
- c. Demonstrate how the construction lighting will achieve compliance with Condition DES14 (Exterior Lighting Standards).

The CLMP would provisionally address the following topics:

- Purpose of the LMP
- Key roles and responsibilities
- Applicable lighting standards
- Requirements for construction lighting to balance operational and safety requirements with best practice lighting techniques taking into account the Auckland Unitary Plan Lighting Standard E24, AS/NZS 4282: 2023 “Control of the obtrusive effects of outdoor lighting” and its light pollution guidelines to protect wildlife as included in Appendix C of that standard.
- Any specific operational requirements for nighttime work
- Definitions and Glossary
- Reference documents.

The CLMP would include any mitigation principles and specifics relevant to the Auckland Prison construction site and relevant information should be included in construction worker and visitor induction documentation.

Conclusion

Artificial lighting may be required to support nighttime activity associated with the construction period for the proposed watercourse works.

With appropriate mitigation measures, and construction worker training, lighting effects on the neighbouring properties and the environment can be adequately eliminated or minimised to the extent that compliance with proposed Designation 3900 conditions will be met for the duration of the construction period.

With these measures in place, the potential construction lighting effects are expected to be negligible.

Prepared on behalf of
Kern Consultants Ltd



Russ Kern MIES

APPENDIX A: Expert Summary Statement

My name is Russ Charles Kern. I have extensive professional experience in external site and street lighting and evaluation of lighting systems. I have worked with clients to establish their brief and advise solutions for lighting design and evaluation, also exterior lighting for pedestrian areas, residential subdivisions and commercial projects including assessment of likely effects on the environment.

I have worked with Auckland Transport technical lighting staff and various New Zealand Councils to facilitate upgrade recommendations for streets and public reserves throughout New Zealand. I have also provided external lighting designs for facilities such as schools, retirement homes, residential developments, quarries, petrol stations and other commercial and industrial facilities.

I am also established in the Building Services arena. I have designed electrical services installations for a number of buildings both in Auckland and across New Zealand. These buildings include fast food restaurants, offices, warehouses, apartment buildings, terrace houses, retail, day care centres and service centres.

I have also advised Councils on digital billboards since their introduction to New Zealand in 2011 and provided external lighting and glare assessments as well as site verification of compliance following installation.

Code of Conduct for Expert Witnesses

In the context of this application, which is made under the Fast-track Approvals Act 2024, and in relation to which there may be no hearing, I have been asked to confirm that the reporting has been prepared in accordance with the Environment Court's Code of Conduct for Expert Witnesses.

I confirm that I have read the Environment Court's Code of Conduct for Expert Witnesses, as contained in section 9 of the Environment Court's Practice Note 2023, and agree to comply with it.

The data, information, facts and assumptions that I have considered in forming my opinions are set out in my technical report. The reasons for the opinions expressed are also set out in the technical report.

I confirm that the matters addressed in the technical report are within my area of expertise, with the exception of where I confirm that I am relying on information provided by another person. I have not omitted to consider material facts known to me that might alter or detract from my opinions expressed. I have specified where my opinion is based on limited or partial information, and I have identified any assumptions I have made in forming my opinion.