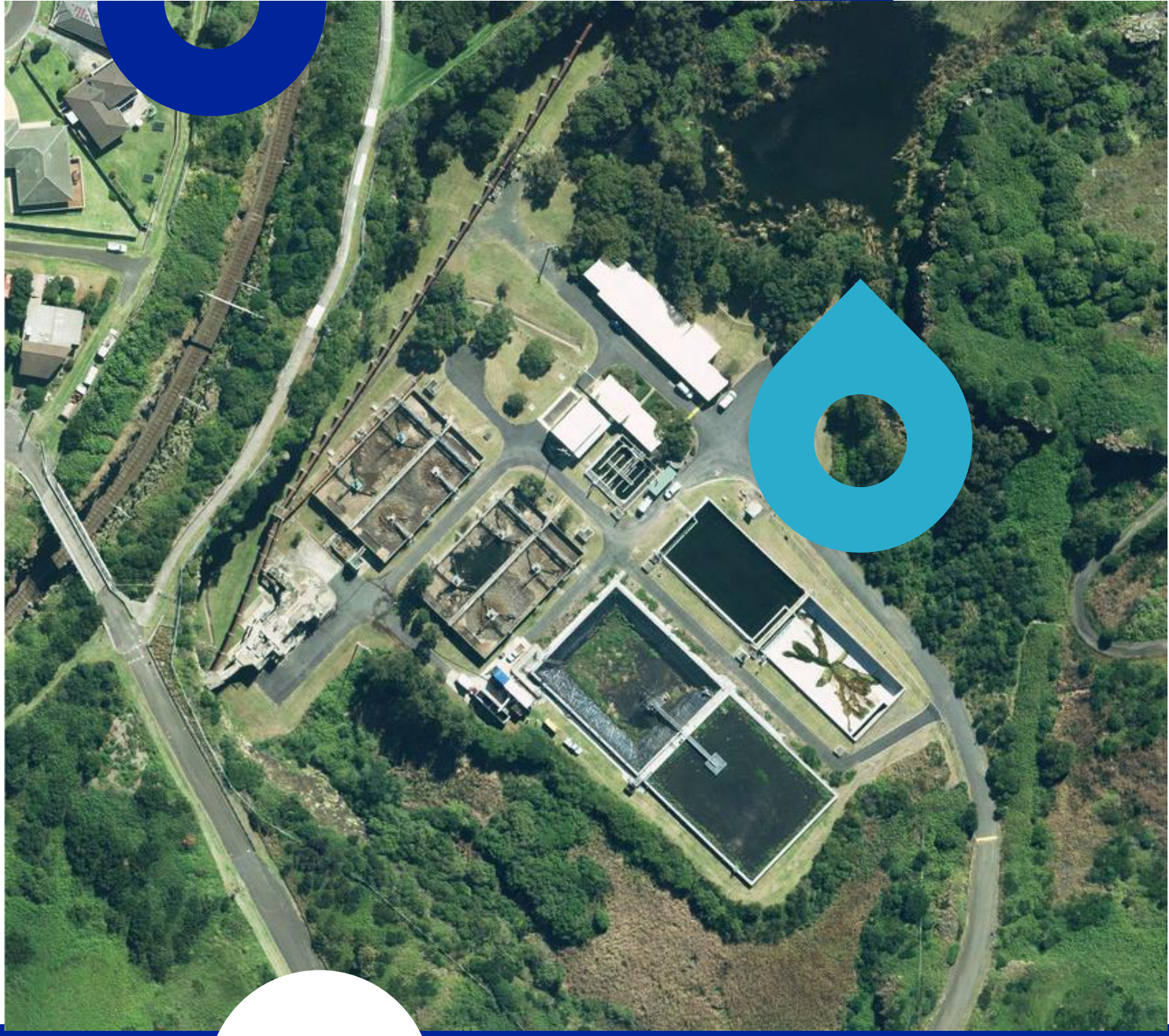

Review of Environmental Factors

ST0022 Bombo Water Resource Recovery Facility (WRRF) Odour and Corrosion Mitigation Project: Medium Term Works (June, 2025)

Sydney WATER

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xx/2024

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Sydney Water respectfully acknowledges the Traditional Custodians of the land and waters on which we work, live and learn. We pay respect to Elders past and present.

Sydney Water recognises the physical and cultural connection of local Aboriginal communities to waters and the land.

Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts ST0022 Bombo Water Resource Recovery Facility (WRRF) Odour and Corrosion Mitigation project. This project is part of a Pollution Reduction Program (PRP) to address community odour complaints, complete ongoing odour monitoring, and to address corrosion repair needs. The REF was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority. The Sydney Water Project Manager is accountable for ensuring the proposal is carried out as described in this REF. Additional environmental impact assessment may be required if the scope or work methods described change significantly following determination.

Certification

I certify that I have reviewed and endorsed this REF and, to the best of my knowledge, it is in accordance with the EP&A Act and the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation). The proposal has been considered against matters listed in section 171 (Appendix A) and the guidelines approved under section 170 of the EP&A Regulation. The information it contains is neither false nor misleading.

Prepared by:	Reviewed and endorsed by:	Endorsed by:
[redacted]	[redacted]	[redacted]
Environmental Scientist Sydney Water Date: 28 April 2025	A/Principal Env Scientist Sydney Water Date: 12 June 2025	Project Manager Sydney Water Date: 16 June 2025

Decision Statement

The main potential construction environmental impacts of the proposal include noise and traffic impacts and vegetation removal. During operation, the proposal will have a beneficial impact by reducing odour problems and completing structural repairs, to ensure Bombo WRRF can continue to operate efficiently. The proposal will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats. Therefore, a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required.

Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, we do not require an Environmental Impact Statement (EIS) and the proposal may proceed.

Determined by:			
	[redacted] Snr Mgr E&H, WES Sydney Water	[redacted]	Date: 20 June 2025

1. Introduction

1.1 Context

Sydney Water provides water, wastewater, recycled water and some stormwater services to over five million people. We operate under the *Sydney Water Act 1994* and have three equal objectives to protect public health, protect the environment and be a successful business.

We are a statutory State-owned corporation and are classified as a public authority, and a determining authority for the proposal under Division 5.1 of the EP&A Act. This REF assesses the potential environmental impacts associated with the Bombo Odour and Corrosion Mitigation project and identifies mitigation measures that avoid or minimise potential impacts.

1.2 Proposal background and need

The proposal is part of the ST0022 Bombo Odour and Corrosion Mitigation project program of works. The Bombo WRRF is located on the headland between Kiama and Kiama Downs within the Kiama Local Government Area (LGA). The facility treats 4 ML/day of wastewater by means of secondary treatment with disinfection.

Since 2021, the EPA has received several community complaints regarding odour from Bombo WRRF. In response, the EPA has issued Sydney Water with a Pollution Reduction Program (PRP) under section 68 of the *Protection of the Environment Operations Act 1997* (POEO Act). The PRP is included as condition U2 of the Bombo EPL No. 2269. Under this PRP, Sydney Water is required to implement odour mitigation measures at Bombo WRRF and undertake subsequent monitoring to determine the effectiveness of the proposed mitigation measures. Corrosion risks, safety and compliance concerns associated with the current state of the facility also need to be addressed. Failure to rectify current odour issues may lead to non-compliance with the EPL.

The program is proposed to be delivered in two phases, including:

- short-term improvements to the sites odour profile to mitigate the risk of further community and/or EPA complaints - competed 2024 (previously assessed)
- medium-term works to ensure long term compliance including monitoring the effectiveness of mitigation measures and addressing corrosion concerns.

This REF assesses medium-term works only as described below.

Table 1-1 summarises the proposal need, objectives and consideration of alternatives.

Table 1-1 Proposal need, objectives and consideration of alternatives

Aspect	Relevance to proposal
Proposal need	The Bombo WRRF, which treats 4 ML/day of wastewater by means secondary treatment with disinfection, has received several odour complaints, and needs repairs to address corrosion concerns.

Aspect	Relevance to proposal
	The Bombo Odour and Corrosion Mitigation project has been designed to facilitate these upgrades for the facility to comply with client and regulatory standards for odour emissions, air pollution limits, safe work exposure limits and to repair historic and prevent future corrosion of assets.
Proposal objectives	The ST0022 Bombo Odour and Corrosion Mitigation project is needed to facilitate upgrades to the facility to comply with client and regulatory standards. The proposal objectives are to: • provide timely delivery of odour control infrastructure and upgrades, including associated electrical requirements • support the completion of corrosion repair works to enable continued facility functionality • meet Sydney Waters statutory and regulatory obligations and address EPL license variations. The secondary objectives are to provide services that: • protect public health • provide affordable and efficient wastewater services • provide resource and energy efficient wastewater services.
Consideration of alternatives/options	Alternative options were outlined in a 2022 Odour Mitigations Options Report. In summary, the following alternatives were short listed: • Option 1: full odour and corrosion mitigation • Option 2 (preferred): staged odour and corrosion mitigation • Option 3: civil mitigation with odour contingency. As the proposal is an EPA mandated project, a ‘do nothing, business as usual’ approach was not an option. A staged approach enabled a short-term delivery phase (REF completed 2024) to complete high-value odour reduction measures, and triage the compliance and structural risks, until the medium-term (current REF). Based on this, the risk and cost criteria, Option 2 was selected as the preferred option.

1.3 Consideration of Ecologically Sustainable Development

Table 1-2 considers how the proposal aligns with the principles of ecologically sustainable development (ESD).

Table 1-2 Consideration of principles of ecologically sustainable development (ESD)

Principle	Proposal alignment
Precautionary principle – *if there are threats of serious or irreversible environmental damage, lack of scientific uncertainty should not be a reason for postponing measures to prevent environmental degradation. Public and private decisions should be guided by careful evaluation to avoid serious or irreversible damage to the environment where practicable, and an assessment of the risk-weighted consequences of various options.*	The proposal will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal. The proposal ensures safe ongoing operation of the plant by addressing corrosion issues, and community odour concerns to meet EPL requirements.
Inter-generational equity – *the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*	The proposal will help to meet the needs of future generations by providing a reliable wastewater service, by improving corrosion issues and addressing community odour concerns.
Conservation of biological diversity and ecological integrity – *conservation of the biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes.*	The proposal will not significantly impact on biological diversity or impact ecological integrity.
Improved valuation, pricing and incentive mechanisms–- *environmental factors should be included in the valuation of assets and services, such as 'polluter pays', the users of goods and services should pay prices based on the full life cycle costs (including use of natural resources and ultimate disposal of waste) and environmental goals*	The proposal ensures safe ongoing operation of the plant by improving corrosion issues and addressing community odour concerns. The proposal will provide cost efficient use of resources and provide optimum outcomes for the community and environment.

2. Proposal description

2.1 Proposal details

Table 2-1 describes the proposal. Figure 2-1 and Figure 2-2 show the location and key environmental constraints.

Table 2-1 Description of proposal

Aspect	Detailed description
Proposal description	The proposal (see Figure 2-1, Figure 2-2, and Section 5), involves the installation of: • one new odour control unit (OCU) and ancillary components • OCU induct ductwork • electrical infrastructure to provide power to the new OCU and ancillary components, including installing cables, HV kiosk, and switchroom • new stormwater line and pit, including pump and discharge line (directed to head of treatment) • two new induct vents, to connect into existing maintenance holes (MHs). Some of these structures will include belowground components, and would result in ground disturbance, vegetation removal and would require new access tracks. The proposal also involves: • mechanical repairs at Sludge Lagoon 1, including waste activated sludge (WAS) piping modifications and valve repairs • structural repairs including relining and refurbishing works on existing infrastructure (e.g. concrete repairs) • undertaking odour sampling and air dispersion modelling post construction/completion of repairs. These components of the proposal involve repairs to existing infrastructure, with limited to no ground and/or vegetation impacts required. All proposed activities will be restricted to Sydney Water land, within Bombo WRRF operations area and the surrounding landscape.
Location and land ownership	ST0022 Bombo WRRF is a Sydney Water owned plant, located along Darien Avenue, Bombo (Lot 1 DP 744712). The facility is situated on the headland between Kiama and Kiama Downs within the Kiama LGA. The facility occupies an area of approximately 21.5 hectares and comprises a fenced enclosure containing the wastewater recycling plant, associated infrastructure and the surrounding land on the southern portion of Bombo Headland. The proposal is adjacent to the South Coast Railway line, which includes a fenced rail corridor. No work, access or traversal of the fenced rail corridor is required as part of this proposal.

Aspect	Detailed description
Site establishment and access tracks	Site establishment would involve: • delineating the construction sites • establishing storage and laydown areas • installing erosion and sediment controls • establishing traffic management (as required) • undertaking vegetation removal/trimming (as required). Access to Bombo WRRF will be via the existing road network, with the facility main entry located off Darien Avenue. The proposal will be contained to previously disturbed areas where possible. All works are within Sydney Water grounds. The headland, outside the operations area of Bombo WRRF is publicly accessible. Some work will be located outside the operations area of the facility. However, minor and temporary impact to visiting public is anticipated. The movement of machinery and vehicles will occur throughout the proposed construction area. To minimise the impacts associated with machinery and vehicular movements, existing access tracks will be utilised where available. In addition to the existing road network, which consists of sealed road surfaces, two existing access tracks have been identified for use when accessing the proposed sites of the two MH vents. For the purposes of this REF, these will be referred to as the northern (MH 1124636) and southern (MH 1124236) access tracks, where activities are specific to one or the other. New temporary access tracks will be created to supplement existing routes, and enable machinery, equipment and contractors to reach the MHs which are in heavily vegetated areas (and consistent mainly of weeds and non-threatened species). New access tracks will cause minor ground disturbance and some vegetation impacts. Vegetation impacts will require removal and trimming of established vegetation. The impacted area will be restabilised upon completion of the proposal. Additional minor upgrades in some sections of the existing northern and southern access tracks may be required. Where required, upgrades may include laying rigid, non-polluting aggregate or gravel for road surface; and trimming of overgrown vegetation to widen tracks (up to 3 m (w) maximum).
Ancillary facilities (compounds)	Construction compounds will be required to house site sheds, construction amenities and material laydown. Due to the limited space within the operational area of Bombo WRRF, multiple compounds are anticipated. Indicative compound locations and site access are detailed in Figure 5-5 and Section 5.2.8. The exact location of construction compounds will be chosen by the Delivery Contractor and remain within the study area. The location will be chosen in consultation with the landowners and will be approved by Sydney Water's Project Manager as described in the mitigation measures in Section 5.
Methodology	Figure 2-1 and Figure 2-2 show the indicative layout of the proposal including all key elements and ecological constraints. Access and compound locations are outlined in Figure 5-5 and Section 5. Vegetation impacts are summarised below and detailed in Appendix C. The major structures required are described below.

Aspect	Detailed description
	Investigation/site establishment The following activities are required: • investigative works including geotechnical, contamination and survey works • soil sampling and waste classification • site preparation works including: - establishing temporary compounds - installing erosion and sediment controls - traffic management measures (into/through site) - vegetation trimming/removal. Minor vegetation impacts are anticipated during site establishment and will include removal and trimming of vegetation consistent with planted natives, grass turf, and shrubby weeds. Efforts will be made to restrict vegetation impacts to trimming rather than removal. Some removal is unavoidable to enable workable construction areas and to meet access needs. The following activities are required: • bulk earthworks to establish required design levels to install underground assets/footings • construct concrete slab and aboveground OCU components, including ventilation stack, fans, nutrient/water supply structures and a bio-trickling filter (BTF) with polishing carbon • install new concrete kerb and gutter adjacent to the OCU slab • install ventilation ducts to connect the OCU to the existing inlet works building (no trenching, all overhead connections proposed) • connect grit lift pumps vent (completed under the short-term works) to the new OCU • vegetation trimming/removal • testing and commissioning of components. The concrete slab for the OCU, including ancillary structures, proposed kerb and guttering and ventilation ductwork footings, has an impact footprint of about 1 m (d) x 17 m (w) x 36 m (l) (see Figure 2-3). The ventilation stack is proposed to be about 14 m in height. Excavation within the footprint of the OCU slab is required to install footings for this and other aboveground OCU components. The largest proposed footing is for the ventilation stack and will be about 2 m (d) x 2.5 m (w) x 2.5 m (l). Proposed ductwork will be fabricated from fibre glass, for maximum corrosion resistance. It will extend from the intermittently decanted aerated lagoon (IDAL) distribution chamber via a gantry structure, run along the eastern edge of the inlet works and branch at select locations to connect educts, before connecting to the

Aspect	Detailed description
	OCU. Pipelines for the secondary effluent transfer and potable water feed to the OCU will follow a similar alignment. However, extending along existing infrastructure from the IDAL unit, from which reclaimed effluent (RE) which will be reused on site. Minor vegetation impacts are anticipated to enable construction of the OCU and ancillary structures. Predominantly, vegetation impacts will be restricted to trimming of large native trees (e.g. casuarina), and/or removal of the shrubby understory which consists mostly of weeds and non-native species including *Lantana* species and African Olive. **Electrical infrastructure** The following activities are required: • bulk earthworks to establish required design levels and install underground assets/footings including - concrete slab for HV kiosk and switchroom - cable supports and management (including conduit, cable ladders and trays) and above- and belowground cabling - multiple aboveground structures including motor control centres, power distribution boards, lighting, PLC/SCADA control system. Installation of supporting infrastructure (e.g. cable supports/ladder) between electrical equipment and the OCU components is required. Most of the proposed cabling will be located aboveground, running along existing infrastructure, before installation continues south to the OCU area. The cable supports/ladder system is planned to run underground, heading west from the proposed switchroom location, before it will surface and attach and run south-west and parallel of existing aboveground infrastructure (i.e. boneyard carrier). The underground section will include open trenching (about 1 m (d) x 15 m (l)). There is potential that the cable ladder design will need to be adjusted to ensure adequate support. A worst-case scenario is therefore being assessed in this REF and would include up to twenty-eight 300 mm diameter vertical stands, with 500 mm deep footings. Footings are proposed to be evenly spaced along the existing boneyard carrier. The cable ladder will be installed to the height required to enable attachment of the cable ladder onto the boneyard carrier structure. Electrical provisions require the installation of two concrete slabs. The concrete slab for the HV kiosk has an impact footprint of about 1.2 m (d) x 6 m (w) x 10 m (l), with the new switchroom proposed to be located on a concrete footing about 1.5 (d) x (10 m (w) x 16 m (l). Both the kiosk and switchroom foundations will be located within what is currently a mostly grassed area, west of the facilities administrations building. An easement will be established, including the WRRF road and above the proposed infrastructure. Minor vegetation impacts are anticipated during electrical works and will predominantly include trimming rather than removal, and only if required. One small native tree will need to be removed to enable installation of the proposed slabs and underground cables. **Stormwater infrastructure (line/pit/pump/discharge line)** The following activities are required:

Aspect	Detailed description
	• Install prefabricated drainage infrastructure to capture stormwater. Two separate channels are proposed, one adjacent to and one within the OCU slab. Both channels run approximately north to south and will direct captured stormwater into the proposed stormwater pit. • Construct stormwater pit, including a proposed pump that connects to the discharge pipe. • Install discharge pipe to direct captured stormwater from the stormwater pit to Bombo WRRF head of treatment. The discharge pipe will be extended to about 10 m (l). As it will be located aboveground, no additional trenching is proposed for its installation. However, excavation of about 2.0 m (d) x 1m (w) x 1 m (l) is required to install the pit and pump, which will be located within the footprint of the OCU slab. Maximum excavation of about 1 m (d) along the length of the OCU and ductwork slab is required to install the drainage channels, which includes prefabricated components. The road surface will be slightly graded to direct runoff into the stormwater channel with its surface reinstated upon completion of the works. **Induct vent installation** The following activities are required: • Clear/trim vegetation including: - Clear a 5 m x 5 m construction area around each MH - trim overgrown vegetation to widen and maintain access along existing tracks - clear vegetation to establish new access tracks (up to 3 m (w), length as mapped in Figure 2-1, Figure 2-2, and Figure 5-5). • Install induct vent on existing maintenance holes (asset numbers: 1124236; 1124636). Most of the vent will be located aboveground and extend about 3 m in height. However, excavation of an area approximately 3 m (d) x 3 m (w) x 3 m (l)) to install footings and connect into the existing MHs is required. • Establish new access tracks, where required. This may include temporarily laying rigid, non-polluting aggregate or gravel for road surface. **Sludge Lagoon 1 modifications/repairs** The following activities are required: • increase WAS pipe length in sludge lagoon 1 • replace/repair existing valves with alternatives that are better suited to the operational requirements • replace the existing syphon breaker air valve and its arrangement • install new non-return valves on WAS lines to avoid backflow.

Aspect	Detailed description
	No ground disturbance or vegetation impacts are required to complete sludge lagoon improvements. Dewatering is not proposed as part of the project. Instead, sludge lagoon works will be planned to align with scheduled plant maintenance periods, during which the lagoon will be drained (dewatered) and taken offline. **Structural repairs, relining and refurbishing works** The following activities are required: • install new covers or refurbish existing covers at inlet works • replace and apply sealant (expansion joint replacement) • remove and replace inlet chamber step irons • brick wall repair including surface cleaning, removing and replacing mortar • concrete wall repair and cleaning, including shotcrete and calcium aluminate cement (CAC) protective coating application, reinforcement repairs • protective coating and mechanical repair works will be completed as required at the inlet works area, including for pipes, valves, bolts, and support brackets. **Odour sampling and air dispersion modelling** Upon operational completion of the medium-term works, odour sampling followed by an air dispersion model will be undertaken to compare against original model outputs. Monitoring will be conducted as per the Odour Monitoring and Evaluation Program Plan (D4C 2023).
Commissioning	Commissioning involves testing and running the new equipment to ensure it works correctly and is integrated with existing plant operations. The exact commissioning steps depend on the type of the equipment, but typically include: • testing utilities, telemetry and switchboards • inspection and performance testing of equipment, pipes, pumps and fittings • testing of any emergency systems in place.
Restoration	The work site will be restored to the pre-existing condition following construction, in consultation with Sydney Water. Site restoration activities would include: • backfilling of trenches as soon as works are finished • dismantling compounds, removal and disposal of waste material and removing construction signage, machinery and excess materials • restoring ground cover and vegetation (in consultation with Sydney Water operations team and SW PEMP project manager)

Aspect	Detailed description
	• restoration of road pavement surfaces and drainage where required removing erosion and sediment control, fencing and traffic management measures.
Materials/ equipment	The materials required for the construction of the proposal will include general construction materials such as concrete, prefabricated components, associated bedding materials, road restoration materials and other materials as required. Construction of the proposal will involve the use of a range of vehicles, equipment and machinery which includes but is not limited to: • light and heavy vehicles • air compressor • franna (pick-and-carry) crane • masonry hammer drill • 40 T crane • elevated work platform • vac truck • excavators (8 T) • rock breakers / jackhammers • compactors • concrete truck and pump • concrete saws • dump trucks • skip bins • generators • welding equipment and power • tools (various) • site facilities and amenities. Construction of the proposal will require shallow excavation. Where possible, spoil will be used as backfill, however, it is likely that there will be excess materials. The management of this and other waste generated by construction is discussed in section 5.2.7 below. It is expected that the proposal will require a relatively small construction workforce, working in shifts, and several vehicle movements per day (refer to Appendix D for activity specific details), including: • flat-bed trucks for deliveries • concrete deliveries • small and large machinery.
Work hours	Work and deliveries will be scheduled to occur during standard daytime hours of: • 7am to 6pm, Monday to Friday • 8am to 1pm, Saturdays. The proposal is expected to require work outside these hours to capitalise on low flow operational periods and increased safety. Excavation and repair work that will cause increased noise and vibration impacts will be conducted between 7:00 am and 5:00 pm and take up to 20 days in total.

Aspect	Detailed description
	Concrete repair works, requiring low flow periods and requiring flow isolation flow management (FIFM) procedures to complete, will be undertaken between 11:00 pm and 6:00 am, and take up to 18 weeks to complete. This has been assessed as part of this REF and mitigation measures are provided in Section 5.
Proposal timing	Construction is expected to start early 2027 and take up to 24 months, with completion expected early 2029.
Operational requirements	The proposal would be operated according to procedures and policies that Sydney Water applies to its other wastewater facilities. This includes routine inspections, and cleaning and repair, as necessary. Additionally, ongoing monitoring will occur to ensure odour mitigation measures meet PRP requirements.

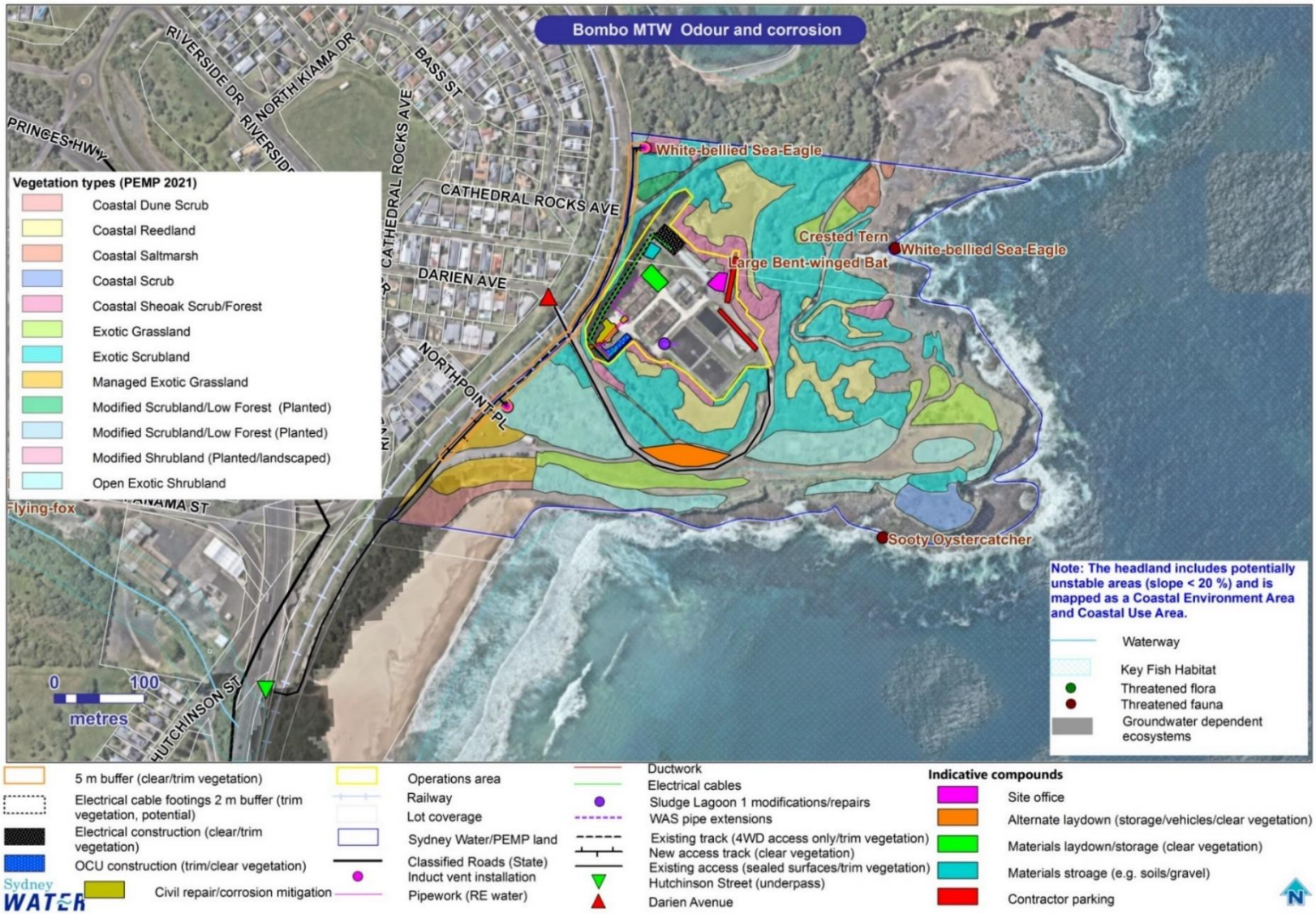

Figure 2-1 Location of proposal and key environmental constraints – flora and fauna

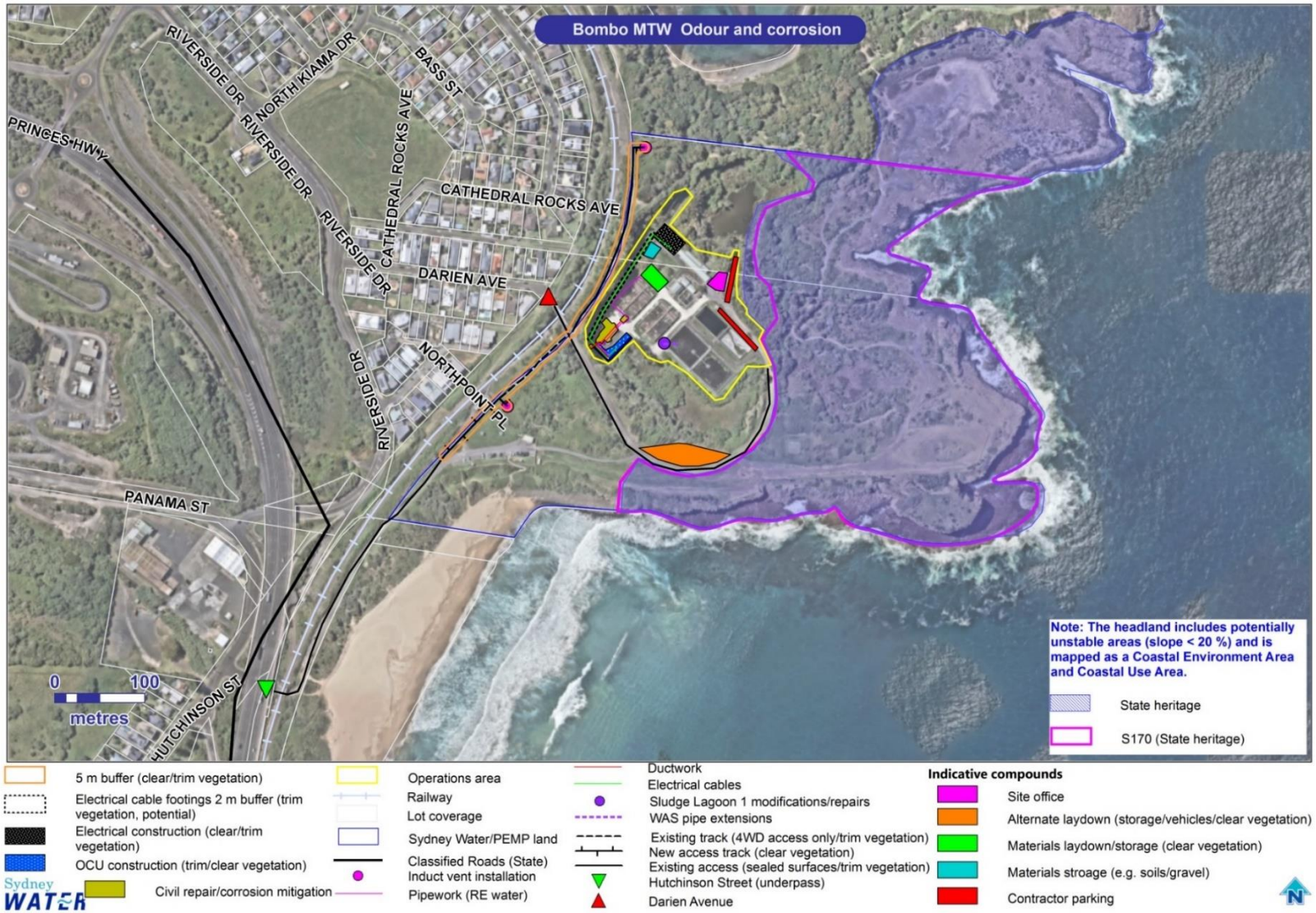

Figure 2-2 Location of proposal and key environmental constraints – heritage

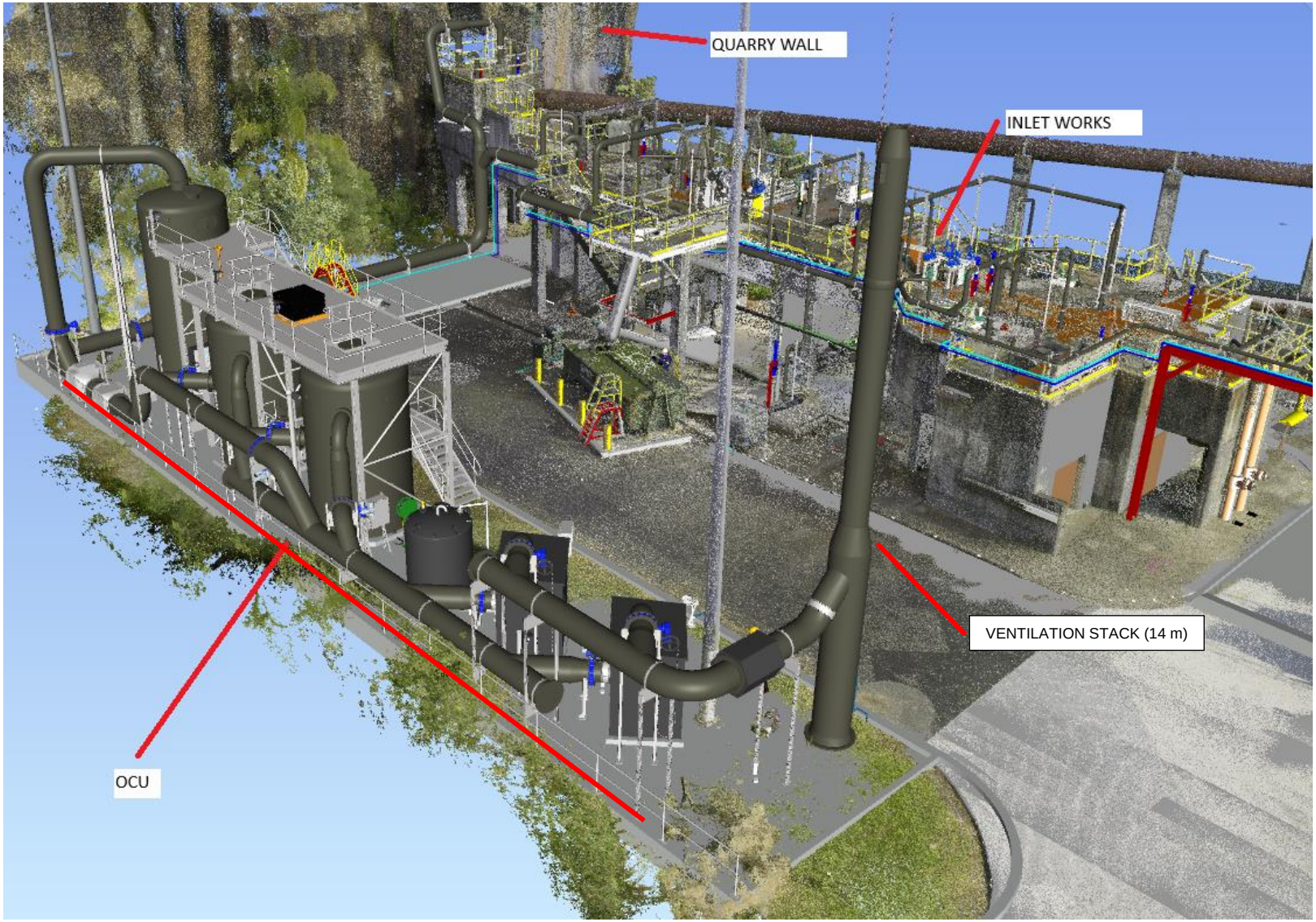

Figure 2-3 Indicative 3D model of OCU, including position relative to existing inlet works and the quarry wall (about 5 m drop), which restricts visibility to the site

2.2 Field assessment area and changes to the scope of work

The proposal described in this REF is indicative and based on the latest concept design at the time of REF preparation. The final proposal may change based on detailed design and/or construction planning. The general mitigation measures outline when changes to the proposal trigger supplementary environmental impact assessment. If required, further assessment must be prepared in accordance with SWEMS0019.

The study area consists of the Bombo headland, upon which Bombo WRRF is located. The construction impact corridor includes the operational area of the plant, mapped access routes, laydown/compound areas, and proposed induct vent installation sites, as well as any buffers indicated in figures. Most construction activities will be restricted to the operational area, with repairs and/or upgrades being applied to existing buildings. Although located outside the immediate operations area, the two proposed induct vents and some compound/laydown sites do fall within Bombo WRRF and are on Sydney Water owned land.

Should the proposal, described in this REF, change, an addendum is not required provided the change:

- remains within the construction corridor assessed in this REF and has no net additional environmental impact; or
- is outside the construction corridor of the REF but reduces the overall environmental impact of the proposal (subsection 5.4(a) of the EP&A Act).

Changes to the proposal outside the construction corridor can only occur:

- to reduce impacts to biodiversity, heritage or human amenity; or
- to avoid engineering (for example, geological, topographical) constraints; and
- after consultation with any potentially affected landowners and relevant agencies.

The Contractor will demonstrate in writing how the changes meet these requirements, for approval by Sydney Water's Project Manager, in consultation with Sydney Water's environmental and community representatives.

3. Consultation

3.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by Sydney Water's community and stakeholder engagement guidelines.

Stakeholder and community engagement is a planned process of initiating and maintaining relationships with external parties who have an interest in our activities. Community and stakeholder engagement:

- enables us to explain strategy, policy, proposals, proposal or programs
- gives the community and stakeholders the opportunity to share their knowledge, issues and concerns
- enables us to understand community and stakeholder views in our decision-making processes alongside safety, environment, economic, technical and operational factors.

The nature, scale and extent of the proposal's potential impact has been evaluated in this REF. If our work impacts the community in some way, we will consult with affected groups throughout the proposal. This includes engaging the broader community and stakeholders during plan or strategy development or before making key decisions.

A community and stakeholder engagement plan will be developed. The primary objective is to engage with residents and other stakeholders to ensure they are aware of the works.

We will also provide local councils with reasonable notice when we would like to commence works. Kiama Municipal Council will be consulted about matters identified in environmental planning instruments such as public safety issues, temporary works on council land, and full or partial road closures of council managed roads (refer below to Section 5.2.8).

4. Legislative requirements

4.1 Environmental legislation

Sydney Water is the proponent and determining authority under the EP&A Act. The proposal does not require development consent and is not classified as State Significant Infrastructure. We have assessed this proposal under Division 5.1 of the EP&A Act. This REF has concluded that the proposal is unlikely to have a significant impact on the environment.

The following environmental planning instruments (Table 4-1) and legislation (Table 4-2) are relevant to the proposal. Table 4-2 also documents any licences and permits required, and timing and responsibility for obtaining them.

Table 4-1 Environmental planning instruments relevant to the proposal

Environmental Planning Instrument	Relevance to proposal
Kiama Municipal Council Kiama Local Environmental Plan 2011 (Kiama LEP)	The proposal is located on land zoned: • SP2 – Infrastructure: main operational area of the facility and Cliff Drive (external of facility) • C2 – Environmental Conservation: surrounds north, east, south of main operational area of the facility.
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)	Section 2.126 of the TISEPP permits development by or on behalf of a public authority for sewage treatment plants without consent on land in a prescribed zone. The proposal involves development of a sewage treatment plant and is in land zoned SP2 – Infrastructure, which is listed as a prescribed zone. As Sydney Water is a public authority, the proposal is permissible without consent.
State Environmental Planning Policy (Resilience and Hazards) 2021 (RHSEPP)	Coastal Management (Chapter 2) The works are on land to which Chapter 2 of this SEPP applies. The works are in an area mapped as Coastal Use Area and Coastal Environment Area and consent is not required. Subsection 2.10 and 2.11 have been considered and the works can proceed in compliance with the SEPP requirements.

Table 4-2 Consideration of key environmental legislation

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
Protection of the Environment Operations Act 1997 (POEO Act)	The proposal is consistent with a current PRP associated with EPL No. 2269. It is expected that the proposal will enable the plant to meet EPL compliance requirements. Temporary relaxation of the EPL is not required during construction/commissioning.	N/A	N/A
Environmental Planning and Assessment (EP&A) Act 1979	Sydney Water is the proponent and determining authority under this Act. The proposal does not require development consent and is not classified as State Significant Infrastructure. We have assessed this proposal under Division 5.1 of the EP&A Act. This REF has concluded that the proposal is unlikely to have a significant impact on the environment.	REF	Pre-construction, Sydney Water
Biodiversity Conservation Act 2016 (BC Act)	The BC Act lists species and ecological communities which are protected in NSW. The impact of the proposal on threatened species, communities and their habitats were assessed in Section 5. The proposal will require some vegetation removal. This will be minor and is not considered a significant impact. Vegetation removed will be offset in accordance with SWEMS0019.13 (SWC Biodiversity Offset Guide). Vegetation impacts are to be offset at a 1:1 ratio (minor impact, non-threatened native species and/or exotic species). For details see Section 5.2.3.	REF	Pre-construction, Sydney Water
National Parks and Wildlife Act 1974 (NPW Act)	The proposal does not fall within land owned by National Parks and Wildlife. Under Section 86 of this Act, it is an offence to harm or desecrate an Aboriginal place or object unless authorised by an Aboriginal heritage impact permit (AHIP), or where it is reasonably determined that no Aboriginal object will be harmed. The proposal will not impact any Aboriginal sites.	N/A	N/A

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	[redacted], being located within the previously disturbed footprint of the Bombo WRRF. The likelihood of encountering unknown Aboriginal heritage items is low to negligible. For details see Section 5.2.4.		
Heritage Act 1977	There is one listed non-Aboriginal heritage item within 200 m of the proposed works, being geological in nature. No direct impacts are expected to this item. The proposal will not impact any items listed on the State heritage register. For details see Section 5.2.4.	N/A	N/A
Water Act 1912/ Water Management Act 2000	Section 60A of the Water Management Act states that it is an offence to take water without a licence. A Water Access Licence (WAL) is required under Section 61 where groundwater extraction will be greater than 3ML. A water supply work approval (WSWA) is required under section 90(2) for all activities that involve dewatering groundwater, irrespective of volume. The proposal is unlikely to encounter groundwater and therefore it is not anticipated that a WSWA or WAL would be required. For details see Section 5.2.2.	WSWA (for <3ML) and WAL (for >3ML) – unlikely to be required.	During or post REF if >3ML known during planning (Sydney Water to initiate). If unknown, pre-construction, contractor.

5. Environmental assessment

Section 5.2 describes the existing environment and assesses direct and indirect impacts of construction and operation**.** It also identifies mitigation measures to minimise impacts. These will be incorporated into contract documents and a Construction Environmental Management Plan (or similar) prior to starting work.

5.1 Existing environment

ST0022 Bombo WRRF is a Sydney Water owned plant, located along Darien Road, Bombo (Lot 1 DP 744712). The facility is situated on the headland between Kiama and Kiama Downs within the Kiama LGA. The facility occupies an area of approximately 21.5 hectares and comprises a fenced enclosure containing the wastewater recycling plant, associated infrastructure and the surrounding land on the southern portion of Bombo Headland.

Most of the proposal is located within the operations area of Bombo WRRF. The site is heavily disturbed by the site's initial development and ongoing use as an operating wastewater treatment facility.

Residential housing dominates the region to the west of the proposal and headland.

A site-specific property environmental management plan (PEMP; EMM Consulting 2024) and associated biodiversity assessment report (BAR; Arcadis 2018) are available for Bombo WRRF and have informed this REF. Sydney Water's land and the surrounding headland consists of degraded coastal shrubland vegetation and large rock structures associated with the Bombo Headland Quarry, which is a significant geological site, north-east of the study area. The proposal area does not support any significant aquatic habitats. However, artificial ponds are present within the Bombo WRRF and have the potential to provide habitat to mobile fauna. There are no coastal wetlands or Key Fish Habitats mapped within the proposal's construction footprint. The marine areas adjoining the eastern perimeter of the headland are mapped as Key Fish Habitat.

5.2 Environmental aspects, impacts and mitigation measures

Several geotechnical and contamination reports, based on desktop reviews and site studies were completed to inform the proposal design, including:

- D4C (2023a), Bombo WRRF Odour & Corrosion Mitigation - Geotechnical Interpretive Report. Sydney Water (IN-P0000478-C-RPT-0001 Geotechnical Interpretive Report_Rev1.pdf)
- D4C (2023b), Interpretative Contamination Report. Sydney Water (IN-P0000478-V-RPT-0001 contamination report RevB.pdf)
- D4C (2025), Detailed Design Report - ST0022 Bombo WRRF Odour & Corrosion Mitigation – Medium Term Works. Sydney Water (IN.P0000478-D-RPT-0012 Bombo WRRF Odour & Corrosion Mitigation Medium Term Detailed Design Report Rev A.docx)

Additional management plans and/or assessments pertaining to the study area are available, and provide insight into past and present land use, flora and fauna, and heritage overlapping and surrounding the proposal. These include:

- Arcadis (2018), Bombo WRP (ST0022) Biodiversity Assessment Report. Sydney Water.

Findings from these reports have informed the current REF and are summarised below in sections:

- 5.2.1 – topography, geology and soils
- 5.2.2 – water and drainage
- 5.2.3 – flora and fauna
- 5.2.4 – heritage
- 5.2.7 – waste and hazardous material.

5.2.1 Topography, geology and soils

Existing environment and potential impacts

The Bombo WRRF is in a former quarry with the natural landform being significantly modified from historic use. Historical satellite imagery between the 1960s to 1980s shows the site to have been heavily disturbed and devoid of vegetation prior to its present-day appearance (see Figure 5-1). Prior use of the site as a quarry has resulted in an elevation drop of approximately 5 m from the natural ground level to the level of the Bombo WRRF, with an intact vertical bedrock wall along the north-west edge of the facility.

The proposal area today contains a mix of hardstand, grass and landscaped/planted vegetation. Generally, the ground surface levels drop in an easterly direction towards the Tasman Sea. Much of the site is relatively flat, however, with the overall difference in levels within the operational area estimated to be less than 1 m from the highest part to the lowest part (excluding artificial ponds and rock wall).

Some potentially unstable areas (> 20% slope) are mapped throughout the Bombo WRRF. Unstable areas overlap much of the vegetated land outside of the operational area, artificial ponds, and the rock wall that is located on the north-western edge of the site. A five-meter exclusion boundary is in place in the vicinity of the rock wall to minimise risk of injury due to rock fall. The proposal requires temporary access to the exclusion area to complete installation of the new proposed OCU and associated slab and other structures.

Some stockpiling of material may occur within the proposal site, resulting in a minor temporary change in the topography. This impact will be minor, and the site will be re-established to pre-construction conditions on completion of the proposal. There is the potential for soil to become contaminated through accidental chemical or fuel spills and leaks from plant and equipment during construction. There may also be fuel spills from maintenance activities during operation (see Section 5.2.7 for further discussion of waste and hazardous material).

Temporary ground disturbance, including minor excavation to install proposed concrete slabs, stormwater channel, and electricals, is required. To install the concrete slabs, OCU and overhead ventilation duct, and ancillary structures, some vegetation impacts are required and are detailed in Section 5.2.3.

Due to historical use of the site as a quarry, and more recent development of the site as a WRRF, all excavation activities will be on previously disturbed land, including areas above existing services/assets, or within cleared grassy areas. Additionally, most proposed activities will be in the operations area of the Bombo WRRF, as modifications or refurbishments of existing infrastructure, or new installations (i.e. the OCU). Although the proposed installation of the two induct vents is outside the operations area, works are

still within Sydney Water owned land. These induct vents are designed to be connected to existing MHs and ground disturbance and vegetation impacts (trimming/removal) will be restricted to the construction footprint outlined in Section 2.2 and Figures 2-1 and 2-2.

The potential presence of acid sulphate soils was assessed as low, and no acid sulfate soil was identified during preliminary investigations (i.e. actual or potential). The proposal is not within an area impacted by soil salinity hazards.

The works to construct the OCU and ancillary structures, including concrete slab and bunding, would permanently change the surface topography and drainage patterns of the proposal area. However, the relatively small and localised area of elevation change mean that potential impacts to the drainage and topography of surrounding areas would be minor. The design of the concrete slab and OCU bund considers the change in surface and potential impacts this may have to rainwater runoff. Concrete slabs will be poured in a way to direct runoff captured towards the proposed stormwater pit, positioned within the OCU area. A separate vehicle delivery bund on the roadway between the OCU and inlet works, is not required. This is because the proposed OCU will use a powdered nutrient in lieu of a liquid alternative. This reduces the risk of nutrient spills. When nutrient dosing is required, the powdered form will be delivered in trucks in 20 – 40 kg bags and lifted into place. The OCU slab includes adequate bunding.

During construction, we will disturb ground, excavate, and stockpile soil which could result in potential offsite erosion and sedimentation of surrounding land and onsite ponds. With appropriate site management the works are not expected to cause erosion or cause significant change to the surface topography and drainage patterns of the area. During operation, captured runoff onto the new hardstand area of the OCU and ancillary structures will be diverted towards the new stormwater channel, designed as part of this project. Given the distance from the proposal, no impacts to waterways are expected (see Section 5.2.2 for discussion of water and drainage impacts).

Potential topography, geology and soil impacts will be managed by implementing the mitigation measures listed in Table 5-1.

Mitigation measures

With the implementation of the mitigation measures below, impacts to the environment can be adequately managed, and residual impacts are expected to be minor.

Table 5-1 Environmental mitigation measures — topography, geology and soils

Mitigation measures
Prevent sediment moving offsite in accordance with *Managing Urban Stormwater, Soils and Construction, Volume 1 and 2A* (Landcom 2004 and DECC 2008), including, but not limited to: • divert surface runoff away from disturbed soil and stockpiles • install sediment and erosion controls before construction starts • reuse topsoil where possible and stockpile separately • inspect controls at least weekly and immediately after rainfall • rectify damaged controls immediately

Mitigation measures
• remove controls once surfaces have been stabilised, including removing trapped sediment in drainage lines.
Minimise ground disturbance and stabilise disturbed areas progressively.
Any imported material should be certified for intended use and is free from contamination including asbestos.
Stop work in the immediate vicinity of suspected contamination. Indicators of contamination include discoloured soil, anthropogenic material within fill, asbestos, chemical or petrol odours and leachate. Contain disturbed material on an impermeable surface and cordon areas off. Notify the Sydney Water Project Manager and the Environmental Representative (who will contact Contamination & Hazardous Materials (CHM) team) to agree on proposed management approach.
Stop work during heavy rainfall or in waterlogged conditions when there is a risk of sediment loss off site.
Sweep up any sediment/soil transferred off site at least daily, or before rainfall.
Eliminate ponding and erosion by restoring natural landforms to the pre-works condition.
Vehicle and machinery movement will be confined to designated tracks, pathways and work areas and will keep to sealed areas where possible. Temporary access tracks will be returned to previous conditions upon completion of the proposal.

5.2.2 Water and drainage

Existing environment and potential impacts

The proposal is not located on flood prone land. The closest waterbodies to the proposal include artificial ponds of various sizes within Bombo WRRF. The nearest natural waterbody is the Tasman Sea (KFH), which surrounds the northern, eastern, and southern sides of the headland upon which Bombo WRRF is located. Positioned approximately 110 m south of the sea, the northern proposed induct vent is the closest component of the proposal to this KFH area. Given the distance from the proposal, no impacts to KFH are expected.

During preliminary investigations to inform designs, groundwater was not encountered within the proposal area and groundwater is not anticipated to be encountered during construction works. However, the depths belowground investigated were comparatively shallow (0.1 to 1.2 m) and it is noted that groundwater is typically subject to seasonal and climatic variations, as well as major weather events such as prolonged and intense rainfall periods. Also, there is potential for localised perched groundwater within the area which may be higher than assumed groundwater levels. Should groundwater be encountered, the project will need to obtain a WSWA for all activities that involve dewatering, irrespective of volume. If more than 3 megalitres of groundwater is anticipated to be dewatered, a WAL is required.

Dewatering is not proposed as part of the current project. Instead, sludge lagoon works have been planned to align with scheduled plant maintenance periods, during which the lagoon will be drained (dewatered) and taken offline. Planning the proposal to align with scheduled facility dewatering is required to enable safe and efficient construction conditions for the proposed WAS pipe modifications.

Construction of the proposal is not expected to significantly change the drainage conditions at the site. However, the OCU and ancillary infrastructure, including concrete slab, will create an additional hardstand area. Suitable stormwater management is included in the construction activities. The proposed new stormwater line will be installed at the northeastern end of the new OCU slab, crossing the existing road and connecting to the existing stormwater pit on the western side of the road. The proposed new kerb and channel will run parallel to the OCU slab, collecting stormwater run-off from the existing road and formalising drainage to this area. The OCU slab will also fall towards the new kerb and channel. A proposed new grated inlet pit will be installed at the end of the kerb and channel, connecting to the proposed stormwater line to convey stormwater to the existing piped network.

The proposal will require temporary storage of fuels and/or chemicals for equipment and machinery operation during construction. Potential impacts include accidental leaks, spills and seepage into the soils, groundwater, nearby waterbodies/ponds or local stormwater system. Any fuels and chemicals required to be stored on site will be securely bunded. Potential impacts will be managed by implementing the mitigation measures listed in Table 5-2.

The design incorporates suitable stormwater controls and operational impacts are not anticipated.

Mitigation measures

With the implementation of the mitigation measures below, impacts to water and drainage can be adequately managed, and residual impacts are expected to be low.

Table 5-2 Environmental mitigation measures — water and drainage

Mitigation measures
Use appropriate controls to avoid potential sedimentation to waterbodies (e.g. floatation boom).
Bund open maintenance holes if there is a risk of wastewater spills.
Bund potential contaminants and store on robust waterproof membrane, away from drainage lines.
Keep functioning spill kit, including aquatic spill kit, on site for clean-up of accidental chemical/fuel spills. Keep the spill kits stocked and located for easy access.
If the potential for intercepting groundwater is identified after the EIA is endorsed, Sydney Water will obtain a groundwater Water Supply Works Approval. Where dewatering is >3ML per water year (from 1 July), Sydney Water will also obtain a Water Access License from NRAR. The Delivery Contractor is responsible for: • providing expert hydrogeological technical information to obtain the approvals • preparing a Dewatering Management Plan • complying with the conditions of the approvals (such as protecting water quality; minimising aquifer extraction volumes, monitoring extraction with flow meters and recording volumes).
Store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Ensure bunded areas have 110% capacity of the largest chemical container, or an additional 25% capacity of the total volume stored within (whichever is greater). Tightly secure chemicals and fuels in vehicles. Clearly label all chemicals.

Mitigation measures
Conduct refuelling, fuel decanting and vehicle maintenance in compounds where possible. If field refuelling is necessary, designate an area away from waterways and drainage lines with functioning spill kits close by.
Discharge all water in accordance with Sydney Water's Water Quality Management During Operational Activities Policy (D0001667) including erosion controls, discharge rate, dechlorination, monitoring. Re-use potable / groundwater water where possible.
Seek approval and discharge criteria from the relevant Sydney Water Network Area Manager prior to discharge of water to the wastewater system. Otherwise, tanker by a licensed waste contractor and dispose off-site to an appropriately licensed facility.

5.2.3 Flora and fauna

Existing environment and potential impacts

Bombo WRRF has a property environmental management plan (EMM Consulting 2024). Development of the site PEMP included completion of a biodiversity assessment report (BAR; completed in 2018) and associated flora and fauna surveys.

Flora

The vegetation of the WRRF varies from degraded native vegetation to stands of weedy exotic shrubs and herbs and managed grassland, and generally has low habitat values for threatened flora and fauna. During construction, we will impact both native and exotic vegetation.

Potentially impacted vegetation does not correspond to registered Plant Community Types (PCTs), nor do they constitute threatened ecological communities (TECs). Prior assessments the vegetation within the construction footprint of the proposal is consistent with:

- highly disturbed areas with no or limited native vegetation (operational area)
- Exotic Shrubland
- Coastal Reedland
- Coastal Sheoak Scrub/Forest.

Flora surveys by Arcadis in 2018 recorded a total of 68 plant species in the study area, comprising 31 native species and 37 exotic species. Threatened plant species have not been recorded in the proposal's study area. Similarly, all threatened flora species identified as occurring or potentially occurring within 10 kilometres of the study area have a low likelihood of occurrence in the study area due to lack of suitable potential habitat.

Where possible, vegetation impacts will be limited to trimming, although some removal will be unavoidable, including where new access tracks are required and to establish new infrastructure. This impact will be managed and offset through the mitigation measures in Table 5-3.

Fauna

The overall condition of fauna habitat in the study area is poor, due to high levels of disturbance, fragmentation, isolation, the presence of pest species and weed incursion. Several common native bird and reptile species were recorded during past surveys and are listed in the BAR.

Threatened fauna sightings within 200 m of the WRRF, assessed as having a low likelihood of occurrence, include:

- White-bellied Sea Eagle (BC Act – vulnerable; nearest sighting is in the immediate vicinity of the northern induct vent)
- Sooty Oystercatcher (BC Act – vulnerable; nearest sighting about 190 m east of the proposal)
- Green Turtle (BC Act and EPBC Act – vulnerable; nearest sighting about 198 m north of the proposal)
- Large Bent-winged Bat (BC Act – vulnerable; nearest sighting about 190 m east of the proposal).

These species are highly mobile, with one (i.e. Green Turtle) being restricted to marine environments. Habitat availability for these species within the proposal study area is limited to occasional foraging, dispersal and shelter habitat. Subsequently, these species were assessed as having a low likelihood of occurrence due to lack of suitable potential habitat.

Threatened fauna assessed as having a moderate likelihood of occurrence, include:

- Green and Golden Bell Frog (BC Act – endangered, EPBC Act – vulnerable; not recorded).

The above species was not recorded during non-targeted surveys undertaken in 2018, but was noted to have been recorded 1.5 km north and 1.5 km southwest of the study area in 2000. Due to the presence of nearby records and suitable foraging and dispersal habitat, it was assessed as having a moderate likelihood of occurrence in the study area and preclearance surveys are recommended prior to large scale construction works occurring within Bombo WRRF.

With implementation of the environmental mitigation measures in Table 5-3 and the minor nature of the proposed work in a previously disturbed area, it is unlikely that the proposal would result in a significant impact to flora and fauna. No impacts to flora and/or fauna are anticipated during operation.

Mitigation measures

With the implementation of the mitigation measures below, impacts to flora and fauna can be adequately managed, and residual impacts are expected to be low.

Table 5-3 Environmental mitigation measures — flora and fauna

Mitigation measures
Provided it is essential for delivering the project, Sydney Water's Project Manager can approve the following vegetation removal and tree trimming, without additional environmental assessment (but only after consultation with the Environmental and Community Representatives and affected landowners). Sydney Water considers vegetation removal in these circumstances has minimal environmental impact. • Any minor: - vegetation trimming or - removal of exotic vegetation or - removal of planted native vegetation

Mitigation measures
where the vegetation is not a threatened species (including a characteristic species of a threatened community or population), heritage listed, in declared critical habitat or in a declared area of outstanding biodiversity value. • Any removal of remnant vegetation where there is no net change to environmental impact (e.g. a different area of vegetation is removed but the total area is the same or less than assessed in the EIA). Written explanation of the application of this clause (including justification of the need for trimming or removal and any proposed revegetation) should be provided when seeking Project Manager approval. Any impacts to native vegetation and trees must be offset in accordance with the Biodiversity Offset Guideline (SWEMS0019.13).
Offset residual impacts to native vegetation and trees in accordance with the Biodiversity Offset Guideline (SWEMS0019.13) and in consultation with Sydney Water and PEMP PM. As per SWEMS0019.13, vegetation impacts are to be offset at a 1:1 ratio (minor impact to non-threatened native species and/or exotic species).
Preclearance inspection for Green and Golden Bell Frog will be completed by a suitably trained ecologist prior to large scale construction works where vegetation disturbance is proposed.
If native fauna is encountered on site, stop work and allow the fauna to move away unharassed. Engage WIRES or a licenced ecologist if assistance is required to move fauna.
If any threatened species (flora or fauna) is discovered during the works, stop work immediately and notify the Sydney Water Project Manager. Work will only recommence once the impact on the species has been assessed and appropriate control measures implemented.
Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing.
Inspect vegetation for potential fauna prior to clearing or trimming. If fauna is present, or ecological assessment has determined high likelihood of native fauna presence, including removal of hollow bearing trees, engage a licenced ecologist to inspect and relocate fauna before works.
If any damage occurs to vegetation outside of the disturbance footprint (as shown in the CEMP), notify the Sydney Water Project Manager and Environmental Representative so that appropriate remediation strategies can be developed.
If replanting near Sydney Water pipelines refer to *'Which trees can damage wastewater pipes? '* link from Sydney Water website.
Bag all plant parts and excavated topsoil that may be infested with weed propagules and dispose at a licensed waste disposal facility.

5.2.4 Heritage

Existing environment and potential impacts

Aboriginal heritage

Most of the proposal is located within the operations area of Bombo WRRF. The entire Sydney Water site is heavily disturbed by historic use as a quarry, its initial development as a WRRF, and ongoing use as an operating wastewater treatment facility (see Figure 5-1).

Given past disturbances, it is unlikely that Aboriginal heritage items will be encountered during the proposal. The risk of potential Aboriginal objects existing at the site is assessed as low.

The proposal:

- is not within 200 m of any Aboriginal Heritage Information Management System (AHIMS) sites (search completed November 2024)
- is not near any culturally modified scarred trees
- [redacted]

Non-Aboriginal heritage

The proposal (measured from the site of Sludge Lagoon 1) is located over 100 m west of Bombo Headland Quarry Geological Site (see Figure 2-2). This heritage item is listed on the State Heritage Register (IF 00177), and on Sydney Water's Section170 register. This heritage item falls outside of the operational area of Bombo WRRF. Due to the minor nature of works and distance from this heritage item, no direct or indirect impacts are expected or proposed during construction or operation.

1960s	1970s	1980s
		
1990s	**2000s (Sydney Water land in blue)**	**Current (22 Oct 2024, NearMaps)**
		

Figure 5-1 Historic aerials from 1960s to 2000s (Google Imagery 2025) showing extent of disturbance compared to current conditions (Nearmap 2025) at and within the vicinity of Bombo WRRF. Bombo WRRF was first constructed in 1984, with subsequent additions to the facility in the early 1990s and 2000s.

Mitigation measures

With the implementation of the mitigation measures below, impacts to heritage can be adequately managed, and residual impacts are expected to be low.

Table 5-4 Environmental mitigation measures — heritage

Mitigation measures
Repeat the basic AHIMS search if it is older than 12 months. Conduct additional assessment if new sites are registered and could be impacted by the works.
If any Aboriginal object or non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify Sydney Water Project Manager in accordance with SWEMS0009.

5.2.5 Noise and vibration

The likelihood of noise impact from the proposal was reviewed against risk factors (based on Table 2 of the EPA's *2020 Draft Construction Noise Guideline*). The review indicated that the construction noise impact would be medium-low risk and therefore a quantitative noise impact assessment was undertaken.

The purpose of the noise assessment is to assess the predicted worst-case noise impacts. This will identify recommended additional mitigation measures for impacted receivers at different distances from the works, which will guide the community engagement for the sites. The Transport for NSW (TfNSW) Construction and Maintenance noise estimator tool (TfNSW, 2022) was used for the assessment.

Existing environment

The proposal is located on land zoned SP2 infrastructure. Prior use of the site as a quarry has resulted in an elevation drop of approximately 5 m from the natural ground level to the level of the Bombo WRRF, and an intact vertical bedrock wall that runs along the north-west edge of the facility. The nearest residential receivers to the proposal are situated in a low-density residential area (R2), situated between the South Coast Railway line (west of Bombo WRRF, east of residents) and the Princess Highway (west of the residential area). The closest residential receivers are located about 60 m from both induct vent installations, and about 100 m from the proposed OCU site, where the noisiest works are expected to occur. There is no clear line of sight to the OCU for residential receivers due to distance, dense vegetation growth, presence of bedrock/cliff face, and the railway line.

Other nearby sensitive receivers include operational staff and visitors, who may be present onsite at Bombo WRRF during construction works for work or sightseeing purposes. Refer to Section 5.2.8 for discussion of traffic and access impacts associated with the proposal.

Potential impacts – construction and operation

Proposed use of noisy equipment during construction, and proposed activities, is summarised in Appendix D. In summary, the proposal will generate noise and vibration during construction from plant and associated construction activities. Equipment, vehicles and machinery that would typically be used during construction of the proposal and that have potential to generate the most noise include:

- tree mulcher
- excavators (8T with hammer)

- 40 T crane
- rock breakers / jackhammers
- drill/piling rig
- backhoes
- concrete/demo saws
- compactor
- concrete pumps
- air compressors
- generators
- light and heavy vehicles movements.

Key noise generating activities from the proposal are:

- earthworks/excavation
- installation/repair works
- personnel/vehicles traversing the site
- minor vegetation removal/trimming
- rock breaking (although not confirmed, given the geology of the area it is possible that rock breaking will be required and is included as a worst-case scenario).

Works would be short-term with most of the noisiest works being restricted to within the operational area of Bombo WRRF, be completed during standard operating hours, and/or occurring intermittently. Some work will be required outside of standard daytime hours, including to capitalise low flow operational periods and increase worker safety. Although some sensitive receivers may experience short-term noise impacts, the overall noise impact is not expected to be significant and can be managed through standard mitigation measures.

Predominantly, the noisiest activities will be located at or within the vicinity of the following works:

- OCU and ancillary infrastructure construction, including excavation, possible rock breaking, vegetation removal and pouring of concrete slab
- electrical infrastructure, including excavation, possible rock breaking, vegetation removal and pouring of concrete slab
- stormwater infrastructure, including excavation and possible rock breaking
- structural repairs at head of treatment, including out of hours work (OOHW) to allow for use of low flow periods
- induct vent installation, including excavation, possible rock breaking, and vegetation removal.

During operation, there will be no changes to background noise. Noise generated during operation will not exceed the noise criteria in the Noise Policy for Industry (EPA 2017).

Noise impact assessment

The purpose of the noise assessment was to assess the predicted worst-case noise impacts, associated with anticipated noisiest activities. This identified recommended additional mitigation measures for impacted receivers at different distances from the works. The predicted worst-case noise impacts are shown in Figure 5-2 and Figure 5-3. The noise assessment used the Transport for NSW Construction and Maintenance Noise Estimator. The modelled scenario comprised of the following inputs:

- representative noise environment – R2 (see Appendix D)
- scenario based scenario – bulk earthworks (see Appendix D)
- line of sight to receiver – no (behind substantial solid barrier).

Activities occurring during the day have the potential to impact upon a small number of residential properties located within 70 m west of the proposal, along Cathedral Rocks Avenue, Commissioners Lane, Darien Avenue, and Northpoint Place. These properties back on to the railway corridor, which separates the proposal from the residential area.

Out of hours activities have the potential to impact a larger number of sensitive receivers This reflects a worst-case scenario, and the project will apply effort to minimise and/or avoid noisiest activities during non-standard hours (refer to Appendix D for anticipated timing and duration of specific activities).

Table 5-5 Worst-case scenario for affected distance (m) for residential receivers (day/night): Bulk Earthworks

Activities / scenario LAeq(15minute) noise level above background (LA90)

	5 to 10 dB(A) Noticeable	10 to 20 dB(A) Clearly audible	20 to 30 dB(A) Moderately intrusive	> 30 dB(A) Highly intrusive	LAeq(15minute) 75dB or greater Highly affected
DAY	N/A	N/A	**70**	**20**	**20**
Recommended additional mitigation measures	N/A	N/A	N	N, PC, RO	N, PC, RO
NIGHT	**635**	**425**	**180**	**70**	**20**
Recommended additional mitigation measures	Notification (N)	N Respite Period 2 (R2) Duration Respite (DR)	N, R2, DR Specific Notification (SN) Phone Call (PC)	N, R2, DR, SN, PC Alternative Accommodation (AA)	N, PC, Respite Offer (RO)

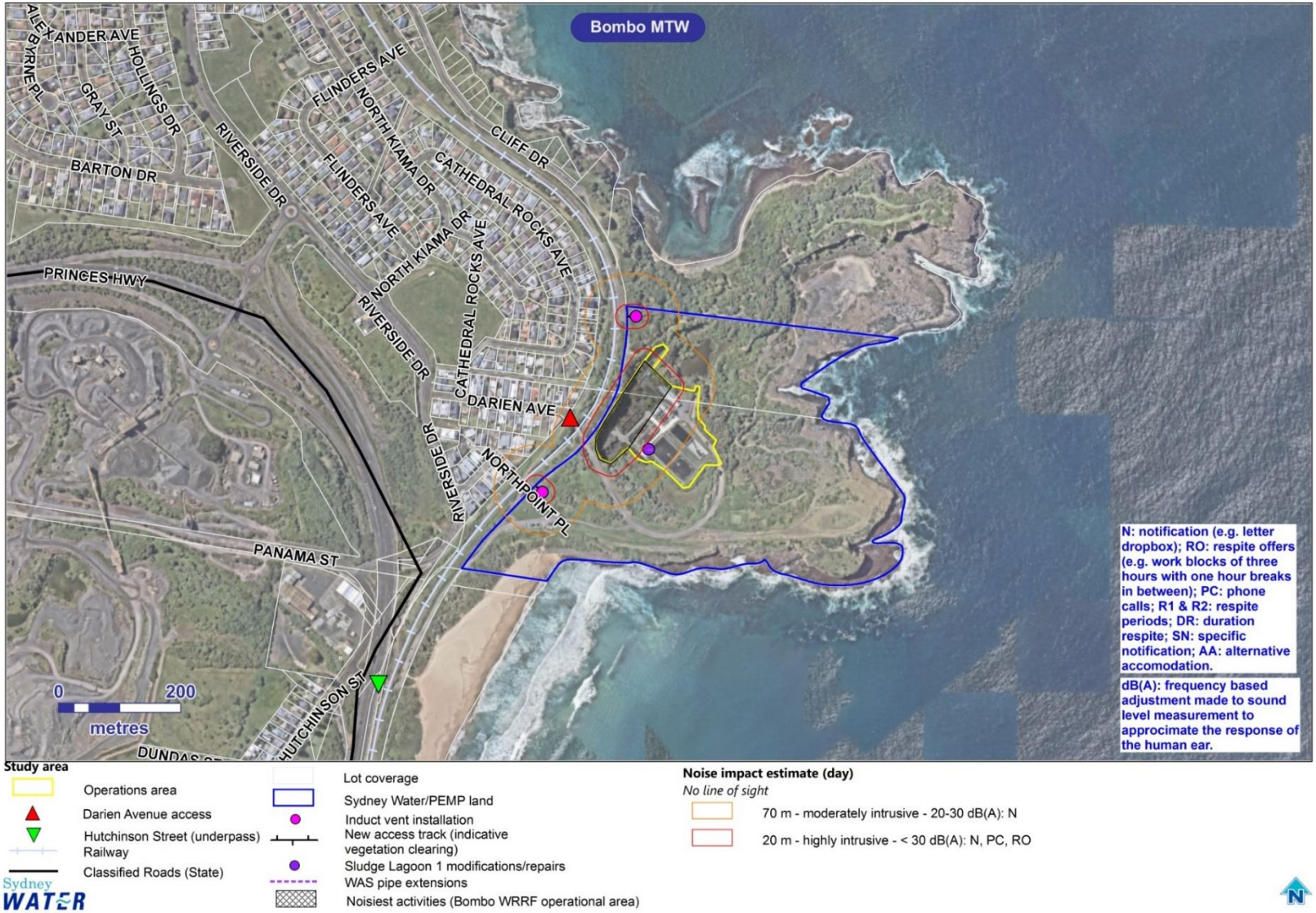

Figure 5-2 Proposal estimated noise impacts. Day, bulk earthworks scenario (TfNSW 2022)

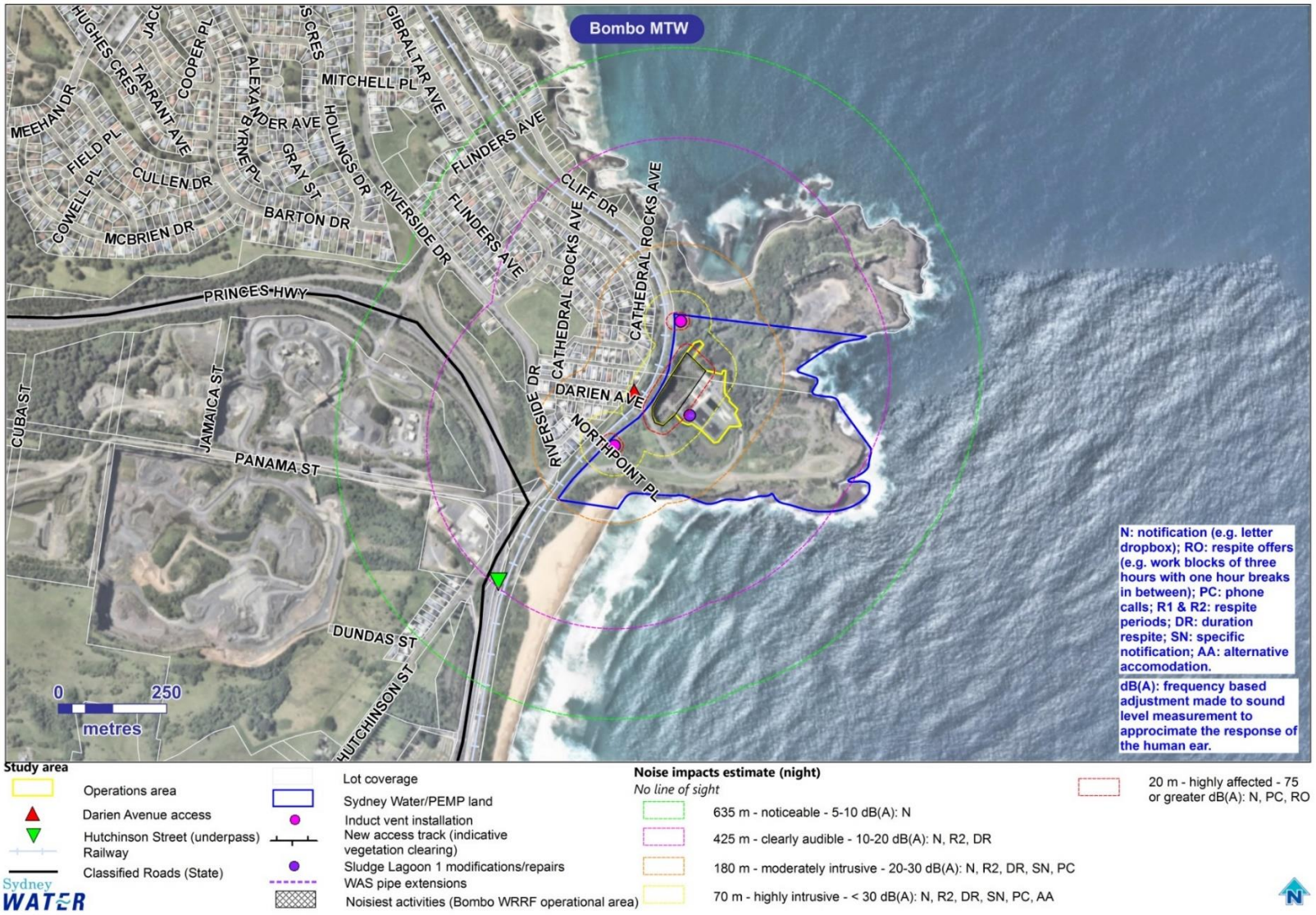

Figure 5-3 Proposal estimated noise impacts. Night, bulk earthworks scenario (TfNSW 2022)

Vibration impact assessment

Vibration intensive construction work may include the use of jackhammers and 8t excavators with hydraulic hammer attachment. Based on the Transport for NSW Construction and Maintenance Noise Estimator the minimum working distance, to avoid vibration impacts to structures and for human comfort, are:

- Jackhammers: 1 m (nominal distance to avoid cosmetic damage) and 3 m (human comfort).
- Small hydraulic hammer (300 kg 5 to 12t excavator): 2 m (cosmetic damage) and 7 m (human comfort).

No sensitive receivers were identified within the safe working distances for vibratory intensive work. There is the potential for human receivers passing by the works (e.g. tourists) to be temporarily impacted during vibration intensive activities. Transient receivers will be impacted intermittently for short durations only. These impacts are expected to be minor and can be managed using the mitigation measures in Table 5-6. Operational vibrational impacts are not anticipated.

Mitigation measures

With the implementation of the mitigation measures below, impacts from noise and vibration can be adequately managed, and residual impacts are expected to be minor.

Table 5-6 Environmental mitigation measures — noise and vibration

Mitigation measures
Works must comply with the *Interim Construction Noise Guideline* (DECC 2009), including schedule work and deliveries during standard daytime working hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturday. No work to be scheduled on Sundays or public holidays. The Proposal will also be carried out in accordance with: • Sydney Water's Noise Management Procedure SWEMS0056 • Noise Policy for Industry (EPA, 2017). All reasonable and feasible noise mitigation measures should be justified, documented and implemented on-site to mitigate noise impacts. All community notification will begin prior to work commencing on site.
Incorporate standard daytime hours noise management safeguards into the CEMP: • identify and consult with the potentially affected residents prior to the commencement: - describe the nature of works; the expected noise impacts; approved hours of work; duration, complaints handling and contact details. - determine need for, and appropriate timing of respite periods (e.g. times identified by the community that are less sensitive to noise such as mid-morning or mid-afternoon for works near residences) - acceptance by the community of longer construction periods in exchange for restriction to construction times. • implement a complaints handling procedure for dealing with noise complaints • plant or machinery will not be permitted to warm-up near residential dwellings before the nominated working hours. • appropriate plant will be selected for each task, to minimise the noise impact (e.g. all stationary and mobile plant will be fitted with residential type silencers) • engine brakes will not be used when entering or leaving the work site(s) or within work areas. • regularly inspect and maintain equipment in good working order

Mitigation measures

- arrange work sites where possible to minimise noise (e.g. generators away from sensitive receivers, minimise use of vehicle reversing alarms).
- schedule noisy activities around times of surrounding high background noise (local road traffic or when other noise sources are active).

As night works are needed, the Contractor would:

- justify the need for night works
- consider potential noise impacts and implement the relevant standard daytime and out of hours safeguards and other reasonable and feasible management measures
- identify community notification requirements (i.e. for scheduled night work (not emergency works)),
- notify all potentially impacted residents and sensitive noise receivers not less than one week prior to commencing night work.
- seek approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives.

If works on Sundays or public holidays are required, the Contractor would:

- justify why all other times are not feasible
- consider potential noise impacts and, implement relevant standard daytime, out of hours and night-time safeguards and other reasonable and feasible management measures
- identify community notification requirements
- seek approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives.

Consider less vibration intensive methodologies where practicable and use only the necessary sized and powered equipment.

5.2.6 Air and energy

Several reports were completed to inform the preferred construction design and odour modelling for this project, including:

- Ensure (2016), Bombo Water Recycling Plant: Odour Model Description (December). Sydney Water.
- Stantec (2022a), Bombo WRRF Odour Impact Assessment Report (April). Sydney Water.
- Stantec (2022b), Bombo WRRF Risk Based Odour Management Plan (April). Sydney Water.
- Stantec (2022c), Bombo WRRF Odour Mitigations Options: Odour Mitigations Options Report (July). Sydney Water.
- Assured Environmental (2022), Odour Monitoring – Bombo WRRF – Stantec (June). Sydney Water.
- Bioaction (2025), Bombo WRRF – Short Term Works: H2S Logging Results for Bombo WRRF Grit Lift Pumps OCU. D4C/Sydney Water.

Findings from these reports have informed the current REF and are summarised below.

Existing environment and potential impacts

The proposal is located within an urban and industrial, coastal setting. The air quality of the surrounding area is primarily influenced by the Bombo WRRF and vehicle movements along local roadways. There are two properties listed on the National Pollutant Inventory within 1 km of the headland, including Bombo WRRF and Sydney Trains Bombo Quarry.

There is potential for minor and localised air quality impacts during construction from:

- dust generated during concrete cutting
- emissions from construction machinery, equipment and vehicles
- odour from construction work including vehicle exhaust and fuel intensive machinery.

There will be minimal air quality impacts during construction due to the nature of the works and the distance to nearest sensitive receivers. Construction impacts on air quality and odour are expected to be temporary and will be minimised by implementing the mitigation measures in Table 5-7. During operation, odour improvements are anticipated (see below for odour modelling details).

Energy use during construction of the proposal would primarily involve the use of fuels to power plant and equipment and is not expected to be different to similar scale construction projects.

Odour modelling

Background

Bombo WRRF treats wastewater by means of secondary treatment with disinfection. Current key process facilities in use at the WRRF are provided in Table 5-7 with their indicative locations in Figure 5-4. The WRRF aims to operate the plant to minimise odour complaints. This generally means two odour unit (OU) contours should not be exceeded 99 percent of the time at existing sensitive receptors (refer to Table 3.1 Odour Assessment Criteria in DEC NSW 2006).

In 2013, the WRRF was considered a low-risk facility for odour. Similarly, a 2016 dispersion model did not show any odour impact on the nearby residences (Ensure 2016). However, some odour impacts on the local walking tracks within the vicinity of the WRRF were apparent. A subsequent, high-level review of the 2016 modelling report identified several issues, including the use of old emission data (from 2006) and the application of unrealistic modelling assumptions (i.e. stable odour emission values from some process facilities). It was later considered that these modelling choices had potentially understated some odour impacts on the community from Bombo WRRF.

Table 5-7 Bombo WRRF Key Process Facilities

Process Area	Key Process Facilities
Inlet work	• collection chamber • two mechanical step screens • one standby manually raked bypass screen • two aerated grit chambers • screenings screw press • grit classifier • combined screenings and grit bin.
Secondary treatment	• distribution chamber • four IDALs with surface aerators

Process Area	Key Process Facilities
	• two catch ponds for treated effluent flow equalisation.
Tertiary treatment	• two Chlorine Contact Tanks (CCTs) • Sodium hypochlorite dosing system • Sodium bisulphite dosing system.
Sludge stabilisation, thickening and dewatering	• two sludge lagoons • periodic dewatering using mobile centrifuge.
Other	• sodium hypochlorite storage tanks and dosing facilities • Sodium bisulphite storage tanks and dosing facilities • foul water pit and pump station • reclaimed effluent (RE) storage tank and pumps.

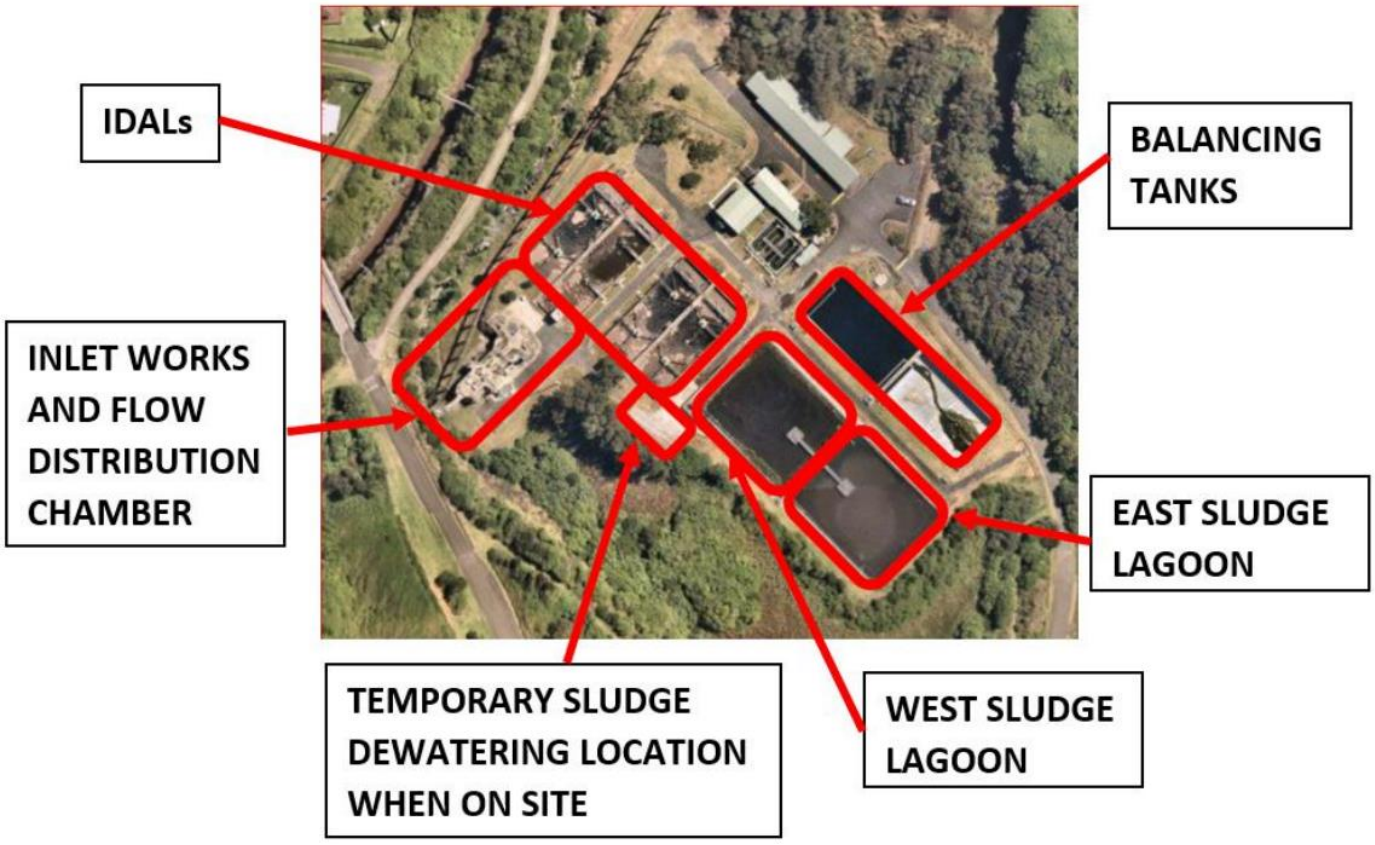

Figure 5-4 Bombo WRRF existing site process layout. Further details above in Table 5-8

After an increase in community complaints throughout 2020 and 2021, odour risk has now been identified as a primary concern. This included 16 odour complaints from seven residences within 500 m of the WRRF (Figure 5-5). Complaints resulted in site attendance by the EPA in March 2021. A further 33 notifications of odour detection were received from May of 2021.

Between the period of April 2021 to April 2022, the WRRF obtained several odour survey responses from nearby residential neighbours (Table 5-8). Dispersion modelling was conducted applying this data, to establish a base model, and to compare the operations at the time with the odour survey responses recorded.

Figure 5-5 2020 – 2021 odour complaint locations. Sixteen odour complaints from seven residences were received from residences within 500 m of the WRRF.

Table 5-8 Odour survey events and instances (hours per month) reported vs sludge dewatering activities.

	2021									2022				
	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Totals
Events	8	33	0	0	13	4	14	4	4	18	5	2	2	107
Instances (hours)	26	58	0	0	20	3	27	8	4	60	9	2	6	223
Dewatering		Yes	Yes					Yes	Yes					

Base case dispersion modelling

In 2022, the odour reputation and compliance of Bombo WRRF were deemed to be *high* and *medium*, respectively. This outcome was achieved following Sydney Water's risk framework. This awareness of site odour conditions increased the urgency for Sydney Water to reduce community odour impacts caused by the WRRF.

Dispersion modelling was conducted, and a base case model scenario was formulated using previously collected emission data. Incorporated emission values were those measured late 2021 – early 2022 (Table 5-9). The output scenarios were used to predict the degree to which the different facility processes were contributing to the odour emissions arising from Bombo WRRF.

To show compliance with the regulations, the maximum predicted odour impact from dispersion modelling needs to be at, or less than, 2 odour units (2 ou) for residential and public recreation areas (sensitive receptors) (DEC NSW 2006). However, overall dispersion modelling of all processes together indicates that the operations at the WRRF are predicted to exceed 2 ou (Figure 5-7 to Figure 5-11). This is predicted to impact sensitive receptors in residential areas to the west of the WRRF and in recreational areas to the south, east and north. These predicted impacts in the residential areas align with the odour survey responses (above Table 5-8; below Figure 5-6 and Table 5-9).

Figure 5-6 Location of sensitive receptors (see Table 5-10 below for details)

Table 5-9 Sensitive receptor locations, description and computed peak odour concentrations within the year (see Figure 5-6 above for mapped locations)

Receptor Number	X (km), UTM 56S	Y (km), UTM 56S	Description	ou
Residential Areas (Receptors 1 – 20)				
1	303.707	6163.531	Residential Area no. 1	13.6
2	303.675	6163.628	Residential Area no. 2	8.2
3	303.678	6163.661	Residential Area no. 3	7.0
4	303.623	6163.733	Residential Area no. 4	4.5
5	303.619	6163.865	Residential Area no. 5	3.2
6	303.471	6163.822	Residential Area no. 6	2.1
7	303.658	6163.487	Residence closest to WRRF (NW)	10.8
8	303.595	6163.495	Residences closest to WRRF (NW)	8.0
9	303.526	6163.506	Residences closest to WRRF (NW)	5.9
10	303.617	6163.542	2nd row residences from south	8.5
11	303.540	6163.555	2nd row residences from south side	5.8
12	303.708	6163.575	Single residence due west of WRRF	12.2
13	303.633	6163.593	Single residence third row from south	8.0
14	303.727	6163.602	2 residences due west of WRRF	12.3
15	303.736	6163.650	Residences along railway line west of WRRF	9.6
16	303.725	6163.746	Residences along railway line west of WRRF	6.1

Receptor Number	X (km), UTM 56S	Y (km), UTM 56S	Description	ou
17	303.675	6163.817	Residences along railway line west of WRRF	4.4
18	303.549	6163.917	Residences along railway line west of WRRF	2.3
19	303.576	6163.828	Residences in centre of suburb (West of Cathedral Park Ave)	3.0
20	303.534	6163.755	Residences west of Bass Street, next to park	3.2
Surrounding Areas (Receptors 21 – 33)				
21	303.702	6163.886	Walkway, east of railway line	4.0
22	303.744	6163.824	Walkway, east of railway line	5.1
23	303.795	6163.660	Walkway, east of railway line	11.4
24	303.784	6163.555	Walkway, east of railway line	19.2
25	303.728	6163.457	Road crossing, Darien Ave	15.9
26	303.791	6163.343	Continuation of Darien Ave, south of WRRF	23.4
27	303.919	6163.326	Continuation of Darien Ave, south of WRRF	21.8
28	304.072	6163.330	Public path at south end of WRRF	35.5
29	304.054	6163.445	Public path to southeast of WRRF	93.7
30	304.017	6163.556	Public path to east of WRRF	89.0
31	304.174	6163.698	Beach to east of WRRF	35.6
32	303.932	6163.677	Public path to north of the WRRF	27.6
33	303.623	6163.334	Public carpark at north end of Bombo beach	8.6

Modelled predictions found three processes were the cause of approximately 90 % of the site's odour emissions:

- sludge lagoons: about 50 % contribution over a one-year period (Figure 5-7)
- IDALs: about 30 % contribution over a one-year period (Figure 5-8)
- grit lift pumps: about 50 % contribution (while it is in operation) and a 13 % contribution on average over a year of simulation (Figure 5-9).

The other areas which were included in the dispersion model were the inlet works, foul water pump station and drains, IDAL distribution chamber and balance tank. The emissions from these areas were generally less than 1 % each of the total emissions over a one-year period (Figure 5-10). Although community odour impact from these areas is not of concern, the high levels of H_2S in the inlet works and IDAL distribution chamber was identified as a corrosion risk and, at times, a health and safety risk to onsite personnel and those working at the WRRF.

Figure 5-7 Sludge lagoon odour emission contributions (base line modelling prediction)

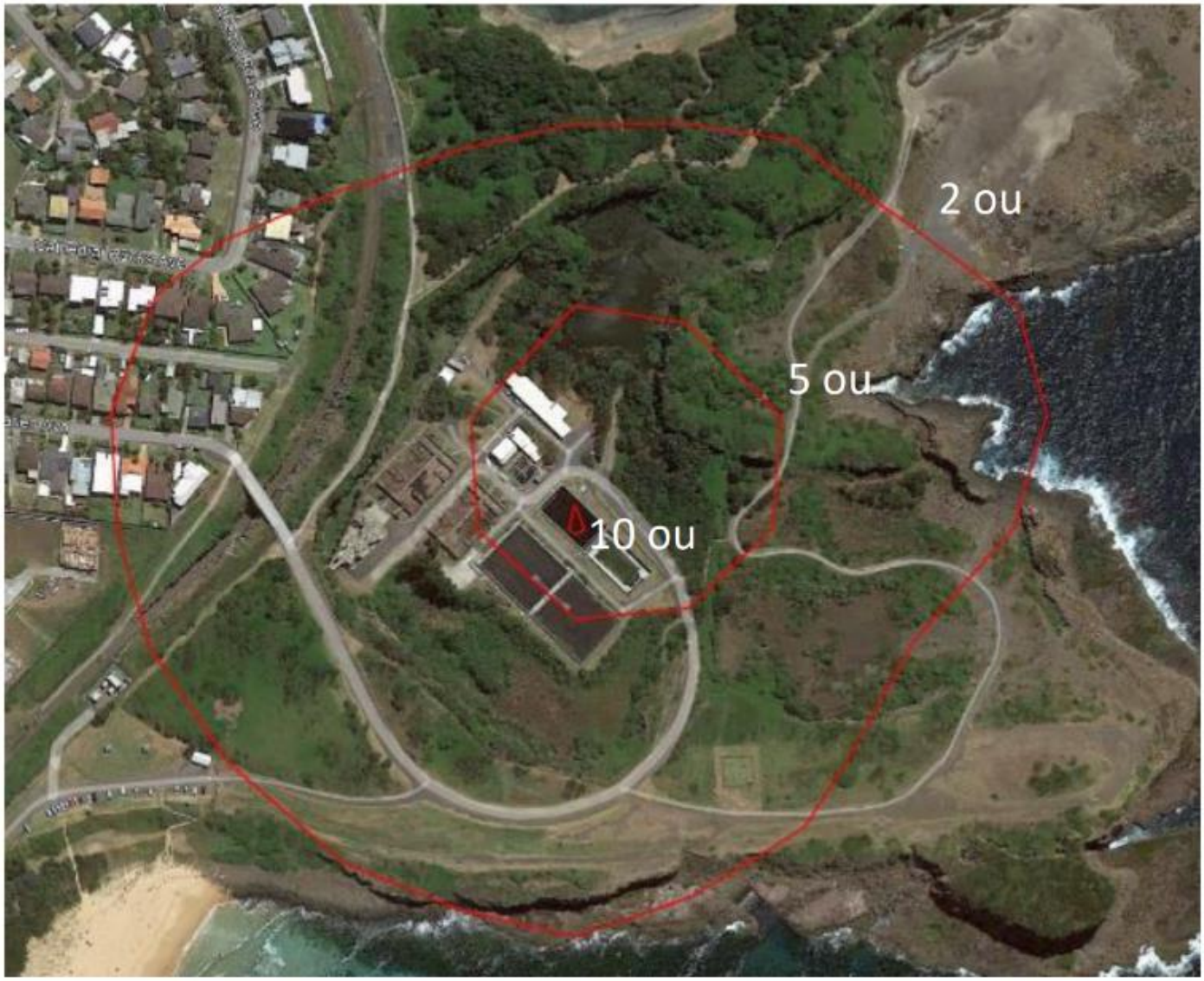

Figure 5-8 IDAL odour emission contributions (base line modelling prediction)

Figure 5-9 Grit lift pump odour emission contributions (base line modelling prediction)

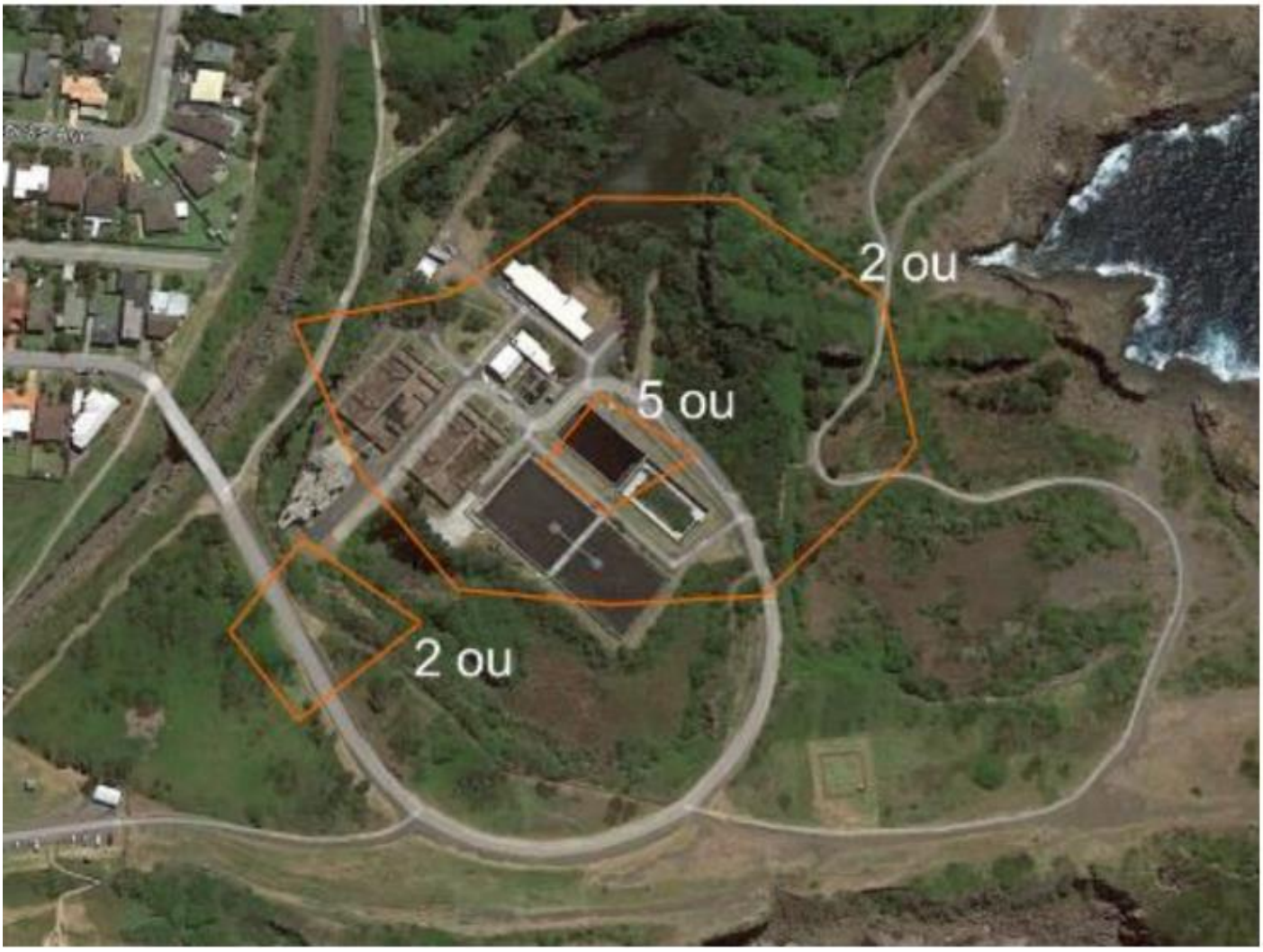

Figure 5-10 Emission for base case dispersion model from the inlet works, foul water drains, IDAL distribution chamber and balance tank.

Figure 5-11 Isopleth contour plot of 2, 7, and 20 ou for the base case of combined WRRF processes

Sydney Water's odour mitigation approach

To address community concerns, Sydney Water has implemented a staged approach to mitigate odour issues at the WRRF. To date, the following measures have been implemented at the WRRF:

- Initial odour modelling (see above) to establish baseline odour levels and understand contributing odour sources.
- Short-term improvement works (STWs), including grit lift pump repairs and carbon filtration system installation (completed 2024). STWs included the submission of an evaluation report to the EPA (May 2025).
- Continued sampling and monitoring as part of an odour evaluation program (including EPA reporting) to determine the effectiveness of STWs and inform design of MTWs.

Reporting intervals have been requested by the EPA and are a requirement outlined in the PRP under EPL 2269. Reporting requirements are outlined in Table 5-10. Post construction odour monitoring is planned to assess the efficacy of the program at reducing odour coming from the WRRF. Sampling locations and timing is designed to be comparable to the baseline sampling regime.

Initial reporting for STWs has shown that the installation of the carbon filtration system is providing a significant reduction in odour emissions from the grit lift pump area. The outlet concentration now meets the minimum requirements for the various contaminants tested.

The completion of MTWs is anticipated to provide further odour improvements and reductions in the background odour at nearby receivers is anticipated. For instance, the installation of a new OCU, will reduce odour from all the other inlet works sources. Specifically, the OCU system has been designed to comply with

strict Technical Specifications (Sydney Water 2025), and outlet concentrations will be significantly reduced from current values (> 10,000 OU at some sources) to ≤ 500 OU at the top of the vent stack. Similarly, proposed magnesium hydroxide dosing will help maintain the sludge lagoon at a pH of 9.2 to eliminate odour. This is because works have been designed to:

- build upon improvements obtained from the completion of STWs
- meet NSW Government best practices and technical framework (DEC NSW 2006)
- meet Sydney Water's minimum design specifications (i.e. ACP0004).

Table 5-10 EPA reporting requirements requested under the Odour mitigation works PRP at Bombo for EPL 2269.

Odour evaluation report	Content	Due Date
Passive Carbon Filter	Effectiveness of the passive carbon filter at the grit lift vent (STWs)	1 May 25 (completed)
Interim Report	Analysis of the post installation sampling as outlined in the Draft Odour Monitoring Evaluation Plan.	31 July 25
Partially Dosed	Effectiveness of partially dosed sludge lagoon with magnesium hydroxide	30 June 26
Fully Dosed	Effectiveness of fully dosed sludge lagoon with magnesium hydroxide	31 March 27
Final Report	Totality of measures under the PRP for Bombo WRRF.	TBC

Mitigation measures

With the implementation of the mitigation measures below, impacts to air and energy can be adequately managed, and residual impacts are expected to be minor.

Table 5-11 Environmental mitigation measures — air and energy

Mitigation measures
Track energy use as per SWEMS0015.28 Contractor NGER template.
Maintain equipment in good working order, comply with the clean air regulations of the *Protection of the Environment Operations Act 1997*, have appropriate exhaust pollution controls, and meet Australian Standards for exhaust emissions.
Sydney Water (Project Manager) to ensure EPA reporting requirements, outlined in Table 5-10, are met.
Switch off vehicles/machinery when not in use.

Mitigation measures
Cover all transported waste.
Use alternatives to fossil fuels where practical and cost-effective.
Implement measures to prevent offsite dust impacts, for example: • water exposed areas (using non-potable water source where possible such as water from excavation pits) • cover exposed areas with tarpaulins or geotextile fabric • modify or cease work in windy conditions • modify site layout (place stockpiles away from sensitive receivers) • vegetate exposed areas using appropriate seeding.
Ensure odour control measures are available and ready to use during the works.
Minimise the potential for odours (e.g. minimise the number of open access chambers, close maintenance holes overnight.)

5.2.7 Waste and hazardous materials

Existing environment and potential environmental impacts

Our corporate objectives include to be a resource recovery business with an increasing portfolio of circular economy products and services. This includes reducing waste through recycling and re-use and encouraging our suppliers to minimise waste. The contractor will seek opportunities to reduce, recycle and reuse materials. This will be documented in the CEMP.

HazCentral has identified hazardous building materials (HBM) within Bombo WRRF. Lead paint has been found within the site, including areas of the preliminary treatment area (inlet works). There is potential for asbestos to be present within buildings at the site (e.g. predominantly, the administration building) and in the surrounding landscape. Remediation works to remove asbestos from the grounds has occurred at locations within the headland. The remediated areas are not proposed to be impacted by the current proposal and should be considered a no-go zone (see Figure 5-12). Disturbance of potential asbestos located within/on b uildings proposed to be refurbished and/or undergo structural additions as part of this REF, will be managed by applying the mitigation measures outlined in Table 5-12.

The proposal will generate the following waste types:

- general construction and demolition waste including excavated road material and concrete
- green waste from (vegetation trimming/removal and turf)
- excess spoil from trenching / minor excavations
- general waste from the workforce such as food packaging waste.

Where possible, it is preferred to reuse excavated materials from site as backfill instead of importing fill material. Where excavated materials cannot be reused as backfill, they would be classified and taken off-site for disposal at a licenced facility.

All waste will be managed in accordance with relevant legislation and records maintained to show

compliance e.g. waste register, transport and disposal records.

Waste generated will be classified according to the *Waste Classification Guideline* (NSW EPA, 2014) and be disposed of at an appropriately licensed facility.

Operation of the proposal may generate minor volumes of waste during maintenance activities. Any operational wastes generated during maintenance would be managed and disposed of in accordance with Sydney Water's standard operating procedures and disposed of at an appropriately licensed waste disposal or recycling facility.

Figure 5-12 Location of past asbestos remediation works. This area is to be considered a no-go zone

Mitigation measures

With the implementation of the mitigation measures below, impacts from waste and hazardous material can be adequately managed, and residual impacts are expected to be low.

Table 5-12 Environmental mitigation measures — waste and hazardous materials

Mitigation measures
Manage waste in accordance with relevant legislation and maintain records to show compliance e.g. waste register, transport and disposal records. Record and submit SWEMS0015.27 Contractor Waste Report.
Minimise the generation of waste and sort waste streams to maximise reuse/recycling in accordance with the legislative requirements.

Mitigation measures
Manage waste and excess spoil in accordance with the NSW EPA Resource Recovery Orders and Exemptions (if applicable) and / or Waste Classification Guidelines. Where materials are not suitable or cannot be reused onsite or offsite, recycle where appropriate. Recycle soils at a licensed soil recycling facility or dispose at an appropriately licenced landfill facility.
Stop work in the immediate vicinity of suspected contamination. Indicators of contamination include discoloured soil, anthropogenic material within fill, asbestos, chemical or petrol odours and leachate. Contain disturbed material on an impermeable surface and cordon areas off. Notify the Sydney Water Project Manager and the Environmental Representative (who will contact Contamination & Hazardous Materials (CHM) team) to agree on proposed management approach.
Review the existing hazardous building materials (HBM) register and implement relevant safeguards. If no HBM register is available, conduct a HBM assessment prior to proceeding with works. Prior to work that could impact on HBM such as refurbishment or demolition, review the HBM register for adequacy and identify any data gaps. Conduct additional HBM assessments (targeted/ destructive/ pre-demolition) prior to commencement where works could disturb HBM not identified in previous HBM assessments (i.e. inaccessible areas)
Manage lead paint in accordance with the WHS Regulation (2017) Part 7.2 and the Australian Standard 4361 Guide to Hazardous Paint Management (Part 1 & 2). Consult with Contamination and Hazardous Materials (CHM) team where works involve removal of lead-based paint. Develop a Lead Management Plan if required.
If fibro (fibre cement sheeting) or other asbestos containing material (ACM) is identified, restrict access and follow Sydney Water's: 1. Asbestos Works Procedure v 6.0, Document Number 746607; 2. Hazardous Building Materials Management Plan (HBMMP) 3. Safety Minimum Requirements; and 4. SafeWork NSW requirements. Contact Sydney Water Project Manager (who will consult with Contamination & Hazardous Materials (CHM) team [redacted].

5.2.8 Traffic and access

Existing environment and potential impacts

The study area is located east of the local railway corridor. Access to both MHs at which induction vent installation is proposed, will require traversal of plant, vehicles, and personnel along existing access tracks that are located immediately adjacent and east of the fenced railway corridor. Lot boundaries and the fence blocking access to the railway corridor do not align. However, no works are proposed within, or below, the fenced area of the railway corridor.

The proposal is located within a Sydney Water owned site, Bombo WRRF. Plant and equipment will access the site from two access points, including the main entry road off Darien Avenue and a railway underpass access off Riverside Drive, which are local council roadways. During construction, there will be an increase in noise and traffic, particularly along Darien Avenue, as contractors, delivery trucks and special equipment is required on site.

Depending on task (see Appendix D), between about 4 to 18 vehicles may be on site on any day, including light vehicles and some infrequent heavy vehicles. Most vehicles would be parked within the site, however, if required, contractor's private vehicles may be parked along local roadways.

Parking of construction vehicles and equipment is not required outside of Bombo WRRF. Several compound, laydown, and storage areas are proposed (Figure 5-13), and will be used to temporarily store spoil, equipment, machinery, and waste prior to disposal.

It is not expected that any traffic controls would be required for roadways. Temporary signage and pedestrian exclusion zones may be required for works located in publicly accessible areas of the headland.

The proposal will:

- not require local road closures
- not require creation of new permanent access roads but will need temporary access tracks
- not result in any permanent changes to traffic volumes or access arrangements along Darien Road
- not impact residential driveway access or street parking.

During construction activities, the proposal may limit movement of Bombo WRRF operations staff and visitors to the site. The paved pedestrian path, heading north from Darien Avenue past the northern MH to Boneyard Beach, will require up to one week's closure to safely complete vegetation clearing and during site setup. Signs and traffic control will be set up to notify public of the works and any closures. Full access will be reinstated upon completion of works and appropriate notification provided to facility operators prior to works beginning. Once installed, the proposed assets will undergo normal maintenance checks. Operational impacts are not anticipated.

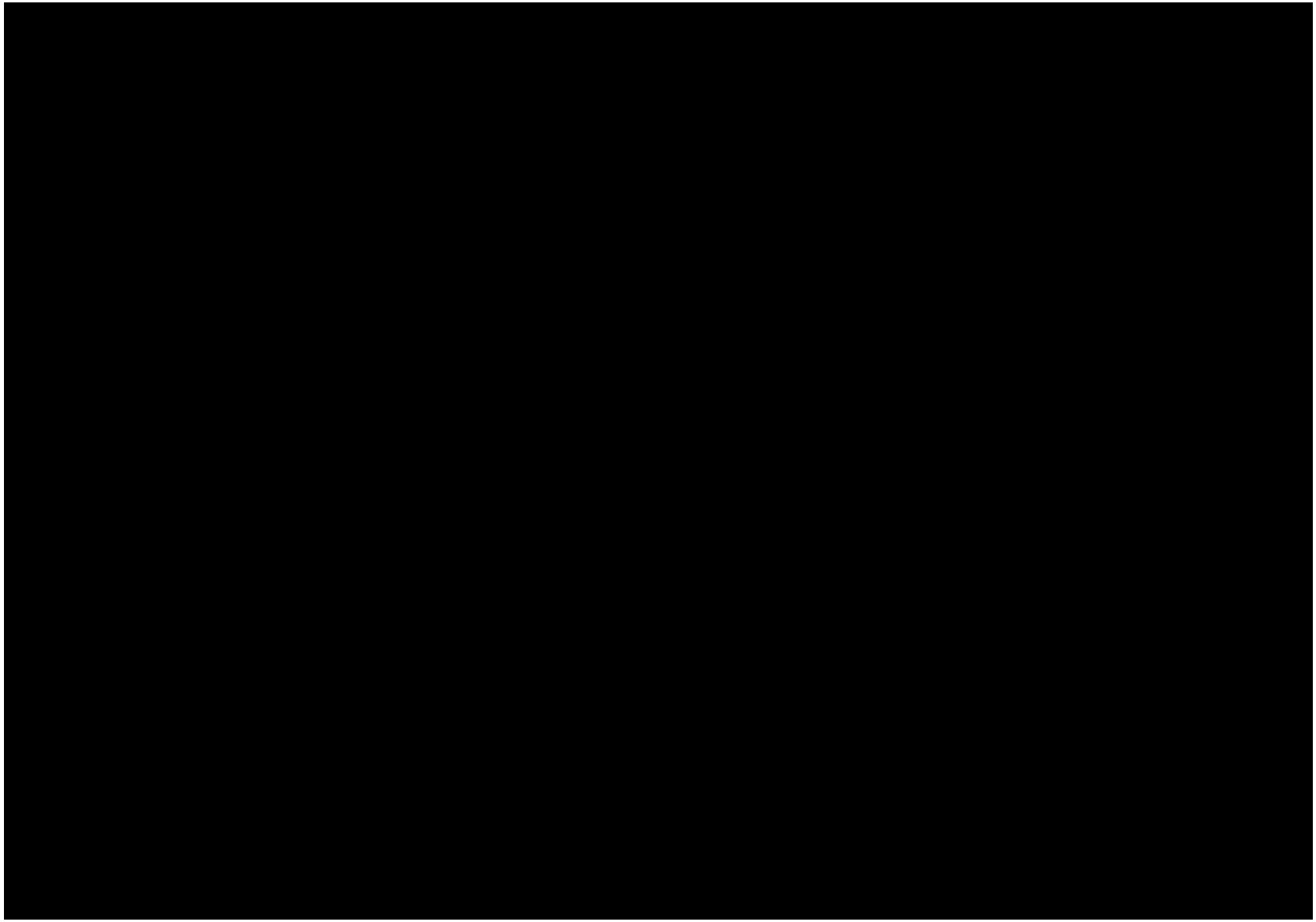

Figure 5-13 Indicative compounds, laydown areas, and access to site

Mitigation measures

With the implementation of the mitigation measures below, impacts to traffic and access can be adequately managed, and residual impacts are expected to be minor.

Table 5-13 Environmental mitigation measures — traffic and access

Mitigation measures
Manage sites to allow people to move safely past the works, including alternative pedestrian, bicycle, pram and wheelchair access.
Ensure work vehicles do not obstruct vehicular or pedestrian traffic, or private driveway, public facility or business access unless necessary and only if appropriate notification has been provided.

5.2.9 Social and visual

Existing environment and potential impacts

The proposal is located within Sydney Water owned Bombo WRRF, with works mostly concealed by existing aboveground infrastructure and buildings, as well as the quarry rock wall. Subsequently, long-term social or visual impacts to the community generally are not anticipated. During construction, there may be temporary impacts associated with a small increase in vehicles and workers entering the site.

Temporary social and/or visual impacts from the proposal will include:

- Visual impacts associated with site compounds and worksites during construction. Predominantly these impacts will be to operational staff at Bombo WRRF, and not the public.
- Increase in vehicle movements, particularly along Darrien Avenue when workers are entering and exiting the site.

Work undertaken to install induct vents at two existing maintenance holes within Sydney Water owned land may be more visible. These works will be short-lived and are able to be completed within standard operating work hours. Upon completion of the works, vents proposed at MH sites will be up to 3 m high, within a densely vegetated area.

Temporary visual impacts associated light spill during night works.

These temporary visual impacts will be mitigated in consultation with stakeholders such as facility operations staff, council, and residents in accordance with the mitigation measures below.

Permanent social and/or visual impacts from the proposal will include:

- New permanent above ground structures, including OCU and all ancillary structures (14 m stack). Given the current use and visual character of the site, the proposed works within the operations area of Bombo WRRF will not alter the existing visual character of the environment.
- Due to the distance from sensitive receivers, and the existing function of the site, potential negative social and visual impacts are expected to be low. The proposal will have a positive community effect by rectifying odour concerns at the facility.

To minimise potential visual impacts, newly constructed assets including tanks and stack, will be painted environmental green and will be kept at the minimum required height.

Mitigation measures

With the implementation of the mitigation measures below, social and visual impacts can be adequately managed, and residual impacts are expected to be minor.

Table 5-14 Environmental mitigation measures — social and visual

Mitigation measures
Restore work sites to pre-existing condition or better.
Maintain work areas in a clean and tidy condition.
Site restoration including roads, verges and vegetation is to be performed in consultation with Sydney Water operational team and PEMP PM.
The scale of tanks, stacks, and vents, and their final locations, would be confirmed during detailed design and would consider visual impacts on receivers. If required, painting of assets in a sympathetic colour, such as environmental green, would be considered.
Minimise visual impacts, where possible (e.g. retain existing vegetation).

5.2.10 Cumulative and future trends

Potential environmental impacts

The main potential cumulative impacts of the proposal include air quality, noise and traffic impacts during construction. These potential cumulative impacts would be localised and temporary during construction of the proposal. There is the potential for local development to occur in the area. However, potential cumulative impacts with such development would be minor and short term and predominantly restricted to a slight increase in vehicle movements along local roadways.

The facility has several planned programs of work, including a power supply upgrade, which is a secondary project required to accommodate the construction and operation of the OCU (assessed in this REF), and replacement of penstocks within the inlet channel. It is possible that there will be some overlap in timing of works being performed. However, Sydney Water will work with the operations team and project teams to ensure impacts within the site and to the community are minimised.

Future trends such as climate change were considered. This includes factors such as bushfires, flooding, extreme heat, and increasing frequency and intensity storm events that could impact the proposal. The proposal does not change the sites function as a WRRF, and the increase in hardstand area was considered, with appropriate stormwater infrastructure incorporated into the design of the proposal. It is unlikely to further exacerbate future trends but will have a positive effect by addressing community odour concerns and asset corrosion.

No cumulative impacts are anticipated during operation.

Mitigation measures

With the implementation of the mitigation measures below, potential impacts to cumulative and future trends can be adequately managed, and residual impacts are expected to be minor.

Table 5-15 Environmental mitigation measures — cumulative and future trends

Mitigation measures
Coordination of works with other ongoing or proposed developments would be required to minimise potential construction scheduling impacts.

5.2.11 General environmental management

Table 5-16 Environmental mitigation measures — general environmental management

Mitigation measures
Should the proposal change from the EIA, no further environmental assessment is required provided the change: • remains within the study area (environmental constraints map extents) for the EIA and has no net additional environmental impact or • is outside the study area for the EIA but: - reduces impacts to biodiversity, heritage or human amenity or - avoids engineering (for example, geological, topographical) constraints and - after consultation with any potentially affected landowners and relevant agencies. The Delivery Contractor must demonstrate in writing how the changes meet these requirements, for approval by Sydney Water's Project Manager in consultation with the environmental and community representatives.
Prepare a Construction Environmental Management Plan (CEMP) addressing the requirements of this environmental assessment. The CEMP should specify licence, approval and notification requirements. Prior to the start of work, all project staff and contractors will be inducted in the CEMP.
Prepare an Incident Management Plan (IMP) outlining actions and responsibilities for: • predicted/onset of heavy rain during works • spills • unexpected finds (e.g. heritage and contamination) • other potential incidents relevant to the scope of works. All site personnel must be inducted into the IMP.
Complaints to be managed in accordance with Sydney Water's Complaints Procedure and relevant Community Engagement Plan.
To ensure compliance with legislative requirements for incident management (e.g. *Protection of the Environment Operations Act 1997)*, Follow SWEMS0009 and attach SWEMS0009 to the EWMS.
Environmentally sensitive areas would be identified as no-go zones (e.g. in induction/ EWMS/ physically delineated as required) if they are located adjacent to the investigation works and at risk of potential impact.

6. Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of ST0022 Bombo WRRF Odour and Corrosion Mitigation project (medium term works). This project is part of a Pollution Reduction Program (PRP) to address community odour complaints, complete ongoing odour monitoring, and to address corrosion repair needs.

The main potential construction environmental impacts of the proposal include noise and traffic impacts and vegetation removal. During operation, the proposal will have a beneficial impact by reducing odour problems and completing structural repairs, to ensure Bombo WRRF can continue to operate efficiently. Given the nature, scale and extent of impacts, and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, an environmental impact statement is not required under Division 5.1 of the EP&A Act.

The REF considers how the proposal aligns with the principles of ESD. The proposal will result in positive long-term environmental improvements. The proposal will not result in the degradation of the quality of the environment and will not pose a risk to the safety of the environment.

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Appendices

Appendix A – Section 171 checklist

Section 171 checklist	REF finding
Any environmental impact on a community	There may be short-term noise impacts on the community. There will be environmental improvements by providing a reliable wastewater service to the local community, with works addressing odour concerns.
Any transformation of a locality	The proposal will not result in the transformation of a locality.
Any environmental impact on the ecosystems of the locality	The proposal will not result in environmental impacts to ecosystems of the locality. The proposal will lead to odour improvements.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	The proposal will not reduce these factors.
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	The proposal will not have any effect upon these factors.
Any impact on the habitat of any protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)	The proposal will not have any impact on the habitat of protected animals.
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	The proposal will not endanger any species.
Any long-term effects on the environment	The proposal will not have any long-term impacts on the environment but will have a long-term benefit by providing a reliable and modern wastewater service for the area by addressing odour concerns.
Any degradation of the quality of the environment	The proposal will not cause the degradation of the quality of the environment.
Any risk to the safety of the environment	The proposal will ensure the safety of the environment.

Section 171 checklist	REF finding
Any reduction in the range of beneficial uses of the environment	The proposal will maintain the range of beneficial uses of the environment.
Any pollution of the environment	Works are in response to a PRP under section 68 of the NSW *Protection of the Environment Operations Act 1997*. Environmental mitigation measures will mitigate the potential for the proposal to pollute the environment. The proposal will operate in accordance with EPL No. 2269.
Any environmental problems associated with the disposal of waste	Waste disposal will be in accordance with the environmental mitigation measures, and no environmental impacts associated with the disposal of waste are expected.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposal will not affect demand on resources.
Any cumulative environmental effect with other existing or likely future activities	The proposal may have a cumulative environmental effect if construction coincides with other existing or likely future activities. Effects will be temporary and not change the existing use of the site. Sydney Water will work with the operations team and project teams to ensure impacts within the site and to the community are minimised.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposal will not have any impact on coastal processes or hazards, and coastal processes and coastal hazards will not have any impact on the proposal.
Any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act, Division 3.1	There are no applicable strategic planning statements or plans.
Any other relevant environmental factors.	The proposal has been assessed against the factors listed above, and there are no other relevant environmental factors to consider.

Appendix B – Consideration of TISEPP consultation

TISEPP section	Yes	No
Section 2.10, council related infrastructure or services – consultation with council		
Will the work:		
Potentially have a substantial impact on stormwater management services provided by council?		✓
Be likely to generate traffic that will strain the capacity of the road system in the LGA?		✓
Connect to, and have a substantial impact on, the capacity of a council owned sewerage system?		✓
Connect to, and use a substantial volume of water from a council owned water supply system?		✓
Require temporary structures on, or enclose, a public space under council's control that will disrupt pedestrian or vehicular traffic that is not minor or inconsequential?		✓
Excavate a road, or a footpath adjacent to a road, for which the council is the roads authority, that is not minor or inconsequential?		✓
Section 2.11, local heritage – consultation with council		
Is the work likely to affect the heritage significance of a local heritage item, or of a heritage conservation area (not also a State heritage item) more than a minor or inconsequential amount?		✓
Section 2.12, flood liable land – consultation with council		
Will the work be on flood liable land (land that is susceptible to flooding by the probable maximum flood event) and will works alter flood patterns other than to a minor extent?		✓
Section 2.13, flood liable land – consultation with State Emergency Services		
Will the work be on flood liable land (land that is susceptible to flooding by the probable maximum flood event) and undertaken under a relevant provision*, but not the carrying out of minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? * (e) Div.14 (Public admin buildings), (g) Div.16 (Research/ monitoring stations), (i) Div.20 (Stormwater systems)?		✓
Section 2.14, development with impacts on certain land within the coastal zone– council consultation		
Is the work on land mapped as coastal vulnerability area and inconsistent with a certified coastal management program?		✓
Section 2.15, consultation with public authorities other than councils		

TISEPP section	Yes	No
Will the proposal be on land adjacent to land reserved under the *National Parks and Wildlife Act 1974* or land acquired under Part 11 of that Act*? If so, consult with DPE (NPWS).*		✓
Will the proposal be on land in Zone C1 National Parks and Nature Reserves or on a land use zone that is equivalent to that zone? *If so, consult with DPE (NPWS).*		✓
Will the proposal include a fixed or floating structure in or over navigable waters? *If so, consult TfNSW.*		✓
Will the proposal be on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? *If so, consult with Subsidence Advisory NSW.*		✓
Will the proposal be on land in a Western City operational area specified in *the Western Parkland City Authority Act 2018,* Schedule 2 and have a capital investment value of $30 million or more? *If so, consult the Western Parkland City Authority*.		✓
Will the proposal clear native vegetation on land that is not subject land (i.e. non-certified land)? *If so, notify DPE at least 21 days prior to work commencing. (Requirement under s3.24 Chapter 3 Sydney Region Growth Centres - of the SEPP (Precincts – Central River City) 2021).*		✓

Appendix C – Vegetation impacts


Trimming proposed (cut point approximately indicated with dashed line) to enable cable ladder installation.


Overhanging branch to be trimmed (cut point approximately indicated with dashed line) to enable electrical infrastructure.


Proposed tree removal.
Indicative kiosk location.
Sub 2443 to
DANGER
ELECTRICAL
CABLE


Coates
13 15 52
Individual tree to be removed to enable electrical infrastructure.
Approximate ground disturbance for electrical infrastructure (continues east and west).


West to Darien Avenue
South to Bombo Carrier
(4WD only)
North to Boneyard Carrier
(temporary closure to public)


Publicly accessible picnic shelters / carpark
Proposed access to MH 1124236. Proposed vegetation trimming along existing access route, if required.
To Hutchinson St (underpass access)


Vegetation to be cleared for access track (3 m x 3 m) with 5 m corridor around MH. Vegetation includes weed species, e.g. *Lantana* sp.
Existing maintenance hole (1124236)
Southwest to Hutchinson St


Hutchinson St access.
Fenced railway corridor. No access to railway corridor proposed.
East to MH 1124236 (vegetation to be cleared for access). Vegetation trimming along existing access route, if required.


Existing MH 1124636
Vegetation removal/ new track proposed. Access track (3 m x 3 m) with 5 m construction corridor around MH. Dense vegetation includes weed species and non-threatened native species.


To existing maintenance hole (1124636)
Fenced railway corridor (west). No work proposed within railway corridor.
Publicly accessible footpath. Temporary closure proposed during initial setup.

Appendix D – Noise impacts

Background noise levels and noise management levels applied.

Noise area category		R2
RBL or LA90[1] Background level (dB(A))	Day	45
	Evening	40
	Night	35
LAeq(15minute) Noise Management Level[2] (dB(A))	Day	55
	Day (OOHW)	50
	Evening	45
	Night	40
scenario		Bulk earthworks
Line of sight to receiver?		NO (behind substantial solid barrier)

Notes: [1]LA_{90} = Background noise level
[2]*Noise Management Level for works during standard hours = Background level plus 10dB(A)*

Noise Management Level (NML) for out of hours works = Background level plus 5dB(A).

Bulk earthworks scenario – activity description and assumed noise impacts.

Activity	Description of activity	Plant/equipment	LAeq	LAeq at 7m	Assumptions for quantitative assessment		
					No. units	Activity total Leq SWL	Activity total LA1 SWL
Bulk earthworks	Formation of road alignment. Excavation of soil and rock, hammering/rock breaking, drilling, loading, haulage, compaction of fill areas, grading	Bulldozer D9	116	91	1	**123**	**Not recommended for OOHW**
		Scraper 651	110	85	1		
		Excavator (tracked) 35t	110	85	1		
		As above + hydraulic hammer	122	97	1		
		Grader	113	88	1		
		Dump truck	110	85	8 per hour		
		Compactor	106	81	1		
		Roller (large pad foot)	109	84	-		
		Water cart	107	82	-		

Additional noise mitigation measures and description, taken from TfNSW noise estimator tool in relation to the assessment (section 6.2.5)

Abbreviation	Mitigation measure and description
N	Notification (letterbox drop or equivalent): Advance warning of works and potential disruptions can assist in reducing the impact on the community. The notification may consist of using variable message sign, letterbox drop (or equivalent), web site / social media or a combination to distribute information detailing work activities, time periods over which these will occur, impacts and mitigation measures. Notification should be a minimum of five working days prior to the start of works. The approval conditions for projects may also specify requirements for notification to the community about works that may impact on them.
SN	Specific notifications: Specific notifications are letterbox dropped (or equivalent) to identified stakeholders no later than five working days ahead of construction activities that are likely to exceed the noise objectives. The specific notification provides additional information when relevant and informative to more highly affected receivers than covered in general letterbox drops. This form of communication is used to support periodic notifications, or to advertise unscheduled works.
PC	Phone calls: Phone calls detailing relevant information made to identified/affected stakeholders, who have provided their contact details, within seven calendar days of construction start. Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposal and specific needs. Where the resident cannot be telephoned then an alternative form of engagement should be used.
RO	Respite offer: Respite Offers should be considered where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed 3 hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers. The purpose of such an offer is to provide residents with respite from an ongoing impact. This measure is evaluated on a project-by-project basis, and may not be applicable to all projects, or when duration respite has been agreed (see below)
R1	Respite Period 1: Out of hours construction noise in out of hours period 1 shall be limited to no more than three consecutive evenings per week except where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and no more than 6 evenings per month
R2	Respite Period 2: Night time construction noise in out of hours period 2 shall be limited to two consecutive nights except for where there is a Duration Respite. For night work these periods of work should be separated by not less than one week and 6 nights per month. Where possible, high noise generating works shall be completed before 11pm.
DR	Duration respite: Respite offers and respite periods 1 and 2 may be counterproductive in reducing the impact on the community for longer duration projects. In this instance and where it can be strongly justified it may be beneficial to increase the work duration, number of evenings or nights worked through Duration Respite so that the project can be completed more quickly.

Abbreviation	Mitigation measure and description
	RDC staff should engage with the community where noise levels are expected to exceed the NML to demonstrate support for Duration Respite.
AA	Alternative accommodation: Alternative accommodation options may be offered (as a last resort) to residents living in close proximity to construction works (within the distance nominated by the noise estimator) that are likely to experience highly intrusive noise levels.

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
1. Site established and restoration										
Site mobilisation	Delineate construction work sites	1 week	Light vehicles, Chain saws Tree Mulcher	1-3 days within site mob duration. Operating majority of shift. Approx 6 hours	1-3 days within site mob duration. N OOHW	4 – 10 vehicles per day	N - none	N - none	Y – as below for specific activities, and per REF figures.	Y, Clear construction zone, construct silt fence.
Compound use	Establish amenities, storage, laydown, parking areas.	2 weeks	Heavy & light Vehicles, Franna, 8T excavator	10 days - Approx 6 hours per shift	5 shifts per week 4 – 10 workers N OOHW	4 – 10 vehicles per day	N - none	N - none	N - none	
Site demobilisation	Removal compounds and restore disturbed areas.	2 weeks	Heavy & light Vehicles, Franna, 8T excavator	10 days - Approx 6 hours per shift	5 shifts per week 4 – 10 workers N OOHW	4 – 10 vehicles per day	N - none	N - none	N - none	Y, remove temporary cement paving installed to level site / scrape ground surface to final finish level
2. Civil repairs & corrosion mitigation / refurbishments										

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
Civil repairs and relining works	Demolition, concrete repairs, shotcrete	3 months	Jack hammer, Heavy & light Vehicles concrete saws, masonry drills, compressed air, concrete truck	3-5 hours per shift	5 shifts per week 6 workers Y OOHW 23:00 – 07:00, low flows, SW to confirm	4 – 10 vehicles per day	Y – FIFM required. Facility will stop flow prior to planned works to limit volume. Water remaining will be directed to head of treatment / kept in the plant process.	N - none	N - none	N - none
Protective coating and mechanical repair works	Apply protective coating to repaired structures	4-6 weeks	Heavy & light Vehicles, Air compressor	Up to 6 hours per shift	5 shifts per week 6 workers Y OOHW 23:00 – 07:00, low flows, SW to confirm	4 – 10 vehicles per day	Y – FIFM required. As per civil repairs and relining works.	N - none	N - none	N - none

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
Supply and installation of new covers / refurbish existing covers / integrate inducts and educts into covers system.	Installation of new covers	2-4 weeks	Heavy & light Vehicles, Franna, Masonry Hammer drill	Intermittently throughout shift	5 shifts per week 4 – 10 workers N OOHW	4 – 10 vehicles per day	N - none	N - none	N - none	N - none
3. Odour Control Unit and ancillary structures/works										
OCU installation (concrete slab detailed below)	Install OCU components	6-10 weeks	Heavy & light Vehicles, elevated work platform (EWP), 40Tcrane	40Tcrane 3-4 weeks beginning of installation	5 shifts per week 4 – 10 workers N OOHW	12-18 vehicles per day	N - none	N - none	N - none	N - none
Ventilation ductwork	Install prefabricated fibreglass ductwork from OCU, along inlet works and extend via new gantry to distribution chamber.	4-6 weeks	Heavy & light Vehicles, EWP, 40Tcrane	40Tcrane 3-4 weeks beginning of installation	5 shifts per week 4 – 10 workers N OOHW	12-18 vehicles per day	N - none	N - none	N - none	N - none

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
Electrical works / cables / switch room activities	Install HV kiosks Construct and fit out new Switchroom Construct pit and conduit system Construct above ground cable ladder system Install remote PLC panel Cable installation, termination and field device installation.	20 – 26 weeks	Heavy & light Vehicles, EWP, Franna, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	5 - 10 shifts N OOHW	4 – 10 vehicles per day	N - none	Y 6 hours per shift for duration of bulk excavation 2-4 weeks	Y Tree removal Corner of northern fence line (next to existing D4C office).	Y Kiosk Excavation 10mx6m – 1.2m deep New Switchroom 16mx10m – 1.5 deep Conduit trenching 1m deep 15m long Cable ladder footings 500m dia 1m deep

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
Concrete slab	Excavation, disposal of waste material and FRP	10 – 12 weeks	Heavy & light Vehicles, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	Standard daytime hours (7 am – 5 pm)	10 – 15 vehicles per day	N - none	Y 6 hours per shift for duration of bulk excavation 2-4 weeks	N - none	Y – approx. max. 1 m (d) 17 m (w) 36m (l) Largest footing = 2mx2mx2m required for proposed stack.
Kerb / gutter	Install kerb and gutter	2 weeks	Heavy & light Vehicles, Plate compactor Concrete truck, concrete pump, 8T Excavator	Intermittently throughout shift	Standard daytime hours (7 am – 5 pm)	4-6	N - none	N - none	N - none	Y – same impact area as slab.
Road reinstatement		1 week	Heavy & light Vehicles, Plate compactor Concrete truck, concrete pump, 8T Excavator	Intermittently throughout shift	Standard daytime hours (7 am – 5 pm)	4-6	N - none	N - none	N - none	N - none
4. WAS piping modifications										
Sludge lagoon 1 repairs	Replace/repair components including: install new non-return						N – none	N - none	N - none	N - none

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
	valves and extend existing pipe (maintain existing diameter)						Proposal will be timed with facilities general maintenance, during which time the lagoon is taking offline and will be emptied.			
5. **Sewer carriers to Bombo WRRF**										
Induct vent installation (on existing MH. Asset number: 1124236 – south location)	Instal induct vent (two vents to be installed consecutively)	4-6 weeks	Heavy & light Vehicles, Franna, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	Standard daytime hours	4-6 Vehicles	N - none	Y 6 hours per shift for duration of bulk excavation 1-2 weeks	Y – ground vegetation clearing	Y – clearing approx. 5m x 5m around existing maintenance hole Duct footing approx3mx3mx3m Access track clearing – reinstate

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
										Machinery access from Bombo Beach carpark required to be established
Induct vent installation (on existing MH. Asset number: 1124636 – north location)	Instal induct vent (two vents to be installed consecutively)	4-6 weeks	Heavy & light Vehicles, Franna, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	Standard daytime hours	4-6 Vehicles	N - none	Y 6 hours per shift for duration of bulk excavation 1-2 weeks	Y – Tree trimming/Removal, ground vegetation clearing	Y – clearing approx. 5m x 5m Duct footing approx3mx3mx3m Access track clearing - reinstate
6. Stormwater pipe and pits										
New 300 mm diameter UPVC stormwater	install new 300 mm diameter UPVC stormwater line and connect to an existing stormwater pit	1-2 weeks	Heavy & light Vehicles, Franna, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	Standard daytime hours, 9 am to 3pm	4-6 Vehicles	N - none	Y 6 hours per shift for duration of bulk excavation 1 week	N - none	Y – open trenching. & Pit installation Max. 2.0 m (d) x 1m (w) x 1 m (l) pit dimensions 10 m (l) – indicative for

Scope	Activities	Duration of activity	Plant/machinery (*noisiest equipment*)	Duration and frequency of use (noisiest equipment)	How many shifts OOHW *Y/N*	Vehicle movements	Planned dewatering *Y/N*	Rock breaking *Y/N*	Vegetation disturbance *Y/N*	Ground disturbance *Y/N*
										discharge – no additional trenching. Above on the slab to head of treatment. .5 m (d) stormwater channel (worse case)
Stormwater pit/s	Install one new pit	1-2 weeks	Heavy & light Vehicles, Franna, Plate compactor Concrete truck, concrete pump, 8T Excavator, Rock Breaker Vac Truck	Intermittently during bulk excavation with bucket refusal	Standard daytime hours, 9 am to 3pm	4-6 Vehicles	N – none	Y 6 hours per shift for duration of bulk excavation 1 week	N – none	Y – open trenching. & Pit installation Max. 2.0 m (d) x 1m (w) 10 m (l)
7. Odour sampling and air dispersion modelling										
As per 2023 plan			N - none	N - none			N - none	N - none	N - none	N - none

Note, access to the railway corridor adjacent to the proposal is not required to complete, or access any of the above activities.

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SWEMS0025.01v22