Review of Environmental Factors

North West Treatment Hub

Castle Hill and Rouse Hill Water Recycling Plants Compliance Upgrade (August, 2021)

Sydney WATER

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Acknowledgement of country

The proposal is the land of the Dharug people. We acknowledge these traditional custodians and their ancestors of the land and waters. Their lore, traditions and customs nurture and continue to nurture the water, creating wellbeing for all. We also pay our respect to Elders, past, present and emerging.

Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts of upgrades to Castle Hill and Rouse Hill Water Recycling Plants and 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 State Environmental Planning Policy (Infrastructure) 2007 allows the proposal to be carried out without development consent. The proposal has also been considered against the matters listed in clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) (Appendix A).

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as erosion and sedimentation, biodiversity, noise and access changes. During operation, the main impacts are associated with noise and visual amenity as well as improved treated wastewater quality. The assessment shows that if we adopt the measures identified in this REF, the proposal would not have a significant environmental impact. Accordingly, we do not require an Environmental Impact Statement (EIS).

The Sydney Water Project Manager will make sure the proposal is carried out as described in this REF. If the scope of work or work methods described in this REF change significantly following determination, additional environmental impact assessment may be required.

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1 Executive summary

Castle Hill Water Recycling Plant (WRP) and Rouse Hill WRP are in The Hills Shire local government area and provide wastewater services to Sydney's North West. Together with Riverstone Wastewater Treatment Plant (WWTP), they form Sydney Water's North West Treatment Hub (NWTH). The North West Treatment Hub (NWTH) services catchments within the North West Growth Centre and priority growth areas spurred by the Metro North-West Line.

Phased upgrades of the treatment plants are required in order to service Sydney's North West into the future and ensure continued compliance with environmental regulatory frameworks as the region develops. In particular, the NSW EPA's Hawkesbury Nepean Nutrient Framework imposes new nutrient load and concentration limits in our Environment Protection Licences (EPLs) effective from July 2024. To achieve these limits, the NWTH will be upgraded for liquid amplification at all three plants and consolidated sludge transfer to Riverstone WWTP for centralised processing.

Currently, both Castle Hill WRP and Rouse Hill WRP are operating at treatment capacity and have recorded non-compliances against EPL requirements. Amplifications to Castle Hill and Rouse Hill WRP commenced in 2018 as Phase 1 upgrades.

This REF addresses Phase 2a upgrades specific to Castle Hill WRP and Rouse Hill WRP. The proposal objectives are to:

- resolve current EPL non-compliances including nutrient concentration limits and wet weather overflows
- enable Castle Hill and Rouse Hill WRPs to meet 2024 EPL requirements
- improve reliability, availability, and operability of the treatment processes
- minimise impacts to the surrounding environment and community.

This Review of Environmental Factors (REF) assesses the potential impacts of the proposal on the surrounding environment. Our assessment concludes that the proposal is unlikely to have a significant adverse impact on the environment and an EIS is not required. Potential impacts have been identified and include temporary erosion and sedimentation, biodiversity, noise and access changes during construction. During operation, the main potential impacts are associated with noise and visual amenity as well as benefits from improved treated wastewater quality.

We are seeking feedback on our proposal presented in this REF. We will consider all submissions and prepare a Decision Report. Pending approvals, we expect that we can start construction from mid-2022.

2 Introduction

2.1 Context

Sydney Water provides water, wastewater, recycled water and some stormwater services to almost 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 proposed work under Division 5.1 of the EP& A Act. This REF assesses the potential environmental impacts associated with upgrades to Castle Hill and Rouse Hill Water Recycling Plants and identifies safeguards that avoid or minimise potential impacts.

Under the *Protection of the Environment Operations (POEO) Act 1997*, our wastewater systems are licenced by the Environment Protection Authority (EPA) via an Environment Protection Licence (EPL). The Castle Hill and Rouse Hill wastewater systems are licenced under EPL 1725 and EPL 4965, respectively.

2.2 Proposal background and need

2.2.1 Proposal background

Castle Hill Water Recycling Plant (WRP) and Rouse Hill WRP provide wastewater services to Sydney's North West and together with Riverstone Wastewater Treatment Plant (WWTP), form Sydney Water's North West Treatment Hub (NWTH). The NWTH services catchments within the North West Growth Centre and priority growth areas spurred by the Metro North-West Line (Figure 1). Options assessments to plan for NWTH over a 30 year horizon concluded the preferred strategy for liquid amplification at all three plants and consolidated sludge transfer to Riverstone WWTP for centralised processing (Section 2.2.4). Upgrades would occur across a number of phases. Amplifications to Castle Hill and Rouse Hill WRP commenced in 2018 as Phase 1. This REF addresses Phase 2a upgrades.

Castle Hill WRP

Castle Hill WRP has a current capacity of 6.9 ML/d average dry weather flow (ADWF), servicing approximately 41,500 equivalent population (EP).

Castle Hill WRP currently transfers sludge to Rouse Hill WRP via the existing wastewater network. Treated wastewater is discharged into Cattai Creek or recycled to the Castle Hill Golf Course for irrigation purposes.

Amplifications at Castle Hill WRP were originally proposed and publicly exhibited in an REF in 2018 (Sydney Water, 2018), however the full scope of works was placed on hold for further investigations into options. This was documented in a Decision Report (Sydney Water, 2019).

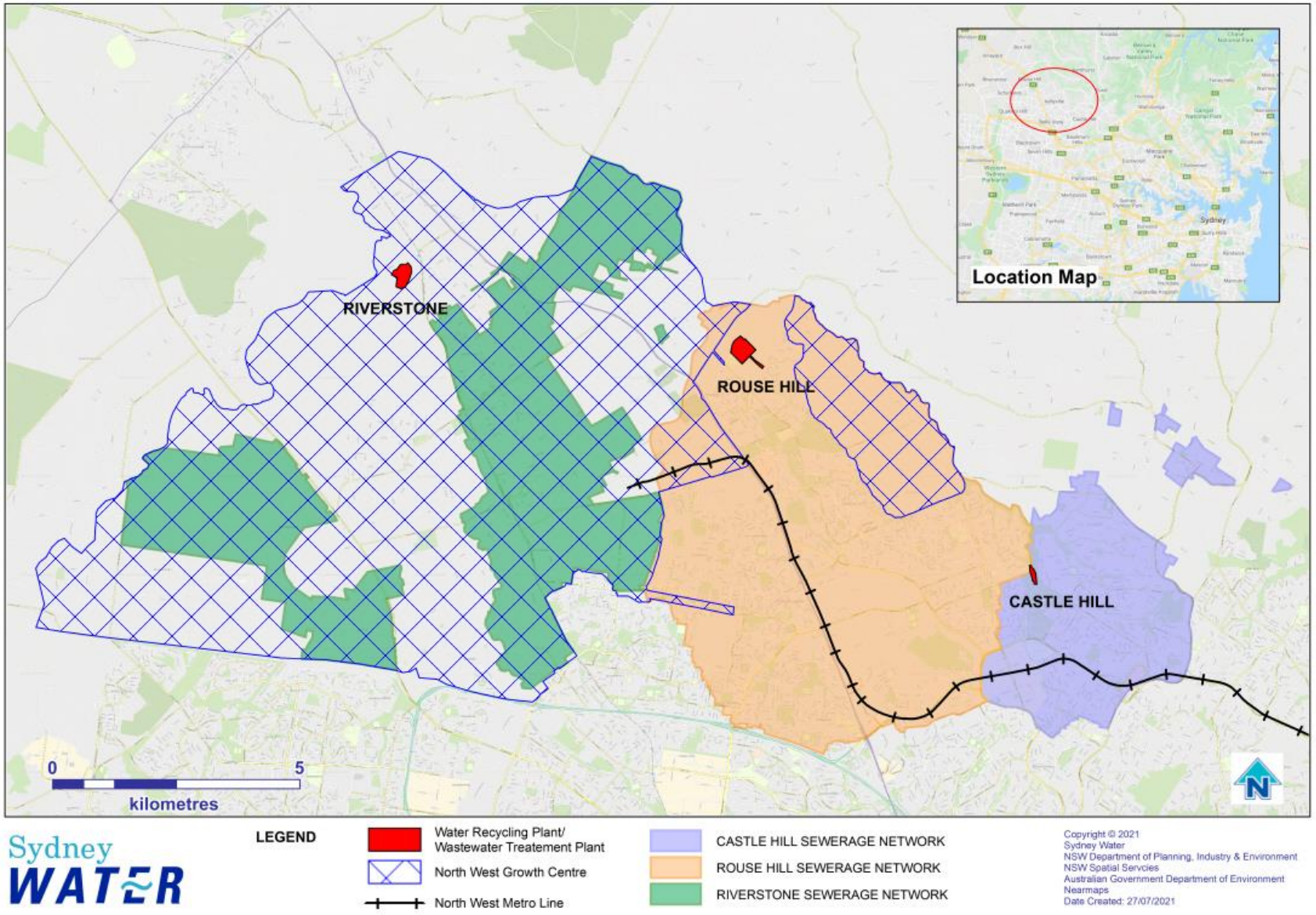

Figure 1. North West Treatment Hub wastewater catchment service areas.

A reduced scope was subsequently constructed at Castle Hill WRP (Phase 1). The reduced scope included bushfire protection work and upgrades to address odour issues, being a permanent ferrous dosing skid (completed in early 2021) and replacement of sealed covers at Sewage Pumping Station (SPS) 1108 (completed in late 2020).

Rouse Hill WRP

Rouse Hill WRP has a current capacity of 26 ML/d average dry weather flow (ADWF), servicing approximately 131,800 EP.

Treated wastewater that is surplus to recycled water production is discharged into Second Ponds Creek. Recycled water produced at Rouse Hill WRP supplies 32,000 properties with 2 billion litres of recycled water every year. The recycled water demand ranges from approximately 6 ML/d during winter periods, up to daily peaks of 16 ML/d, which typically occur in summer. Potable water top-up is used when the production of recycled water cannot keep up with demand.

Works are currently underway to transfer excess flows from Rouse Hill WRP to Riverstone WWTP which provides an interim solution for treatment capacity and utilise spare capacity at Riverstone WWTP (Phase 1). The works to be completed by late 2022 include a new transfer pump station, balance tank, odour control unit, and pipe from the inlet works.

2.2.2 Proposal need

Castle Hill WRP and Rouse Hill WRP are operating at treatment capacity. Both WRPs have recorded EPL non-compliances related to wet weather overflow exceedances and are at risk of future non-compliances due to capacity constraints and new regulatory requirements.

New EPL requirements will come into effect from 1 July 2024. This includes new nutrient load and concentration limits under NSW EPA's Hawkesbury Nepean Nutrient Framework (NSW EPA, 2019). The new limits aim to minimise the risk of algal blooms and aquatic weed outbreaks from treatment plant discharges that will service increased development in Western Sydney. Both Castle Hill WRP and Rouse Hill WRP discharge to Sackville Subzone 3 defined under the framework.

The framework specifically identified the need to upgrade Castle Hill WRP to reduce Total Nitrogen (TN) concentrations in treated wastewater toward compliant limits (from a current median of 17 mg/L to a future median of 6 mg/L by 2024).

Rouse Hill WRP is also subject to a wet weather overflow abatement Pollution Reduction Program (PRP) under its EPL (condition U1 of EPL 4965). This condition requires work to be undertaken at Rouse Hill WRP to ensure compliance (by 30 April 2024) with the wet weather overflow limit of 12 overflows per 10 years.

The continued provision of recycled water to existing customers is also reliant on meeting recycled water quality (concentration) targets including nitrogen as ammonia being maintained (as this is at risk of a non-compliance by mid-2024).

Table 1 and Table 2 provides recent plant performance and key future EPL nutrient compliance targets.

Table 1. Future nutrient load limits and past performance

Parameter	Total Nitrogen (kg/yr)		Total Phosphorous (kg/yr)	
	2024 load limit	2019/20 load	2024 load limit	2019/20 load
Sackville Subzone 3	82,400	78,815	1,160	1,214
Castle Hill WRP	N/A	34,694	N/A	674
Rouse Hill WRP	N/A	44,121	N/A	540

Table 2. Future key nutrient concentration limits and past performance

Parameter	Total Nitrogen (mg/L)		Total Phosphorous (mg/L)	
	2024 50th percentile	2019/20 50th percentile	2024 50th percentile	2019/20 50th percentile
Castle Hill WRP	6	17.3	0.1	0.1
Rouse Hill WRP	6	6.8	0.1[1]	0.01

Notes: 1. EPL concentration limit will be 0.1 mg/L however, 0.05 mg/L needs to be achieved from 2021 at Rouse Hill WRP to meet load limits (this is not considered a major constraint as the Rouse Hill WRP already achieves this).

2.2.3 Proposal objectives

The proposal objectives are to:

- resolve current EPL non-compliances
- enable Castle Hill and Rouse Hill WRPs to meet 2024 EPL requirements
- improve reliability, availability, and operability of the treatment processes
- minimise impacts to the surrounding environment and community.

2.2.4 Consideration of alternatives/options

The shortlisted options following five years of studies for NWTH included:

- Base Case: liquid stream upgrades at each treatment plant and for solids treatment to remain decentralised
- Option 1: liquid stream upgrades at each treatment plant and a centralised biosolids facility at Riverstone WWTP to maximise energy recovery and potential for co-treatment of imported food waste

- Option 2: decommission Castle Hill WRP and transfer flows to Rouse Hill WRP or North Head via the Northern Suburbs Ocean Outfall Sewer (NSOOS) with a further decision to be made on centralised biosolids processing
- Option 3: decommission both Castle Hill and Rouse Hill WRP and construct a large regional centralised biosolids treatment plant for liquids and solids at Riverstone WWTP.

An assessment of options (Sydney Water, 2019) to meet environmental requirements for NWTH was conducted and the preferred solution was identified. The preferred solution was for the closure of Castle Hill WRP, liquid stream amplification at Rouse Hill WRP and Riverstone WWTP and to consolidate biosolids processing at Riverstone WWTP. Costing and constructability was subsequently revisited in mid-2020 and a separate options assessment was then conducted for Castle Hill (Sydney Water, 2020). It reviewed and considered several different options including upgrading Castle Hill WRP and transfer of all flows to Rouse Hill WRP. The 2020 assessment recommended the preferred option of keeping Castle Hill WRP open and a staged upgrade of the plant. This enables the new licence requirements by mid-2024 to be achieved in conjunction with future upgrades for NWTH to service growth.

The preferred strategy (Option 1) for the NWTH (Sydney Water, 2021) is a solution that enables staged upgrades. This will reduce risks associated with environmental approvals and odour management required in the short term. In the long term, a staged approach enables maximising energy recovery and providing resilience for future uncertainties. Future uncertainties include regulatory change and forecasting to service growth and demand.

2.3 Consideration of Ecologically Sustainable Development

The proposal has been considered against the principles of ecologically sustainable development (ESD) (refer to Table 3 below).

Table 3 Consideration of principles of ecologically sustainable development (ESD)

Principle	Consideration in proposal
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.*	Mitigation measures have been incorporated into the proposal to reduce scientific uncertainty relating to potential impacts to the environment. The proposal would reduce the concentrations and load of nutrients entering waterways, thereby reducing the current operational impact of the WRPs.
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 an improved and reliable wastewater service. Improved treatment processes will reduce future nutrient levels entering waterways. This will contribute to improved waterway and ecological health for future generations.
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 includes removal of 0.47 ha of critically endangered Shale Sandstone Transition Forest for construction of the inlet works at Rouse Hill WRP. The concept design has minimised the impact to biological diversity and ecological integrity. The proposed road access behind the new inlet works at Rouse Hill WRP was removed to reduce vegetation clearing at this location. This impact would be offset in accordance with Sydney Water's Biodiversity Offset guideline.
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 will provide cost efficient use of resources and provide optimum outcomes for the community and environment through improved waterway health.

3 Proposal Description

3.1 Proposal details

The proposal is to upgrade Castle Hill WRP and Rouse Hill WRP to bring the plants into compliance with existing EPL conditions including to address wet weather overflow non-compliances and to meet impending nutrient targets that must be achieved by 2024.

Future upgrades beyond 2024 at Castle Hill WRP will be required and the current design has considered the need for these future upgrades. Additional infrastructure proposed at Castle Hill WRP to be delivered beyond 2024 has been incorporated into this REF. This has been done to assess for the combined potential impacts to operational noise and odour as well as vegetation and visual amenity (Table 5).

Future upgrades beyond 2024 at Rouse Hill WRP will address servicing requirements for growth in the catchment. These upgrades are not included in the scope of this proposal but will be assessed in a future REF (anticipated late 2021/ early 2022) to address servicing growth in the NWTH catchment (herein referred to as the NWTH 'growth package').

The proposed work would be located at properties identified in Table 4.

Table 4. Proposal location details

Site name	Address	LGA
Castle Hill WRP	Wrights Road, Kellyville NSW 2155	The Hills Shire
Rouse Hill WRP	Mile End Road, Rouse Hill NSW 2155	The Hills Shire

The key components of the proposal and indicative construction footprints are shown in Figure 2 and Figure 3. The proposed works for construction are summarised in Table 5.

Table 5. Proposal detail summary

Proposal	Detail
Castle Hill WRP upgrade	Proposed upgrades include: • inlet works (including screening and grit removal) • primary sedimentation tank (PST) cover replacement (for odour control) • pumps (mixed liquor recycle pumps) and pipe installations in the existing bioreactor • anoxic tank (to increase TN reduction) • sodium hydroxide dosing system

- sucrose dosing system
- alum dosing facility (to decrease TP during wet weather using existing storage tank and bund)
- chemical storage (for sodium hypochlorite, citric and sulfuric acid)
- ultra-filtration (UF) for expansion of tertiary phosphorus removal
- ultraviolet (UV) disinfection system replacement
- reclaimed effluent (RE) system upgrade
- odour control facility (OCF) with ~ 5.5 m vent stack
- switch rooms and transformers, transformer kiosks
- switching stations (x2) located at the main access gate
- first flush detention tank
- bypass storm tank
- storage building
- new internal access road along the western boundary
- retaining walls including temporary retaining piled walls during construction
- WRP extension and new fence to enable installation of a HV switchroom, chemical storage, switching stations and future pump station
- realignment of public access walking track
- additional discharge main (~125 m) to Cattai Creek and headwall
- various pipeline installations
- demolition of:
    - existing odour control unit
    - existing sodium hydroxide unit
    - digester and control room including associated pipes, cables
    - existing lime dosing facility
    - existing underground aeration pipework to be removed and backfilled
    - redundant site storage structures, BBQ area and demountables
    - existing first flush system (near the main access gate)
    - existing inlet works and associated equipment/ pipework (potential for decommissioning only - to be determined in detailed design)

In addition, the following would be delivered concurrent to the proposal:

- new sludge pump station and balance tank

- sludge screening– provision for ferrous dosing to the sludge balance tank to reduce the creation of corrosive and odorous gases in the sludge transfer system
- sludge flush tank for RE storage of ~290 kL

The potential for combined impacts to operational noise and odour as well as vegetation and visual amenity have been considered in this REF.

Rouse Hill WRP upgrade

Proposed upgrades include:

- inlet works, including:
  - screening and grit removal
  - 3x barometric loops[1] (~12 m high) associated with 3x rising main tie ins for Sydney Water's Metro North West urban renewal wastewater corridor project (Sydney Water, 2021)
  - a fourth connection (<25 m) adjacent the proposed inlet works and connected to SP1139 will tie into the inlet works
  - temporary connection from the new inlet works to an existing flow splitter structure and to the recently upgraded (Phase 1) transfer pump station
- wet weather (WW) PST conversion
- reclaimed effluent (RE) system (existing) upgrade
- OCF with 15 m vent stack and connections to the new inlet works and wet weather PST (note - existing OCF will continue to operate)
- HV switch room, HV switch board and HV network reticulation via existing conduit
- inlet works LV switch room and LV switch board and transformer kiosks
- DN760 gravity pipeline
- first flush tank
- internal access road
- demolition of redundant education building and microfiltration (MF) building
- new mechanical primaries (potentially part of this scope, to be confirmed during detailed design)
- decommission mechanical equipment within existing inlet works

[1] An additional future barometric loop at Rouse Hill WRP associated with a future sludge transfer pipeline from Castle Hill WRP (growth package) is considered in this REF (Section 6.3) for the purposes of assessing combined environmental impacts to vegetation at Rouse Hill WRP near the proposed new inlet works.

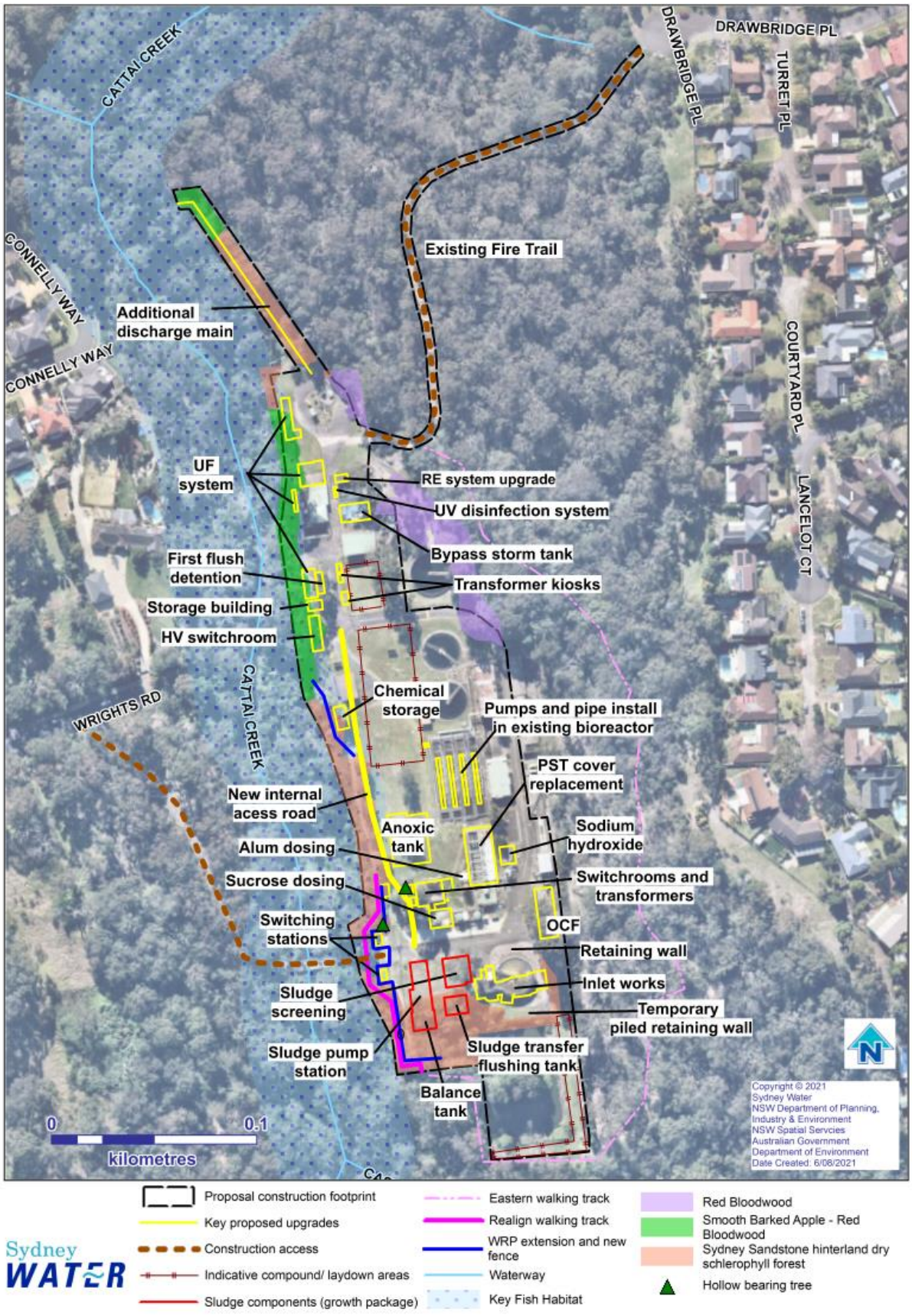

Figure 2. Proposal at Castle Hill WRP and key environmental constraints

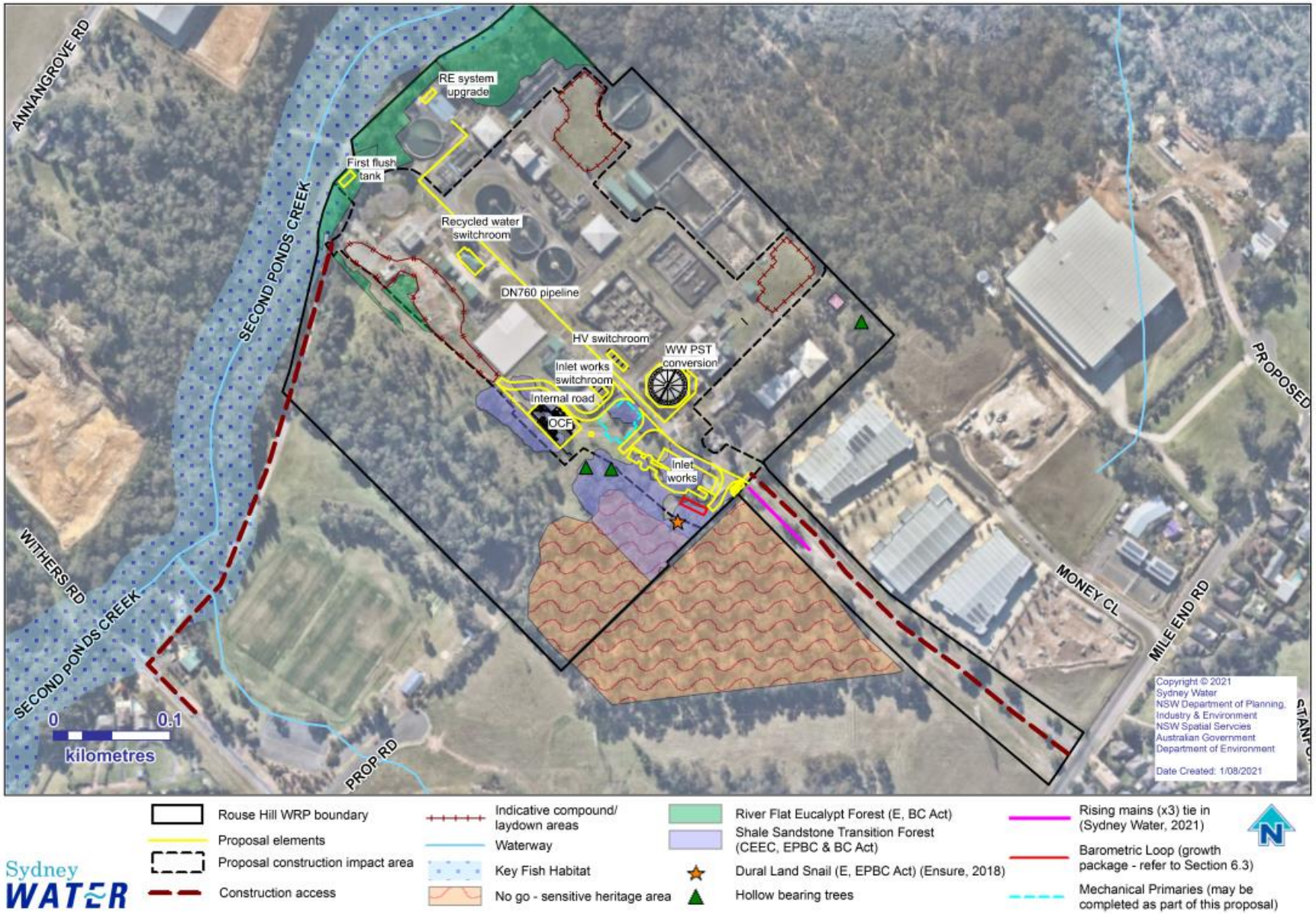

Figure 3. Proposal at Rouse Hill WRP and key environmental constraints

3.2 Proposal activities

3.2.1 Pre-construction

Pre-construction activities include surveying, geotechnical investigations, soil sampling and locating existing underground services.

We will also be:

- preparing management plans and procedures including a Construction Environmental Management Plan (CEMP), a Community and Stakeholder Engagement Plan (CSEP), site inductions and safety plans
- liaising with local authorities and local residents to notify and discuss the works in accordance with Sydney Water's community relations protocols
- establishing and marking out the designated construction areas including upgrades to access routes, and areas for temporary material and machinery storage, and temporary fencing to separate construction works from WRP operations if required
- setting up temporary construction compounds including site sheds and amenities including providing these with temporary water and electricity services
- establishing signage along Withers Road at Rouse Hill WRP to inform of increased use of the secondary access road
- establishing walking track diversions around Castle Hill WRP, signage and gate to inform of temporarily closed sections, redirect pedestrians and inform of changed track conditions along the fire trail (refer to Section 6.8)
- preparing the site by establishing erosion and sediment controls and removing vegetation to be cleared
- delivering and storing materials and equipment.

3.2.2 Commissioning

Commissioning follows the completion of construction (Table 5) and involves testing and running new equipment to confirm it meets the expected performance criteria. The exact commissioning steps depend on the type of equipment, but typically include:

- providing all resources and undertaking all activities to comply with the commissioning requirements of Sydney Water's maintenance related clauses
- providing site labelling of WRP upgrade components
- preparing and testing new infrastructure which may include pressure leak tests, checking of all equipment and safety devices
- performance testing including sampling where required

- operator training and preparing maintenance manuals.

3.2.3 Post construction

Post construction activities include:

- decommissioning existing assets
- dismantling the site, cleaning up and restoring areas
- reinstating damaged roadways and ground surfaces
- removing waste materials, machinery and excess materials
- replanting trees, and restoring grassed areas
- removing environmental controls, temporary fencing, site sheds, amenities and safety barriers
- fixing any defects during the liability period.

The work areas will be restored to the pre-existing condition following construction.

3.2.4 Materials and equipment

The materials required for construction will include:

- concrete, structural steel, aluminium, timber and steel reinforcement
- pipework, ductwork and vessels made from stainless steel, PVC, glass fibre reinforced plastic (GRP), concrete or steel
- polyethylene
- colour bond sheeting
- electrical cabling and conduits
- mechanical and electrical equipment
- road base, rock rip-rap and engineered backfill
- asphalt for sealing roads
- fuel for equipment, machinery and vehicles
- ancillary construction materials.

Equipment required for construction will include:

- excavators and backhoes (including those fitted with hydraulic hammers)
- compactors, concrete vibrators and rollers
- dozers, graders and loaders
- light and heavy vehicles including haulage trucks
- concrete trucks, pumps and kerbing machines
- mobile cranes

- compressors for pneumatic equipment
- generators
- welding equipment
- painting and coating equipment
- asphalt paver and profiler
- water cart and pump
- jackhammers
- temporary fencing, skip bins, environmental controls and portable amenities
- hand tools including explosive fastening tools for fixing formwork to concrete
- cherry pickers, access platforms (fixed and mobile) and scaffolding.

3.2.5 Work sites, access and vehicle movements

Construction compounds may include sheds, stockpiles, parking and material storage. Compound sites will be located in previously cleared and disturbed land away from drainage lines. Indicative locations are provided in Figures 2 and 3.

Construction vehicle access to Castle Hill WRP will use the main entrance via Wrights Road as well as a fire trail leaving north east of the WRP and connecting to Drawbridge Place. Construction vehicle access to Rouse Hill WRP will use the access road connected to Withers Road and the main entrance via Mile End Road as a secondary access road. These construction access roads may be required to be upgraded to make them suitable for construction traffic.

Typically, 40 light vehicle movements per day at each WRP is expected with up to 50 light vehicles during peak times. Heavy vehicle traffic generation will fluctuate depending on the program of work and is expected to be between 15-20 heavy vehicles per day for each WRP, concentrated in the morning.

Temporary closure of a section of the walking track along the east boundary of Castle Hill WRP will be required with temporary diversions assisted by signage, in consultation with Council. Further details on traffic and access are provided in Section 6.8.

3.2.6 Workforce

The construction workforce is estimated to be typically 40 workers per day and about 50 workers in peak times at each WRP.

The construction workforce is likely to fluctuate each day, depending on the program of work with heavy vehicles/concrete trucks concentrated in the morning.

3.2.7 Working hours and timeframe

Construction is expected to start in 2022 and finish by early 2024 and occur for a duration of 24 months. The following standard construction hours are proposed for this proposal:

- Monday to Friday – 7 am to 6 pm

- Saturday – 8 am to 1 pm

No work would take place on Sundays and public holidays.

The EPA's *Interim Construction Noise Guidelines* (ICNG) (DECC, 2009) acknowledge that the following activities can be undertaken outside standard construction hours assuming all feasible and reasonable mitigation measures are implemented to minimise the impacts to the surrounding sensitive land uses:

- the delivery of oversized plant, equipment and materials that police or other authorities determine require special arrangements to transport along public roads
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services or considerations of worker safety do not allow work within standard hours
- public infrastructure works that shorten the length of the proposal and are supported by the affected community
- works where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours
- works which maintain noise levels below the noise management levels outside of the recommended standard construction hours.

We expect that most construction work will occur during standard daytime hours. However, should the need for any out of hours works be identified during detailed construction planning, approval and further consultation will occur as per the process described in Section 6.7.

3.3 Operation and performance

During construction, Castle Hill WRP and Rouse Hill WRP will continue to be operated to meet EPL compliance. An interim EPL variation would not be required during the construction period.

Pathogen log reduction values (LRV) for continued recycled water supply from both WRPs would be maintained to ensure we meet our recycled water commitments to existing customers.

At Rouse Hill WRP, flows will continue to the existing flow splitter to distribute flows to the existing two treatment trains at Rouse Hill WRP. Flows greater than the existing capacity (or three times the average dry weather flow) will be diverted to the wet weather PST.

A licence variation to each EPL and revised process flow diagram to reflect the process improvements will be required for future operations. This will be prepared by the project team and submitted to the EPA prior to commissioning.

3.4 Changes to the scope of work

The proposal assessed in this REF includes construction, commissioning and operation activities as described above and is based on the concept designs prepared to date. Detailed design and construction may result in changes to these components.

If the scope of work or construction methods described in this document change significantly following the awarding of the contract and exhibition of the REF, supplementary environmental impact assessment must be prepared for the amended components. Such proposal changes would be documented in a Decision Report or REF addendum and displayed on Sydney Water's website.

4 Consultation

4.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by the Community and Stakeholder Engagement Policy (Sydney Water, 2019a).

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, projects 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.

If our work will impact the community in some way, we will consult with affected groups through a variety of ways and through different stages of a project. This includes engaging the broader community and stakeholders during planning or strategy development or before making key decisions.

We will also provide The Hills Shire Council with reasonable notice before we commence works, regardless of the need for development consent. Council will be consulted about matters identified in environmental planning instruments (refer Section 4.3 below), including public safety issues.

A Community and Stakeholder Engagement Plan (CSEP) will be prepared for the proposal. The plan helps us to provide the community and key stakeholders with clear, accurate and timely information.

Consultation with key stakeholders will continue throughout detailed design, construction and commissioning of the proposal. We will consult with community members where the proposal directly impacts them.

During construction, the contractors responsible for delivering the proposal will consult with stakeholders and the community and, as representatives of Sydney Water, will adhere to our community relations policies and procedures. We will continually monitor the contractor's performance during proposal delivery.

The CSEP will identify stakeholders with an interest in the proposal, and ensure they are informed during proposal delivery. The CSEP will also:

- identify the directly and indirectly affected landowners and other stakeholders, including government agencies and interest groups

- identify issues likely to be of high community/stakeholder concern and determine the level of risk to the development of the proposal
- incorporate stakeholder views into the proposal planning and delivery.

4.2 Consultation on this REF

We will invite the community and stakeholders to comment on this REF. We will provide information about the proposal and the REF process, and we will invite comment through:

- a community newsletter
- Sydney Water's website (www.sydneywatertalk.com.au)
- static displays
- online webinars.

This REF will be available to download from sydneywatertalk.com.au during the display period up to 5 September 2021. The community phone line is **1800 560 682**. Submissions on the REF must be made in writing and received by 5 September 2021 by emailing: NorthWestTreatmentHub@sydneywater.com.au.

We will collect information in written representations to help us assess the proposal. The information may be disclosed to appropriate agencies such as the EPA. If the respondent indicates at the time of submission that the information should remain confidential, Sydney Water will attempt to ensure this, but there may be legislative or legal justification for its release, for example under the *Government Information (Public Access) Act 2009.* The supply of information is voluntary.

Each respondent can request to access the information they have supplied, but not information supplied by others. Respondents may correct or update information they have submitted if the update is received by 5 September 2021.

At the end of the public display period we will consider all submissions and prepare a Decision Report.

4.3 Consultation before and during construction

We will continue to inform the community and stakeholders about:

- the proposed start date
- where we will be working and when
- what to expect during each stage of the proposal's progress.

During construction, we will ensure the Contractor is mindful of the community, that they inform the community about any work that may impact nearby residents, and that they leave a positive legacy when their work is done.

Engaging with the community enables Sydney Water and its contractors to listen and understand community values. Feedback will be used to improve our performance and all complaints during the construction of the proposal and following its commissioning will be managed according to Sydney Water's Customer Complaint Policy and Procedure.

4.4 Consultation required under State Environmental Planning Policies and other legislation

To meet State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) requirements, Sydney Water must consult with councils and other authorities for work in sensitive locations or for work which may impact upon Council's infrastructure. As all works are located within Rouse Hill and Castle Hill WRPs, no additional ISEPP consultation has been identified (refer to Appendix B). Notification will be provided to the Department of Primary Industries (DPI) – Fisheries regarding the headwall proposed (Table 7).

5 Legislative requirements

The following environmental planning instruments (Table 6) and legislation (Table 7) are relevant to the proposal. Table 7 also documents any licences and permits, timing and responsibility for obtaining them.

Table 6. Consideration of environmental planning instruments relevant to the proposal

Environmental Planning Instrument	Relevance to proposal
The Hills Local Environmental Plan 2019	Castle Hill WRP is located on area zoned as SP2 Infrastructure, and the Rouse Hill WRP is located on land zoned as Light Industrial, both in the Hills LEP. We do not require approval from The Hills Shire Council as the project is permissible without development consent under the Infrastructure SEPP.
State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)	Clause 106 of the Infrastructure SEPP permits development by or on behalf of a public authority for wastewater infrastructure without consent on any land in a prescribed zone. The project involves development of a wastewater system in land zoned Infrastructure and Light Industrial. As Sydney Water is a public authority, the proposal is permissible without consent.
SEPP (Vegetation in Non-Rural Areas) 2017	This SEPP applies as it is in an area listed in Clause 5.1a and/ or land within the zones listed in Clause 5.1b. However, section 6.1 states: '*This Policy does not affect the provisions of any other SEPP….*' As the works are permissible under ISEPP a Council permit to clear vegetation under this SEPP is not required.

Table 7. Consideration of key environmental legislation

Legislation	Relevance to proposal	Permit/ approval Timing and responsibility
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 Decision Report Pre-construction, Sydney Water

Protection of the Environment Operations (POEO) Act 1997	Castle Hill WRP and Rouse Hill WRP are operated in accordance with EPL 1725 and EPL 4965, respectively. Prior to operation, a licence variation will be obtained for Castle Hill WRP for increased disinfection. An interim licence variation during construction is not required.	EPL variation Prior to operation, Sydney Water
Biodiversity Conservation (BC) Act 2016	Schedules 1 and 2 of the BC Act list terrestrial species, populations and ecological communities threatened in NSW. We are required to assess impacts to the listed items and complete a 'test of significance'. Some vegetation clearing of two threatened ecological communities (TEC) at Rouse Hill WRP is needed and a test of significance has been completed (refer to Section 6.3). The assessment found the proposal is unlikely to have a significant impact on the TEC and a Species Impact Statement is not required.	N/A
National Parks and Wildlife (NPW) Act 1974	The proposal will not directly or indirectly impact any known Aboriginal archaeological sites, objects or places. An Aboriginal due diligence assessment was prepared for the works which concluded that impacts are unlikely, an Aboriginal Heritage Impact Permit (AHIP) is not required and the works can proceed with caution (see Section 6.6).	N/A
Fisheries Management (FM) Act 1994	Cattai Creek and Second Ponds Creek are mapped as Key Fish Habitat under the FM Act. The proposal does not block or impede fish passage, however, construction of the headwall for the discharge main to Cattai Creek requires consultation under Section 199 of the FM Act.	Notification to DPI- Fisheries Pre-construction, Sydney Water
Water Act 1912/ Water Management Act 2000	Geotechnical investigation during concept design indicates that it is unlikely the works require dewatering of >3ML of groundwater. A Water Supply Works Approval (WSWA) may be required. It is unlikely that a Water Access Licence (WAL) would be required.	WSWA for <3ML Pre-construction, Sydney Water
Environment Protection and Biodiversity Conservation (EPBC) Act 1999	The EPBC Act protects nationally significant animals, plants, habitats and places. There are nine 'matters of national environmental significance' (MNES) to be considered under the EPBC Act. Two TEC and one threated species are located at Rouse Hill WRP are listed under the EPBC Act. A significance test was prepared to assess potential impacts (see Section 6.3) and these concluded that a significant impact is unlikely. Referral to the Commonwealth Department of Agriculture, Water and the Environment is not required.	N/A

6 Environmental assessment

The potential environmental aspects and impacts associated with construction and operation of the proposal are identified in this section as well as safeguards to minimise these. These safeguards will be incorporated into contract documents and a Construction Environmental Management Plan (CEMP) (or similar) to be developed and approved by Sydney Water prior to commencement of work. Operating procedures may be revised for the new treatment processes, including environmental clean-up requirements for new chemicals.

6.1 Topography, geology and soils

Existing environment

Castle Hill WRP

Soil investigations previously conducted at the WRP indicates soils comprise of sandy filling, up to 2 m thick with fill thickness increasing towards the east of the site, underlain by residual clayey sands and sandstone rock. The WRP is located in a natural depression and a sandstone cliff face bounds the WRP to the east. There is no known contamination, acid sulfate soils (ASS) or saline soils at Castle Hill WRP. Filling at the site may contain localised contamination. The walking track around the WRP and the fire trail to the North East are unsealed tracks. The fire trail is steep in places and requires upgrading to make it suitable for construction vehicle use.

Rouse Hill WRP

Soil investigations previously conducted at the WRP indicates soils underlying the proposed work areas comprise of silty sand and clay up to ~1.2 m thick then sandstone. Filling has been recorded at the site as reworked residual materials. There is potential for asbestos to be encountered within the filling. There are no other known off-site sources of contamination impacting the WRP and no known ASS at Rouse Hill WRP. Localised saline soils are mapped in the south and east of the WRP.

Potential impacts – construction

The proposal requires vegetation removal, excavations and stockpiling of soils which could lead to potential erosion and sedimentation into surrounding waterways or drainage lines if inappropriately managed. Heavy vehicle use of the fire trail over time may also lead to erosion and sedimentation. Excavations adjacent to the lagoon embankment at Castle Hill WRP will require a temporary retaining wall to maintain wall integrity. Upgrades to the stormwater drainage system will occur at Castle Hill WRP. Contaminated soils may be encountered during excavations at Rouse Hill WRP. Estimated surplus spoil generated at Castle Hill WRP for disposal off site is 14,000 tonnes. Estimated surplus spoil generated at Rouse Hill WRP for disposal off site is 6,500 tonnes.

Potential impacts – operation

The works are not proposing to permanently change the surface topography of the area. Run-off from the WRPs will be captured into new first flush detention tanks for return into the treatment train.

Safeguards

We will implement the following safeguards during construction and operation to minimise any impacts to soils, topography and geology:

- a Stockpile Management Plan will be prepared to accompany the CEMP to adequately manage the construction of any temporary stockpiles. This will include detail and justification on:
    - stockpile location and stockpiling capacity on site before off-site disposal or re-use must be initiated
    - height, slopes and batters
    - maintenance of bund and cover integrity, while temporarily stockpiled
    - stockpile segregation based on soil/waste type
    - erosion and sediment control
    - restoration.

  The Stockpile Management Plan will be prepared before construction commences and approved by the Sydney Water Project Manager in consultation with the Plant Manager, RDC Maintenance team, Environmental Lead, and Property Environmental Services.
- prevent sediment moving off-site in accordance with *Managing Urban Stormwater, Soils and Construction, Volume 1 and 2A* (Landcom 2004 and DECC 2008), including:
    - diverting surface runoff away from disturbed soil and stockpiles
    - installing sediment and erosion controls before construction starts
    - reusing topsoil where possible and stockpile separately
    - inspecting controls daily and immediately after rainfall
    - rectifying damaged controls immediately
    - removing controls once surfaces have been stabilised, including removing trapped sediment in drainage lines
- minimise ground disturbance and stabilise disturbed areas progressively
- ensure imported material is certified for intended use and is free from contamination including asbestos
- liaise with Property Environmental Services for any unexpected finds

- 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 worksites to the pre-works condition
- install and maintain erosion controls on the fire trail during use by construction vehicles to ensure no erosion impacts offsite.

6.2 Water and drainage

Existing environment and potential impacts

Castle Hill WRP

Cattai Creek flows north adjacent to the western boundary of the WRP (Figure 2) and is mapped as key fish habitat. This creek is part of the Hawkesbury-Nepean catchment and flows into the Hawkesbury River. Castle Hill Creek flows along the southern boundary of the WRP and into Cattai Creek immediately upstream of the site access road crossing. The WRP is not within flood liable land.

Groundwater has previously been recorded at 3.75 m below ground level at the WRP (Sydney Water, 2018).

The WRP has experienced some water ponding issues in the past. Run-off generally flows east to west across the site.

Rouse Hill WRP

Second Ponds Creek is located on the north west boundary of the WRP (Figure 3) and flows north east, joining Cattai Creek about 850 m north east of the site. Directly north west and adjacent to the WRP are artificial wetlands. Second Ponds Creek is mapped as key fish habitat. Second Ponds Creek is located within the Rouse Hill Trunk Drainage Lands (TDL). Water quality will continue to be monitored in the creek, in line with our Plan of Management (Sydney Water, 2020) and EPL. The proposed upgrades at Rouse Hill WRP are not located within any flood prone land.

Groundwater has previously been recorded at 3.2 m below ground level at the WRP (Sydney Water, 2018).

Run-off generally flows south east to north west towards Seconds Pond Creek.

Potential impacts – construction

Potential impacts include:

- potential sedimentation impacts on this local waterway/ stormwater system from poor management of excavations, stockpiles, unsealed access roads
- construction of the headwall at Cattai Creek will need to be designed and constructed to minimise potential impacts on the bed/bank, including likely installation of minor cofferdam

- contamination from spillage or inappropriate storage of chemicals for construction
- dewatering of groundwater at Castle Hill WRP may be required for the inlet works, with the potential to encounter perched ground water at the proposed anoxic zone tank, RE tank and first flush tanks
- excavations at Rouse Hill WRP for compliance upgrades are not anticipated to encounter groundwater.

Potential impacts – operation

The proposal would improve the quality of treated wastewater entering local waterways through the reduction of nutrient levels in treated wastewater. There would be no change to the volume of treated wastewater discharged, and as such there are no anticipated hydrological impacts associated with the proposal.

The proposal incorporates subsurface drainage at Castle Hill for structures located below the water table including perched groundwater zones. The proposed first flush tank will capture sediment laden runoff and return this to the treatment train in line with water sensitive urban design principles.

Bunding associated with new chemical dosing and storage would be designed and maintained in accordance with Australian Standards for fuel and chemical storage. New chemicals used at the WRP may require specific environmental clean-up requirements.

Safeguards

We will implement the following safeguards during construction and commissioning to minimise water quality impacts:

- bund potential contaminants and store on robust waterproof membrane, away from drainage lines
- keep functioning spill kit on site for clean-up of accidental chemical/fuel spills
- keep aquatic spill kit on site for clean-up of accidental chemical/fuel spills in mapped key fish habitat
- keep the spill kits stocked and located for easy access
- if potential for intercepting groundwater is identified, Sydney Water will obtain a groundwater Water Supply Approval and where dewatering is >3ML per water year (from 1 July) a Water Access Licence from NRAR will also be obtained.
    - a Dewatering Management Plan will be prepared at least four months prior to construction
    - all approval conditions (such as protecting water quality; minimising aquifer extraction volumes, monitoring extraction with flow meters and recording volumes) will be complied with

- if temporary wastewater bypass is required:
    - pressure test hoses before, and monitor during bypass
    - monitor wastewater flows to ensure critical flows are not reached
    - stop bypass if leaks occur
    - bund access chambers
    - contain wastewater spills and pump back to wastewater system or disposal tanker.
- store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Bunded areas to have 110% capacity of stored liquid volume. Chemicals and fuels in vehicles must be tightly secured. All chemicals to be clearly labelled
- 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
- conduct any equipment wash down within a designated washout area
- ensure headwall is designed and installed to minimise erosion impacts and in accordance with any requirements from DPI – Fisheries
- revise operating procedures as required for new treatment processes, including environmental clean-up requirements for new chemicals.

6.3 Flora and fauna

Existing environment

Previous flora and fauna studies have been conducted at Castle Hill and Rouse Hill WRPs. A flora and fauna assessment conducted for the proposal (Biosis, 2021) confirmed the presence of three plant community types (PCTs) at Castle Hill WRP which do not form part of a threatened ecological community (TEC) and two PCTs at Rouse Hill WRP which do form part of TECs (Table 8).

No threatened flora species were recorded and there is a low likelihood of occurrence for threatened flora within the construction impact area due to the disturbed urban nature of both WRPs. It was noted that the flora species, *Epacris purpurascens subsp. purpurascens* (vulnerable under the BC Act) may occur north of Castle Hill WRP.

Two potential hollow bearing trees at Castle Hill WRP and three hollow bearing trees at Rouse Hill WRP were recorded, all with small to medium sized hollows suitable for microbats. The Dural Land Snail (*Pommerhelix duralensis*) was not identified during the field investigation at the Rouse Hill WRP, however it was previously recorded at Rouse Hill WRP during field investigations for the Phase 1 upgrade. The Dural Land Snail is listed as endangered under the EPBC Act and BC Act. No threatened species were recorded during the investigation for this proposal. Non-threatened

fauna species likely to be present in and immediately surrounding the WRPs are primarily highly mobile.

Six priority weeds from the region were recorded: Alligator Weed, Asparagus Fern, Bridal Creeper, Green Cestrum, Lantana and African Olive.

Potential impacts – construction

Vegetation would be removed at both WRPs for the proposal. The area and number of planted trees which may be removed is provided in Table 8. At Rouse Hill WRP, removal of the critically endangered ecological community Shale Sandstone Transition Forest (PCT 1395) is unavoidable due to engineering and operational constraints with relocating the infrastructure elsewhere. Minimising removal of PCT 1395 was achieved in concept design by redesigning an internal road originally proposed south of the new inlet works. At Castle Hill WRP, vegetation trimming may be required along the existing fire trail and up to 0.157 ha of PCT 1255 may be removed for the additional discharge main.

Tests of significance under the BC Act and the EPBC Act indicated that a significant impact was not likely to result from the proposal. The small patches of Shale Sandstone Transition Forest (0.47 ha) and River-Flat Eucalypt Forest (0.07 ha) to be removed were both assessed as highly altered vegetation which had already been exposed to a number of disturbances. The assessment found that the proposal is unlikely to significantly alter floristic or structural diversity of the retained vegetation types and the proposal would not significantly trigger or exacerbate any key threatening processes. The impact of removing the small patch of Shale Sandstone Transition was not considered important in terms of its intensity, magnitude and geographic extent (Biosis, 2021).

It is expected that removal of the small patch of Shale Sandstone Transition Forest would have minimal impact to a very limited number of individual Dural Land Snails. The proposal is unlikely to substantially interfere with the recovery of this species.

A Species Impact Statement (SIS) is not required.

Construction of the proposal may impact on primarily highly mobile non-threatened fauna through the removal of habitat features such as leaf litter, rocks and tree hollows.

Uncontrolled handling of weeds during construction may inadvertently spread weed propagules into adjacent land and into drainage lines with the potential to spread weeds downstream.

Safeguards recommended below will be implemented to minimise such impacts as much as practicable.

Table 8. Summary of PCTs and impact area

PCT	Description	Condition (area to be removed)	Conservation significance
	Castle Hill WRP		
1083	Red Bloodwood - scribbly gum heathy woodland on sandstone plateau of the Sydney Basin Bioregion	Low (0.01 ha)	NA
1181	Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion.	Low (0.08 ha)	NA
1255	Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion (also extends north of Castle Hill WRP, UBM Ecological Consultants, 2018)	Poor (0.08 ha) plus Fair to Good (0.18 ha)	NA
N/A	Urban native/ exotic (planted trees)	23 trees (0 locally native)	NA
	Rouse Hill WRP		
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion forming part of a component of the River Flat Eucalyptus Forest on Coastal Floodplains TEC.	Good (0.07 ha)	E[1] – BC Act
1395	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion forming part of a component of the Shale Sandstone Transition Forest TEC.	Moderate (0.47 ha)	CEEC[2] – BC Act and EPBC Act
NA	Urban native/ exotic (planted trees)	9 trees (3 locally native)	NA

Notes: 1 Endangered; 2 Critically Endangered Ecological Community

Potential impacts – operation

No impacts to terrestrial vegetation during operation are anticipated.

Bushfire risk assessments previously completed for Castle Hill and Rouse Hill WRP (BC&BHS, 2018a and BC&BHS 2018b, respectively) would be updated to inform any need for continued maintenance of surrounding bushland. Rouse Hill WRP occurs in a commercial/ industrial setting

with low bush fire risk. At Rouse Hill WRP, about 10 m of vegetation clearance south of the proposed inlet works and future barometric loop (growth package) for construction allows sufficient distance as radiant heat levels fall considerably over 10 m. This construction area has been considered in the above impact assessment. Any additional vegetation removal to address bushfire management requirements for the proposal would be incorporated as an addendum to the REF.

Safeguards

We will implement the following safeguards during construction and operation to minimise impacts to flora and fauna:

- prepare a site restoration management plan
- all workers are provided with an environmental induction prior to starting construction activities on site. This would include information on the biodiversity values of the site and protection measures to be implemented to protect biodiversity during construction
- minimise vegetation clearance and disturbance. Where possible, limit clearing to trimming rather than removal of whole plants
- physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing
- protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites. Do not damage tree roots unless absolutely necessary, and engage a qualified arborist where roots >50mm are impacted within the Tree Protection Zone
- during detailed design and construction planning, avoid or minimise impacts to habitat features such as hollow-bearing trees where possible. Where removal of hollow bearing trees is required, the following process will be undertaken:
    - Stage 1: All surrounding vegetation to be cleared and grubbed
    - Stage 2: 24 to 48 hours later, the hollow bearing trees are to be inspected by an ecologist. If resident fauna is observed, the hollow section is to be lowered to the ground and the animal allowed to move on of its own volition. If injured, the fauna to be taken to a WIRES carer or appropriate veterinarian for care
- if native fauna is encountered on site, stop work and allow the fauna to move away unharassed. A local wildlife rescue service or the ecologist responsible for pre-clearing surveys should be engaged to assist with fauna removal and rescue if fauna fails to move away on its own
- pre-clearance inspections for the Dural Land Snail at Rouse Hill WRP will be undertaken by a qualified ecologist who will relocate any fauna individuals from the impact area. Searches should be undertaken during ideal conditions for detecting the species, which include, early evening during rain, where possible

- pre-clearance inspection (specifically for *Epacris purpurascens subsp. purpurascens*) will be undertaken by a qualified ecologist along the additional discharge main alignment at Castle Hill WRP to be undertaken prior to trenching
- salvage and relocate habitat features (e.g. leaf litter, woody debris, rocks, hollow logs and branches into adjacent bush
- generated green waste must be disposed of off-site (refer to Section 6.5)
- bag all weeds, plant parts and excavated topsoil that may be infested with weed propagules and dispose at a licensed waste disposal facility
- temporary storage of materials including pipe lengths to be in cleared, previously disturbed areas and not beneath tree canopies to avoid impacts on tree protection zones (TPZ)s
- provided it is essential for delivering the proposal, Sydney Water's Project Manager can approve the following vegetation removal and tree trimming, without additional environmental assessment (but only after consultation with Sydney Water's Environmental and Community Representatives and affected landowners). Sydney Water considers vegetation removal in the following circumstances has minimal environmental impact:
    - any minor vegetation trimming, removal of exotic vegetation or removal of planted native vegetation
    - 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 (eg a different area of vegetation is removed but the total area is the same or less than assessed in the REF).

  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 Sydney Water Project Manager approval.
- residual impacts to native vegetation and trees (including hollow bearing) will be offset in accordance with the Sydney Water Biodiversity Offset Guideline (SWEMS0019.13). Based on the Biosis (2021) assessment, 2.22 ha of vegetation offsets are required, this includes:

  Castle Hill WRP:
    - 0.7 ha of native vegetation in total (0.35 ha total removed)
    - 23 native trees consistent with surrounding PCTs (23 planted trees removed)

  Rouse Hill WRP:
    - 0.21 ha of vegetation consistent with PCT 835 (0.07 ha total removed)
    - 1.41 ha of vegetation consistent with PCT 1395 (0.47 ha total removed)
    - 15 native trees consistent with surrounding PCTs (9 planted trees removed)

Actual vegetation impacts would be quantified before clearing and required offsets provided for verified impacts. The location of offsets would be determined during detailed design in consultation with the WRP operators and/ or local Council.

6.4 Air and energy

Existing environment

Castle Hill WRP

Castle Hill WRP is surrounded predominantly by bushland in all directions with the nearest residential property located 55 m away. For Castle Hill WRP, between 2005 to 2018, up to one odour complaint was received per year. In 2018/19, two odour complaints were received and in 2019/2020 one odour complaint was reported. Upgrades were recently completed at Castle Hill to specifically address odour issues (Sydney Water, 2019) and included replacement of sealed covers at pump station SPS1108 (completed in late 2020). No odour complaints relating to the WRP have been received since.

Rouse Hill WRP

Rouse Hill WRP is surrounded by commercial/ industrial land uses and bushland to the north east. Residential properties are located over 400 m to the south east and south west. Past odour complaints received were mostly between 2011 and 2013 with 14 odour complaints received. Another six odour complaints were received in 2015/2016 and one odour complaint was recorded in 2016/2017.

Potential impacts – construction

Construction work can generate dust and vehicle exhaust emissions. Dust could result from site excavations, materials delivery, spoil stockpiles and vehicle movements, particularly during dry and windy conditions. Poorly maintained construction machinery, equipment and vehicles can release higher emissions, resulting in air quality impacts.

During construction and commissioning activities, isolated odour events can occur when odourous equipment is exposed to make new connections. These activities are expected to be short term and temporary.

Potential impacts – operation

An existing operational odour source, being fugitive leaks from the existing PST at Castle Hill WRP will be rectified as part of the proposal.

For both WRPs, proposed key odour generating sources would be connected to the proposed new OCFs for extraction of emissions, treatment and venting via a stack.

CALPUFF odour modelling was completed for both WRPs based on the proposed concept designs (Jacobs, 2021a and 2021b) using the most stringent NSW EPA assessment criterion of 2 odour units (OU) (EPA, 2016).

For Castle Hill, the results confirm that the 2 OU contours (at the 99th percentile) do not encroach on any residential receptors. The proposed upgrades at Castle Hill WRP are unlikely to increase the intensity or frequency of off-site odour levels relative to existing operations.

For Rouse Hill, the results indicate a near identical odour impact compared with existing levels indicating the OCF design achieves optimal dispersion. The 2 OU contours do not encroach on residential areas. Land uses inside the 2 OU zone include a sports field, light industrial/ commercial areas and bushland. A 2 OU impact is generally acceptable for such land uses.

Overall, worst case conservative estimates were undertaken for the purpose of the impact assessment. Modelling for both WRPs under worst case shows that offsite odour would not increase. It is likely that actual odour levels would be reduced given that conservative emissions rates were used in the model. Odour impacts are not anticipated as a result of the proposed works, rather the works will improve air quality and mitigate the potential for odour complaints.

Energy

WRPs have high energy demand to treat and recycle water. The proposal has sought to reduce reliance on the energy network by preferencing gravity flows through the treatment trains and minimising the use of pumps. The proposal also enables the next steps in upgrades at Rouse Hill WRP which would see decommissioning of biosolids treatment at Rouse Hill for centralised treatment at Riverstone WWTP. This would enable opportunities for anaerobic digestion which aligns to Sydney Water's draft Carbon Zero plan and future intentions for energy recovery and co-digestion.

Efficient construction practices through implementation of safeguards in this REF will also enable reduced energy and resource consumption during the construction phase.

The compliance upgrades will ensure continued off-site use of recycled water can be maintained and our recycled water quality targets are achieved. This aligns with Sydney Water's 2020-2030 Strategy to embrace circular economy practices and support sustainable cities as they grow.

Safeguards

We will implement the following safeguards during construction and operation to minimise potential for air quality impacts and energy use:

- 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
- switch off vehicles and machinery when not in use
- cover all transported waste
- implement measures to prevent off-site dust impacts during construction, for example:
    - water exposed areas
    - 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 covers on odour generating sources are maintained during construction works
- select energy efficient pumps and equipment during detailed design in accordance with Sydney Water's *Best Practice Energy in Design Guide*
- use alternatives to fossil fuels where practical and cost-effective
- track energy use as per Sydney Water's National Greenhouse and Energy Report SWEMS0015.28.

6.5 Waste and hazardous materials

Potential impacts – construction

Our goal is to reduce waste through recycling and re-use and to encourage our suppliers to minimise waste. Natural material from excavations may meet the definition of Excavated Natural Material (ENM) and could be reused on or off-site subject to further testing. Opportunities to reduce, recycle and reuse on this project will be sought prior to and during delivery and documented in a Waste Management Plan (SWEMS0026.08) or CEMP.

There is potential to encounter contaminated fill (such as asbestos) as well as other materials that cannot be reused. Generated spoil from fill material is likely to be classified as General Solid Waste (Asbestos Waste).

There is also the potential to encounter hazardous building materials (HBM) during demolition of existing structures. At Castle Hill WRP, there is a low potential to encounter HBM during demolition of the digester. HBM associated with the digester components includes asbestos containing material (ACM), synthetic mineral fibres (SMF), and polychlorinated biphenyls (PCBs). At Rouse Hill WRP, there is a low risk of PCBs and SMF associated with the education building and MF building. No lead paint or ACM was previously detected within the education building or the MF building.

Expected wastes to be generated are:

- excavated rock and spoil that is deemed unsuitable for reuse, such as for backfilling excavations
- uncontrolled fill material with large amounts of deleterious material including contaminated materials
- vegetation waste from clearing activities
- demolition waste from existing structures with the potential to contain HBM

- groundwater where dewatering is required at Castle Hill WRP and where extracted groundwater cannot be used for dust suppression
- small volumes of general construction waste.

The site footprints are space constrained limiting the opportunity for temporary or permanent stockpiling of surplus spoils.

Potential impacts – operation

No new waste streams will be generated after commissioning of the proposal. New chemical storage tanks and dosing facilities would be in bunded areas within the WRPs. New signs will be installed and staff trained on any extra/new safe handling practices.

Safeguards

We will implement the following safeguards during construction and operation to minimise any impacts associated with waste and hazardous materials:

- undertake further sampling if required to understand the extent and nature of contamination and establish mitigation measures for inclusion in the CEMP
- minimise the generation of waste, sort waste streams to maximise reuse/recycling in accordance with the *Waste Avoidance and Resource Recovery Act 2001*
- identify spoil storage and fate of materials (onsite or offsite) during detailed design and construction planning (refer to Section 6.1)
- manage removal of HBM in accordance to NSW Safework practices during demolition
- securely store all wastes to prevent pollutants from escaping
- provide adequate bins for general waste, hazardous waste and recyclable materials. Remove bins when 80% full
- manage waste and excess spoil in accordance with the NSW EPA Waste Classification Guidelines 2014
- dispose wastes at an appropriately licenced facility
- manage waste in accordance with relevant legislation and maintain records to show compliance eg waste register, transport and disposal records
- dispose excess vegetation (non-weed) that cannot be used for site stabilisation at an appropriate green waste disposal facility
- if fibro or other asbestos containing material is identified, restrict access and follow Sydney Water's Asbestos Management procedure, WHSMS0064. Contact Property Environmental Services for advice
- track waste as required using EPA's WasteLocate online tracking system.

6.6 Heritage

Existing environment

Aboriginal heritage

A due diligence Aboriginal heritage assessment by Kelleher Nightingale Consulting (KNC) was conducted in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH 2010). No previously known Aboriginal objects, archaeological sites or areas of potential were identified within the proposal construction impact area. Both WRPs are located adjacent to creek lines, however review of historical aerial photos and assessment of previous land use determined that the majority of proposal area has been severely disturbed by construction of the existing WRPs, roads and former cultivation.

Review of previous investigations identified an area of potential archaeological deposit (PAD) recorded adjacent to the southern impact area at the Rouse Hill WRP, associated with an area of remnant trees with low disturbance levels. Historical aerial photo review and the visual inspection confirmed that this PAD extends into the south west portion of the WRP. This area displays low disturbance and is considered to display moderate potential for subsurface archaeological deposit. No Aboriginal archaeological constraints were identified for the Castle Hill WRP study area.

The visual inspection by KNC did not identify any Aboriginal objects, sites, or other areas of Aboriginal archaeological potential within the study area. In general, the study area comprises a severely disturbed and modified landscape with low to no potential for Aboriginal archaeology.

Non-Aboriginal heritage

The proposal will not impact any listed heritage items.

Potential impacts – construction

The heritage due diligence assessment found that provided the identified PAD area at the Rouse Hill WRP is avoided by the proposed works, there are no archaeological constraints to the proposal. According to the Heritage NSW Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales the proposed works can proceed with caution.

Potential impacts – operation

The proposal would not result in any impacts to heritage items during operation.

Safeguards

We will implement the following safeguards during construction to minimise impacts to Aboriginal heritage:

- do not make publicly available or publish, in any form, Aboriginal heritage information on sites / potential archaeological deposits, particularly regarding location
- the location of the identified PAD at Rouse Hill WRP must be avoided by all pre-construction and construction activities associated with the WRP upgrades, fencing is to be installed prior to construction to ensure no inadvertent impacts

- if any Aboriginal object or non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify the Sydney Water Project Manager in accordance with SWEMS0009
- all workers will be inducted into the Aboriginal heritage sensitivities of the proposal
- in the unlikely event that possible human skeletal material (remains), are identified during the proposed works, cease all works immediately and notify the Sydney Water Project Manager in accordance with SWEMS0009.

6.7 Noise and vibration

Existing environment - noise

At Castle Hill WRP, the closest residential receivers are located 55 m away. At Rouse Hill WRP, residential properties are located over 400 m to the south east and south west. A childcare centre, two places of worship and various commercial buildings are located within 400 m from Rouse Hill WRP.

A noise and vibration assessment was undertaken for the proposal (Aecom, 2021). Unattended noise monitoring was conducted at representative residential locations for over seven days in surrounding noise catchment areas (NCAs) for Castle Hill WRP (NCA 7 and 8) and Rouse Hill WRP (NCA 3 and 4) (Figure 4). Attended noise measurements were undertaken at both WRPs.

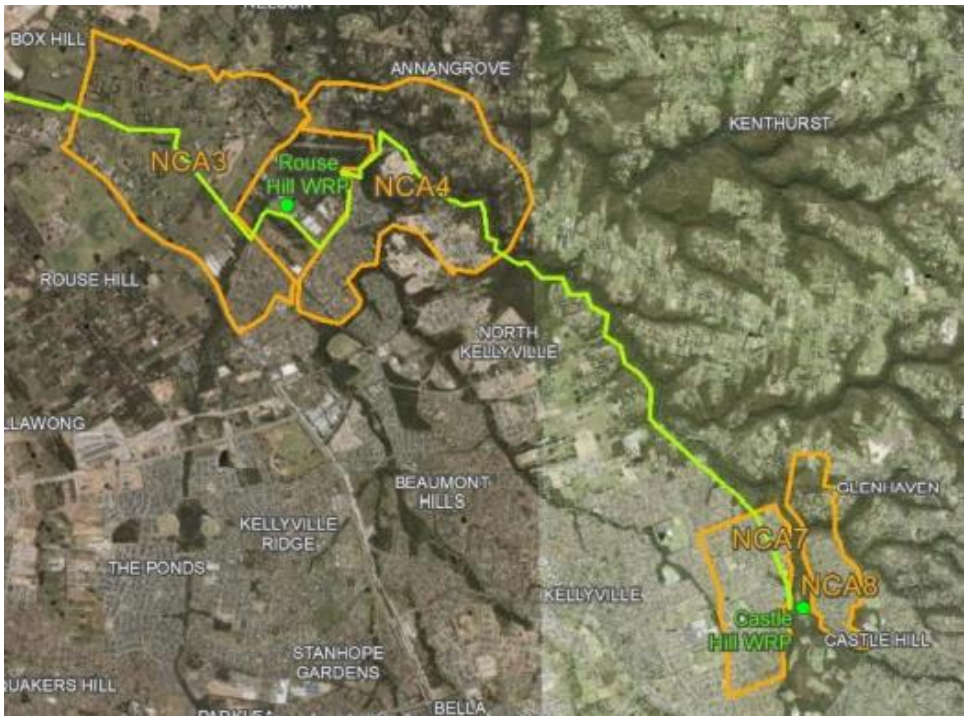

Figure 4. NCAs at Castle Hill WRP and Rouse Hill WRP (Aecom, 2021)

Background noise levels (RBL) were established for the NCAs based on unattended monitoring. Noise management levels (NMLs) during construction were derived from the RBL + 10dB(A) for standard daytime hours, as per the EPA's *Interim Construction Noise Guidelines* (DECC, 2009). Table 9 shows the background noise levels against the construction noise management levels (NML). A level of 75dB(A) is considered to represent 'highly noise affected' receivers.

Table 9. Background Noise Levels, Construction Noise Management Levels

Area	Period	RBL, L_{A90} dB(A)	NML (standard hours) $L_{Aeq, 15min}$, dB(A)
NCA 3 (Rouse Hill)	Day	44	54
	Evening	43	-
	Night	36	-
NCA 4 (Rouse Hill)	Day	41	51
	Evening	35	-
	Night	30	-
NCA 7 (Castle Hill)	Day	35	45
	Evening	33	-
	Night	30	-
NCA 8 (Castle Hill)	Day	35	45
	Evening	30	-
	Night	30	-

Table 10 shows the NMLs applicable to non-residential receivers.

Table 10. Construction Noise Management Levels – non-residential receivers (DECC, 2009)

Land Use	NML $L_{Aeq, 15min}$ (applies when properties are in use)
Places of worship	55 dB(A)
Childcare centres	55 dB(A)
Active recreation	60 dB(A)
Commercial premises	70 dB(A)
Industrial premises	75 dB(A)

Project noise trigger values were established for operation and shown in Table 11.

Table 11. Operational Project Noise Trigger Levels and Sleep Disturbance screening levels

Location	Time of day	Project noise trigger levels L_{Aeq}, dB(A)	Measured night time RBL	Sleep disturbance screening levels $L_{Aeq, 15min}$, dB(A)
NCA 3	Day	49	-	-
	Evening	43	-	-
	Night	38	36	41
NCA 4	Day	46	-	-
	Evening	40	-	-
	Night	35	30	40
NCA 7	Day	40	-	-
	Evening	38	-	-
	Night	35	30	40
NCA 8	Day	40	-	-
	Evening	35	-	-
	Night	35	30	40
School classroom	Noisiest 1-hour period when in use	48	-	-
Place of worship	When in use	5335	-	-
Commercial premises	When in use	6835	-	-
Active recreation area	When in use	58	-	-

Existing environment – vibration

There are no ongoing vibration impacts characterisng the existing environment. Table 12 provides maximum and preferred vibration dose values (VDVs) based on the NSW EPA guideline Assessing Vibration: A Technical Guideline. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 12. Preferred and Maximum VDVs for intermittent vibration (m/s$^{1.75}$)

Location	Daytime (defined as 7am to 10pm)		Night time (defined as 10pm to 7am)	
	Preferred	Maximum	Preferred	Maximum
Critical areas[1]	0.10	0.10	0.10	0.20
Residences	0.20	0.20	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.40	0.40	0.80
Workshops	0.80	0.80	0.80	1.60

1. *Locations with vibration sensitive equipment such as hospitals/ laboratories*

Potential impacts – construction

Construction is expected to take 24 months within standard construction hours. During construction not all equipment would always operate simultaneously. The results of noise levels predicted are therefore conservative.

For Castle Hill WRP, noise levels are expected to exceed NMLs during standard hours at a number of noise sensitive receivers to the west and east of Castle Hill WRP. Most impacted properties do not exceed the NMLs by more than 20 dB where noise levels could be considered audible or moderately intrusive. Earthworks, sheet piling and rock breaking are considered to be the noisiest activities, however these would be intermittent in nature and occur within a period of up to 12 months. For these activities up to four properties to the north west of the WRP are expected to be exposed to noise levels which exceed the NMLs by more than 20 dB during noisiest activities occurring intermittently. Mitigation measures are provided below. No properties are considered to be highly affected as all construction noise levels are expected to be less than 75 dB(A) at residential receivers.

For Rouse Hill WRP, noise levels are not expected to exceed the NMLs during standard hours at any noise sensitive receivers near Rouse Hill WRP.

Traffic noise from construction vehicles for both WRPs would have a minor impact on existing road traffic noise surrounding the WRPs as this is expected to increase by less than 2dB. Traffic noise on Drawbridge Place near Castle Hill WRP may increase by more than 2dB, however is unlikely to exceed $L_{Aeq\ 1hr}$ 55 dB(A) which is the daytime criteria for local roads (DECC, 2011).

It was considered unlikely that vibration intensive works would occur within minimum working distances in terms of cosmetic damage (Table 13). Residents located within 100 m may respond to vibratory rollers greater than 7 tonnes. Typically, a vibratory roller of 10 tonne would be used for the proposal at Castle Hill WRP, however, rollers less than 7 tonnes may be preferenced to avoid this impact.

A large hydraulic hammer would be used for construction of the inlet works at Castle Hill WRP. The closest receiver to these works is approximately 90 m to the north east which achieves the minimum working distances recommended (Table 13).

Table 13. Minimum working distances of vibration intensive equipment to be used during the Proposal

Plant	Rating/ description	Cosmetic damage	Human response
		Residential/ commercial	
Vibratory roller	<50 kN (typically 1-2t)	5 m	15 m
	<100 kN (typically 2-4t)	6 m	20 m
	<200 kN (typically 4-6t)	12 m	40 m
	<300 kN (typically 7-13t)	15 m	100 m
	>300 kN (typically 13-18t)	20 m	100 m
	>300 kN (> 18 t)	25 m	100 m
Small hydraulic hammer	300 kg (5 to 12t excavator)	2 m	7 m
Medium hydraulic hammer	900 kg (12 to 18t excavator)	7 m	23 m
Large hydraulic hammer	1,600 kg (18 to 34t excavator)	22 m	73 m

Potential impacts – operation

Operational noise levels were modelled in accordance with the Noise Policy for Industry (NPfI) (EPA, 2017) for the worst affected receivers under neutral and adverse weather conditions. Results show that the operation noise criteria were complied with at all noise sensitive receivers for Rouse Hill WRP.

At Castle Hill WRP, operations during the night-time and under neutral and adverse weather conditions were modelled. Noise attenuation treatments are recommended for proposed plant items (refer to safeguards below). It is noted that barriers have not been considered to the east of the Castle Hill WRP as they are unlikely to be effective due to the ground topography (receivers to the east are around 15 m higher in elevation than the WRP) and are not required to meet requirement noise limits for the proposed plant items.

It is noted that where there is a modelled exceedance of the trigger level by less than 2 dB the overall increase in noise from the existing situation case is considered negligible (i.e. inaudible to human ear). Therefore, the requirements of the Noise Policy for Industry are considered to be complied with. No significant exceedances of the sleep disturbance criteria are predicted as a result of the Proposal.

The NPfI notes that for >10 year old facilities with discrete development, proposals should not increase the overall noise emissions from the entire site. Results show that while there are some exceedances of trigger levels, the level of increase from the existing noise environment is ≤1 dB(A) and therefore negligible (the increase is inaudible). Results also show for increased levels where the above is not the case, the trigger levels for operational noise are not exceeded. In addition, the predicted noise levels of the proposed upgrade all comply with project amenity noise levels. Furthermore, the existing plant equipment typically dominates the predicted noise level. Treatment of existing plant items at Castle Hill WRP are recommended in addition to treatment for new equipment.

Operational traffic would have a minor impact on existing road traffic noise.

Safeguards

We will implement the following safeguards during construction and operation to minimise impacts:

- the CEMP should document all reasonable and feasible safeguards to manage the noise emissions from the site and any complaints which may occur due to construction noise, including the following:
    - identification of nearby residences and other sensitive land uses
    - description of approved hours of work
    - description and identification of all construction activities, including work areas, equipment and duration
    - description of what work practices (generic and specific) would be applied to minimise noise and vibration
    - a complaint handling process
    - overview of community consultation required for identified high impact works.
- works must comply with the EPA's *Interim Construction Noise Guidelines* (DECC, 2009), including schedule work and deliveries during standard daytime working hours of 7 am to 6 pm Monday to Friday and 8 am to 1 pm Saturday. No work 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).
- reasonable and feasible noise mitigation measures should be implemented to mitigate noise impacts and include selection of low-noise construction equipment or quieter and less

vibration emitting construction methods (e.g. rubber wheeled instead of steel tracked plant), avoiding simultaneous operation of noisy plant etc, and modifying construction program to minimise impacts

- Sydney Water's Project Manager may approve large deliveries or heavy vehicle movements that may generate excessive noise outside of standard construction hours. In doing so, it must be demonstrated that the activity would be in line with requirements for working outside of standing construction hours in the EPA's *Interim Construction Noise Guidelines* (DECC, 2009). 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 (eg 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 complaint 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 would be selected for each task, to minimise the noise impact (eg all stationary and mobile plant would be fitted with residential type silencers)
    - engine brakes will not be used when entering or leaving the work site(s)
    - regularly inspect and maintain equipment in good working order
    - arrange work sites where possible to minimise noise (eg 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)
- if works beyond standard daytime hours, or night works are needed, we will:
    - ensure the need for out of standard daytime or night work is justified
    - consider potential noise impacts and implement the relevant standard daytime hours safeguards, Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01), and other reasonable and feasible management measures

- identify community notification requirements, and for scheduled night work notify all potentially impacted residents and sensitive noise receivers not less than one week prior to commencing night work
- not undertake the works without 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, we will:
  - 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 measures
  - identify community notification requirements
  - not undertake the works without approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives
- provide the following acoustic treatments of existing plant items at Castle Hill WRP (or similar measures to achieve required operational noise reduction):
  - providing housing or a shroud around the Sodium Hypochlorite Motor or similar, to provide approximately 10 dB reduction
  - covering the grate between the blower room and the secondary clarifier to reduce water noise emanating from the grate
- provide the following acoustic treatments for proposed noise sources at Castle Hill WRP (or equivalent to meet required operational noise reductions):
  - extracted fan and ventilation fan - install attenuator to reduce the external sound power levels
  - UF feed pumps, UF back wash pump, CIP transfer pump and RE supply pumps – construct housing or shroud to provide ~10dB reduction
  - blower – either locate the blower within a building, or construct housing or shroud that reduces the sound power levels by ~10dB.

6.8 Traffic and access

Existing environment

Castle Hill WRP

Access to Castle Hill WRP is via a sealed internal access road connected to Wrights Road (a local road) and via a bridge over Cattai Creek with a 30 tonne weight limit. A second emergency access point is located via an existing fire trail that connects to Drawbridge Place north east of the WRP. A

culvert with a 30 tonne weight limit connects the fire trail to the WRP. Unrestricted on street kerbside parking is available on Wrights Road as well as Drawbridge Place (a residential cul de sac) in addition to many connecting local residential streets.

The local area is serviced by the Hills Showground metro station approximately 2 km south of Castle Hill WRP, served by the Metro North West Line. The nearest bus routes use Green Road to the west, Showground Road to the south and Ridgecrop Drive to the east.

The residential nature of the surrounding land use means that pedestrian use of surrounding streets is generally low. Local walking tracks connect recreational parks to the south and west, as well as around Castle Hill WRP with pedestrian access possible via Wrights Road and a pedestrian bridge over Cattai Creek.

Off-road shared paths are also accessible by cyclists to the south and west of Castle Hill WRP.

Rouse Hill WRP

Operational access to Rouse Hill WRP is via Mile End Road. A secondary access road is located adjacent to Second Ponds Creek and connects to Withers Road. The unsealed road varies in width and has reduced sight distance for vehicles exiting onto Withers Road.

The local area is serviced by the Rouse Hill metro station approximately 2.5 km south of Rouse Hill WRP, served by the Metro North West Line. Several bus stops are located along Mile End Road and Milford Drive, east of Rouse Hill WRP.

Pedestrian activity around Rouse Hill WRP is low given the surrounding open space and industrial land uses. Footpaths are provided on one or both sides of Mile End Road but not on either side of Withers Road. Pedestrian access is not permitted via the secondary access road, however, pedestrians were observed using this access road as it is directly adjacent to Russell Reserve. An off-road shared path is located south of Withers Road and connects to the wider regional cycling network via Windsor Road.

Potential impacts – construction

A traffic and transport assessment was prepared by Aurecon Arup (2021). Peak construction traffic would occur in the AM peak hour. Traffic generated by nearby developments are expected to relatively minor (refer to Section 6.10).

Castle Hill WRP

Construction vehicle routes for Castle Hill WRP is given in Figure 5. The relatively small increase in construction traffic is not expected to detrimentally impact the surrounding local and connecting arterial roads. Construction traffic generation is expected to have a negligible impact on the operation of local roads with existing low traffic volumes. Impacts on the surrounding road network relating to construction traffic are expected to be minimal.

Accommodation on site for 30 light vehicles is possible. Additional worker vehicles (10-20) that cannot be accommodated, may be required to park on surrounding local roads. Constructions vehicles would not park on Drawbridge Place.

Minimal impacts on bus services are expected given the low volumes of traffic being generated. No impacts are anticipated on the operation of bus stops.

Temporary closure of a section of the walking track along the east boundary of Castle Hill WRP would be required during the construction period (Figure 6). Shared access with construction vehicles is possible along the fire trail and for pedestrians crossing the fire trail provided safeguards presented below are adopted. Given the existing moderate pedestrian volumes on this walking track, impacts are expected to be moderate. Heavy vehicle movements may also impact school morning drop-off periods between 8 am and 9:30 am near William Clarke College and Samuel Gilbert Public School located on Wrights Road and Gilbert Road/ Ridgecrop Drive respectively.

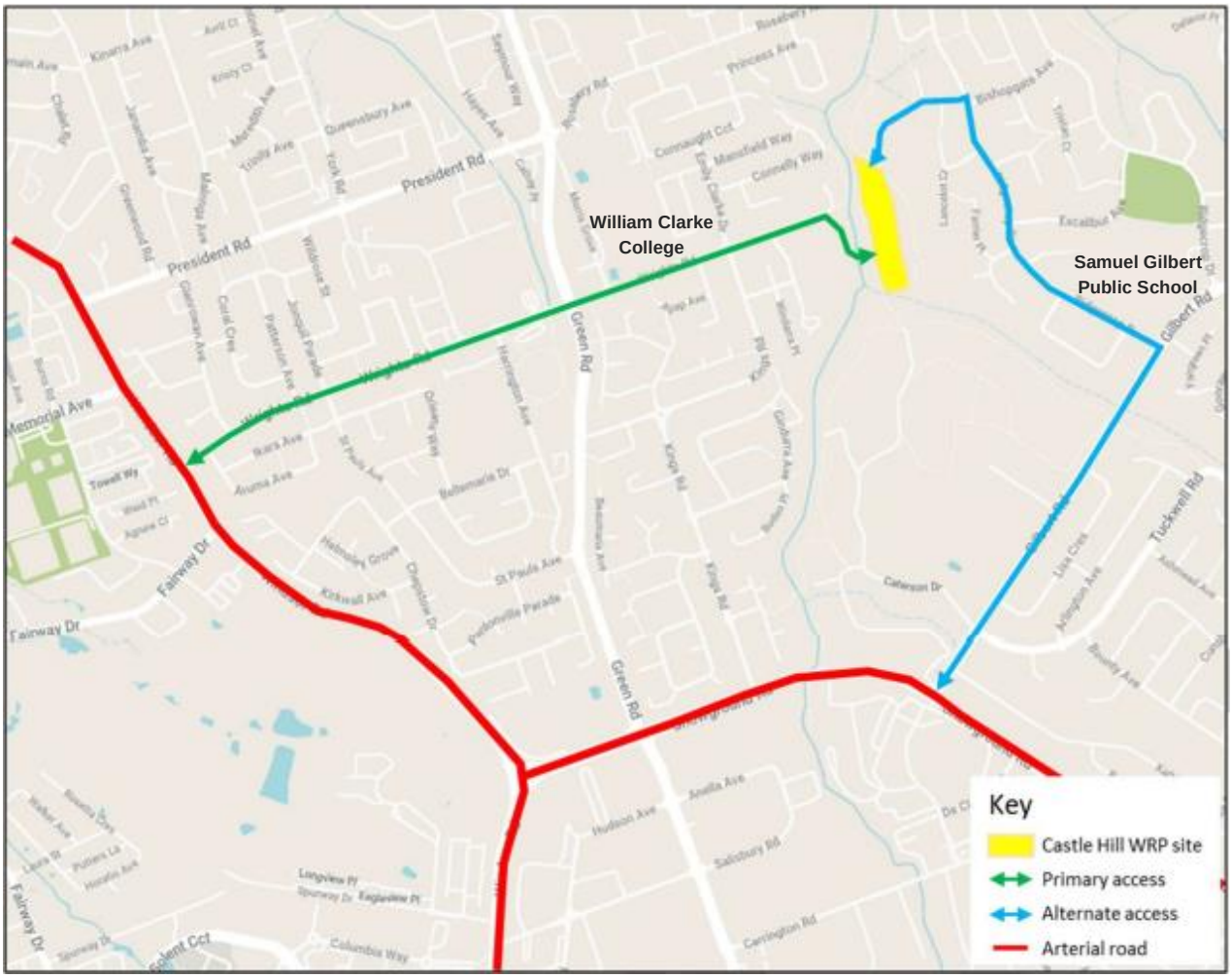

Figure 5. Construction vehicle routes to and from the Castle Hill WRP (modified from Aurecon Arup, 2021)

Figure 6. Temporary walking track closure during construction period (source: Google Maps).

Rouse Hill WRP

Indicative construction vehicle routes for Rouse Hill WRP is given in Figure 7. Poor sight distances for vehicles exiting the secondary access road onto Withers Road poses a potential safety risk, particularly for heavy vehicles with slower acceleration speeds. Safeguards including a traffic and pedestrian management plan and consideration for left out and in only turns will be implemented.

Impacts to roads that form part of the proposed construction vehicle route are expected to be minimal. Windsor Road is an arterial road that is suited to carrying high volumes of traffic and heavy vehicles. Therefore, the relatively small increase in construction traffic is not expected to significantly increase traffic volumes on Windsor Road. It is noted that Council plans to upgrade Withers Road into a six lane road (including two bus lanes) and that high volumes of traffic may be generated during peak hours along Withers Road. However, no detrimental impact is anticipated to the local road network with the implementation of below safeguards.

No impacts to surrounding roads are expected from construction worker parking which would be wholly accommodated on site. No impacts are anticipated on the operation of bus stops with construction vehicles using the access road connected to Withers Road. No impacts are anticipated on the operation of bus stops.

Given low existing pedestrian volumes on this walking track, potential impacts would be appropriately managed following implementation of the safeguards below. Heavy vehicle movements may also impact school morning drop-off periods between 8 am and 9:30 am near Rouse Hill Public School, which is located on Mile End Road, south of Rouse Hill WRP.

Potential impacts – operation

Truck movements for daily chemical deliveries will be required at both plants as well as waste out-loading to continue at Rouse Hill WRP (until Riverstone biosolids facility is commissioned at later date). It is expected there would be 10 trucks per day in total for Rouse Hill WRP and 10 trucks for Castle Hill WRP which is similar to current WRP operations. This will have minimal impact to the surrounding road network.

Track access along the west boundary of Castle Hill WRP will be re-opened to the public.

Figure 7. Indicative construction vehicle routes to and from the Rouse Hill WRP (modified from Aurecon Arup, 2021)

Safeguards

We will implement the following safeguards during construction and operation to minimise traffic and access impacts:

- a traffic and pedestrian management plan will be developed where there is interaction between construction vehicles and pedestrians. Traffic management measures may include temporary closures with or without detours
- consult with the relevant traffic authority about managing impacts to pedestrian traffic, signposting, parking or if traffic control or pavement restoration is required
- minimise traffic impacts near residential properties, schools and businesses (eg. no major materials deliveries at school drop off or pick up times etc)

- ensure work vehicles do not obstruct vehicular or pedestrian traffic, private driveways, public facility or business access unless necessary and only if appropriate notification has been provided
- schedule construction traffic movements outside of peak periods where possible to minimise impacts on the surrounding road network performance
- encourage carpooling and use of public transport including the Sydney Metro North West Line and local bus routes to reduce the number of vehicles travelling and parking at/near the site
- reinstate damaged trails/tracks to pre-existing or better condition

At Castle Hill:

- regrade fire trail at Castle Hill WRP for suitable and safe access for construction vehicles including heavy vehicles
- prior to closure of a section of the walking track and modifications to the fire trail including shared use, notify local residents and track users of closure at least a month prior to track closure.

At Rouse Hill:

- vehicles leaving the Rouse Hill WRP via the secondary access road to turn left only due to poor sight distance when exiting into Withers Road. The traffic and pedestrian management plan to consider left turn in only for construction vehicles entering the access road
- use signage to alert vehicles on Withers Road of changed conditions with increased use of the secondary access road
- ensure pedestrian use of access road is managed during delivery in accordance with the approved traffic and pedestrian management plan.

6.9 Social and visual

Existing environment

Castle Hill WRP

Visual lines of sight into Castle Hill WRP are largely obstructed for surrounding residential properties located east and west of the WRP, due to location of the WRP in a natural topographical depression and concealing bushland surrounding the WRP (Figure 8). However, the narrow and unsealed walking track around the WRP is frequented by local walkers, joggers and occasionally mountain bikers. The wire fence along the WRP western boundary currently allows clear sight into the WRP by users of the track immediately adjacent the WRP on the west side and from the southern boundary (Figures 9 and 10). The walking track east of the WRP is located further back from the WRP operations area and approximately 8 m higher than the WRP ground level.

Figure 8. Obstructed views looking towards Castle Hill WRP from surrounding residential areas

Figure 9. View along western walking track

Figure 10. View from southern boundary

Rouse Hill WRP

Visual lines of sight into Rouse Hill WRP are minimal from residential properties located over 400 m south east and south west of the WRP. Surrounding commercial and industrial developments along Mile End Road set a commercial/industrial backdrop against the WRP for residents to the south east (Figure 11).

Potential impacts – construction

Castle Hill WRP

The main entry road connected to Wrights Road as well as an existing fire trail connecting to Drawbridge Place would both be used for construction vehicle access. This will minimise impacts to WRP operations that will continue to use the main entrance. No construction vehicles would occupy street parking on Drawbridge Place. Given the low number of heavy vehicles and low frequency expected to use the fire trail, it is anticipated that the fire trail could remain open to the public with clear signage established for both pedestrian and vehicle safety.

Walking track access west of WRP would be temporarily closed during the construction period. Signage would be installed to divert track users. North - south access along the eastern track would be modified across the fire trail with barriers on either side to create a stopping point for pedestrians prior to walking across.

Minor temporary visual impacts are anticipated with the establishment of site compounds and worksites within the WRP during construction.

Rouse Hill WRP

Construction vehicles would use an existing access track adjacent to Second Ponds Creek connecting to Withers Road. Pedestrian access is not permitted on this road as clearly posted at the entrance gates on Withers road. The entrance/exit at Withers Road is adjacent to a separate driveway for the Rouse Hill Volunteer Rural Fire Brigade headquarters. No impacts are anticipated to Fire Brigade operations. Access for Sydney Water and our contractors to regularly clean the gross pollutant trap (GPT) along Second Ponds Creek could potentially be impacted.

Potential impacts – operation

Castle Hill WRP

The visual character of the WRP would change following completion of the proposed works. Of note is the removal of vegetation and construction of a new vent stack for the OCU designed to be approximately 5.5 m high. The stack would be located adjacent to the cliff face to the east, furthest from line of sight into the plant from the western track. The visual changes with the addition of a new sludge transfer station and balance tank (and the subject of a future REF) are likely to be more noticeable to track users, however unlikely to be noticeable from residences and overall are consistent with the current visual character of the site.

Figure 11. Obstructed views looking towards Rouse Hill WRP from surrounding local areas

Rouse Hill WRP

The inlet works located close to the main access gate will incorporate 3x barometric loops for three incoming sewer rising mains as part of Sydney Water's Metro North West project. The barometric loops would be approximately 12 m high. The OCF vent stack would be 15 m high. Given the no to low visibility from residential properties and adjacent commercial/industrial developments, minimal impact is anticipated.

Safeguards

We will implement the following safeguards during construction and operation to minimise social and visual impacts:

- minimise visual impacts by retaining existing vegetation wherever possible
- worksites will be restored to the pre-existing condition or better following construction
- maintain work areas in a clean and tidy condition
- materials selected are to reduce colour contrast and blend any new and existing structures, as far as possible into the surrounding environment.

At Castle Hill:

- install signage for track diversions and changed fire trail conditions
- consider installing temporary visual screening (e.g. shade cloth) along western and northern fence
- consult residents about construction vehicle use of the fire trail via Drawbridge Place
- undertake opportunistic revegetation as screening along the north west and south west boundary to reduce visual impacts to track users prior to re-opening the western track.

At Rouse Hill:

- maintain access to GPTs located along Second Ponds Creek
- do not obstruct driveway used by Rouse Hill Volunteer Rural Fire Brigade on Withers Road.

6.10 Cumulative

Cumulative construction and development impacts on social amenity

A review of DPIE's major project website indicates that the key projects currently in progress in the proposal area are:

Castle Hill

- Samuel Gilbert Public School Redevelopment – 750 m east of Castle Hill WRP with construction expected to overlap with the proposal construction timelines. Construction traffic is expected to use Gilbert Road and Ridgecrop Drive. Small amounts of construction

vehicle traffic would be generated and could be accommodated adequately by the surrounding road network.

- expansion of the Museums Discovery Centre – 1.8 km south west of Castle Hill WRP with construction commencing in 2021 and taking up to 24 months to complete. Construction is expected to generate between 40 to 50 vehicles per day with construction traffic expected to use Windsor Road and Showground Road.

Rouse Hill

No infrastructure schemes were identified that would impact the transport network surrounding the Rouse Hill WRP during construction. It is noted that 2 Money Close, approximately 250 metres south of the site, is currently being redeveloped into Money Business Park. Construction is expected to be completed in December 2021 and is not expected to overlap with construction of this proposal. Other local construction works include an upgrade to the intersection of Annangrove Road and Withers Road is currently in design by The Hills Shire Council and in associated with the shopping centre to be built near this intersection.

Sydney Water is also planning the following projects which will have overlapping construction timelines (2022 to 2024) and impacts along Mile End Road:

- North West Metro wastewater project involving three new rising mains entering via the main access road at Rouse Hill WRP
- North West Treatment Hub Growth project (NWTH growth package) involving a new sludge transfer pipeline from Castle Hill WRP to Rouse Hill WRP.

Construction for the above pipelines would be coordinated in order to minimise construction occupation along Mile End Road and impacts to residents. Construction access for this proposal would use of the access road connected to Withers Road as the primary construction vehicle access road. Given that Mile End Road is a one lane, two way road with bus stops to the east of the WRP, construction impacts will be assessed in the REF for the NWTH growth package and it is anticipated that a traffic management plan would be required.

6.11 General Environmental Management

The following general environmental management safeguards will be implemented:

- 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. The CEMP should be readily available on site and include a site plan which shows:
    - no go areas and boundaries of the work area
    - location of environmental controls (including erosion and sediment controls, any fences or other measures to protect vegetation or fauna, spill kits, stockpile area)

- location and full extent of any vegetation disturbance

- the alignments shown in this REF are indicative and based on latest concept design at the time of the REF preparation. The final alignment may change based on activities such as detailed design and construction planning. No further environmental assessment is required provided the changed alignment:
  - remains within the field assessment area for the REF and has no net additional environmental impact, or
  - is outside the field assessment area for the REF but reduces the overall environmental impact of the proposal
- changes to the proposal outside the field assessment area will 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
- Sydney Water's Project Manager (after consultation with Sydney Water's environment and community representatives and affected landowners) may approve changes once it is demonstrated in writing how the changes meet those requirements.
- Sydney Water's Project Manager (after consultation with Sydney Water's environment and community representatives and affected landowners) may approve temporary ancillary construction facilities (such as compounds and access tracks), without additional environmental assessment or approval if the facilities meet the following principles:
  - limit proximity to sensitive receivers
  - no disruption to property access
  - no impact to known items of non-Aboriginal and Aboriginal heritage
  - outside high-risk areas for Aboriginal heritage
  - use existing cleared areas and existing access tracks
  - no impacts to remnant native vegetation or key habitat features
  - no disturbance to waterways
  - potential environmental impacts can be managed using the safeguards in this REF
  - no disturbance of contaminated land or acid sulphate soils
  - will be rehabilitated at the end of construction
- approval requires written demonstration of how the proposed ancillary facilities meet these principles. Any facilities that do not meet these principles will require additional environmental impact assessment. The agreed location of these facilities must be shown on the CEMP site plan and appropriate environmental controls installed
- prepare an Incident Management Plan (IMP) outlining actions and responsibilities during:

    - onset of heavy rain during works
    - spills other potential incidents relevant to the scope of works
    - unexpected heritage finds
    - all site personnel should be inducted into the IMP
- immediately notify the Sydney Water Project Manager and Community Relations Representative of any complaints
- to ensure compliance with legislative requirements for incident notification (eg. *POEO Act 1997*), Sydney Water's employees and contractors will follow SWEMS0009.

7 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of upgrades to Castle Hill and Rouse Hill Water Recycling Plants. The proposal is required to address EPL compliance requirements for meeting current and 2024 nutrient load targets and concentration limits under EPA's Hawksbury Nepean Nutrient Framework, as well as address wet weather overflow compliance requirements (PRP) at Rouse Hill WRP.

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as erosion and sedimentation, biodiversity, noise and access changes. During operation, the potential impacts are associated with noise and visual amenity as well as benefits from improved treated wastewater quality. It is considered that, given the nature, scale and extent of impacts and implementation of the safeguards outlined in this REF, the proposed work is unlikely to have a significant impact on the environment and an environmental impact statement is not required under Division 5.1 of the EP&A Act.

The proposal has been considered in accordance 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.

8 References

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9 Appendices

Appendix A – Clause 228 checklist

Clause 228 checklist	REF finding
Any environmental impact on a community	There may be short-term construction impacts on the community from noise and access changes. Visual changes at Castle Hill WRP have been assessed in this REF and mitigation measures recommended to reduce impacts to track users. No visual impacts are anticipated for residential properties. There would be environmental improvements by improving treated wastewater quality released to waterways or distributed to the community to recycled water customers.
A transformation of a locality	The proposed work will not result in the transformation a locality.
Any environmental impact on the ecosystem of the locality	There will be some vegetation clearing associated with construction of the proposal, however this will not affect the ecosystems of the locality. Revegetation will be completed in accordance with Sydney Water's biodiversity offsetting guideline. Treated wastewater quality will improved, contributing to future healthier waterways and associated ecosystems.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	Visual changes at Castle Hill WRP will impact passing track users, however vegetation screening would seek to reduce this minor impact. Therefore the proposed work will not result in a reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality.
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 proposed work will not have 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 avoids impacts to a PAD at Rouse Hill WRP.
Any impact on the habitat of any protected animals (within the meaning of the Biodiversity Conservation Act 2016)	The proposed work will involve clearing a small amount of a threatened ecological community listed under the BC Act and EPBC Act. Potential habitat impacts have been minimised through redesign. The removal has been assessed to be not significant (Section 6.3). We propose to offset this residual impact.

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 proposed work will not be endangering any species of animal, plant or other form of life, whether living on land, in water or in the air. If encountered, the Dural Land Snail at Rouse Hill WRP will be relocated to adjacent more suitable habitat prior to construction.
Any long-term effects on the environment	The proposed work will not have any long-term impacts on the environment but will have a long-term benefit of providing improved treated wastewater quality to local waterways, reducing eutrophication risks associated with increasing growth in Sydney's North West.
Any degradation of the quality of the environment	The proposed work will not cause the degradation of the quality of the environment. Odour modelling conducted for this proposal confirms that there would be no net reduction in odour performance at the WRPs.
Any risk to the safety of the environment	The proposed work will result in a temporary increase of traffic movements along residential streets associated with construction work for Castle Hill WRP. Consultation and signage will mitigate this potential safety of the environment. Chemical deliveries will be of the same magnitude as current operations, however outloading and storage locations will change. The proposal design has incorporated bunding requirements to Australian standards. Operation and safe handling will be in accordance with MSDS requirements to mitigate potential safety hazards to the environment.
Any reduction in the range of beneficial uses of the environment	The proposed work will not have any reduction in the range of beneficial uses of the environment. The proposal responds to both current and future EPL requirements aimed at minimising pollution of the environment.
Any pollution of the environment	Environmental safeguards will mitigate the potential for the proposed work to pollute the environment. No pollution of the environment is expected.
Any environmental problems associated with the disposal of waste	The disposal of wastes will be conducted in accordance with the environmental safeguards, and no environmental problems 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 proposed work will not increase demand on resources, that are, or are likely to become, in short supply.
Any cumulative environmental effect with other existing or likely future activities	Construction vehicles using access from Withers Road will avoid traffic impacts associated with concurrent developments along Mile End Road for new rising mains and a new sludge transfer

	pipeline (growth package). The proposal has minimal potential to create cumulative environmental effect with other existing or likely future activities.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposed work will not have any impact on coastal processes or hazards.

Appendix B – Consideration of ISEPP consultation

ISEPP clause	Yes	No
Clause 13, 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?		✓
Involve connection to, and have a substantial impact on, the capacity of a Council owned sewerage system?		✓
Involve connection to, and use of a substantial volume of water from a Council owned water supply system?		✓
Involve installation of a temporary structure on, or enclosing, a public space under council's control that will cause a disruption to pedestrian or vehicular traffic that is not minor?		✓
Involve excavation of the surface of, or a footpath adjacent to, a road for which the council is the roads authority that is not minor or inconsequential?		✓
Clause 14, 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?		✓
Clause 15, flood liable land – consultation with council		
Will the work be located on flood liable land (that is land that is susceptible to flooding by the probable maximum flood event) and will they alter flood patterns other than to a minor extent?		✓
Clause 15AA, flood liable land – consultation with State Emergency Services		
Will the work be located on flood liable land (ie. 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)?		✓
Clause 15A, 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?		✓
Clause 16 – consultation with public authorities other than councils		
Will the proposal be located on land adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act*? If so, consult with DPIE (NPWS).*		✓
Will the proposal be located on land in Zone E1 Nationals Parks and Nature Reserves or in a land use zone that is equivalent to that zone? *If so, consult with DPIE (NPWS)*		✓
Will the proposal be adjacent to an aquatic reserve or a marine park declared under *Marine Estate Management Act 2014? If so, consult with the Department of Industry.*		✓
Will the proposal be in the foreshore area within the meaning of the *Sydney Harbour Foreshore Authority Act 1998? If so, consult with Sydney Harbour Foreshore Authority*		✓
Will the proposal comprise a fixed or floating structure in or over navigable waters? consult *TfNSW*		✓
Will the proposal be located 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 involve clearing of native vegetation on land that is not subject land (ie non-certified land)? *If so, notify DPIE at least 21 days prior to work commencing. SEPP (Sydney Region Growth Centres)*		✓

Appendix C – Specialist studies

Aboriginal heritage information must not be made publicly available or be published in any form or by any means by Sydney Water or our contractors / joint ventures, unless where approval has been sought from DPC's AHIMS Registrar and provided in writing to Sydney Water.

For those REFs which are being publicly displayed, all Aboriginal heritage information which identifies individual sites must be removed.