MEREWETHER HIGH LEVEL TANK DEMOLITION AND NEW COMMUNICATIONS TOWER

JULY 2021

REVIEW OF ENVIRONMENTAL FACTORS

HUNTER WATER

DOCUMENT CONTROL

Prepared by Bowditch Group on behalf of Hunter Water Corporation.

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EXECUTIVE SUMMARY

PROPOSAL

Description

Hunter Water Corporation is proposing to demolish the Merewether 2 High Level Tank (HLT) located at 29 Scenic Drive, Merewether (off Hickson Street) as part of a project to reduce ongoing maintenance requirements and maintain water supply to customers. The proposal would include the construction of a communications tower at the site of the demolished HLT to allow the relocation of essential communication installations from the tank structure as well as the addition of one new microwave dish to improve communications within the water and wastewater network.

The key features of the proposal include:

- Installing a temporary timber pole up to 21 metres high between existing installations on site to allow continuity of communications during construction
- Demolishing the HLT structure and removing all materials from site
- Constructing a 23 metre high concrete monopole plus headframe and antenna arrangement (for a total height of 27 metres) at the site of the demolished HLT
- Relocating four collinear antennae (ultra-high frequency (UHF) radio communications) and one 300 millimetre microwave dishes from the HLT to the new tower
- Installing one new 300 millimetre microwave dish on the tower to communicate with the Burwood Beach Wastewater Treatment Works (WWTW).

Need and options considered

The HLT forms part of the water reticulation system and due to operational changes is no longer required and is therefore proposed for demolition. The development of the proposal considered a number of options including retaining the HLT ('do nothing') and removing the tank with various system reconfigurations to ensure continued water supply service to customers. The demolition of the tank was deemed the preferred option as it would remove the ongoing need to maintain the aging tank structure. There was a subsequent need to provide an alternative structure for mounting essential telecommunication installations.

The preferred location of the new tower was selected following consideration of existing site constraints including existing structures, overhead lines, buried services, constructability, the need to be within the Hunter Water owned site and being able to optimise the height of the tower to provide the communication links necessary.

STATUTORY CONTEXT

The proposal would include infrastructure to facilitate the delivery of both sewerage systems and water supply systems by Hunter Water. The relevant divisions of the State Planning are therefore Division 18 Sewerage Systems and Division 24 Water Supply Systems.

Clause 106(3B) of ISEPP enables development for the purposes of sewerage reticulation systems to be carried out by or on behalf of a public authority without consent on any land. Clause 125(1) of ISEPP enables development for the purposes of water reticulation systems to be carried out by or on behalf of a public authority without consent on any land.

As the proposal would form part of the sewerage and water reticulation systems operated by Hunter Water, and Hunter Water is a public authority, it is considered permissible without consent pursuant to the provisions of ISEPP and can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

CONSULTATION

Targeted consultation has taken place with key stakeholders and landholders in accordance with requirements of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP). Hunter Water have consulted:

- City of Newcastle
- Department of Planning Industry and Environment (DPIE) – National Parks and Wildlife Service (NPWS)
- Subsidence Advisory NSW
- Adjoining landholders.

ENVIRONMENTAL IMPACTS

This Review of Environmental Factors has reviewed the potential impacts of the construction and operation of the proposal. The key environmental impacts associated with the proposal are related to:

- Biodiversity – the proposal would require the removal of about 100 square metres of vegetation. A site inspection concluded that no threatened species or threatened ecological communities would be impacted by the proposal.
- Noise during demolition and construction – the proposal would generate high noise during the demolition and construction work that would impact nearby residential receivers. High noise generating activities would be intermittent and generally of a short-duration.
- Parking disruptions during demolition and construction – the proposal would result in short-term impacts on available public parking. The use of the road reserve for plant placement would result in a temporary loss of less than ten percent of available nose-to-kerb parking on the eastern side of Hickson Street
- Access disruptions during demolition and construction – the proposal would result in short-term disruptions to the Hickson Street walking track that leads through Glenrock State Conservation Area to a gliding pad and Burwood Beach. Alternative access arrangements would be in place at all times.
- Visual impacts – the demolition of the HLT and construction of a slim line communications tower in its place would have a long-term positive impact on the visual environment of the area that has a high scenic value.

CONCLUSION

The proposal would result in minor short-term noise and visual impacts for residents and users of the Glenrock State Conservation Area. There would be temporary disruptions to public parking and pedestrian / cyclists. The proposal would result in long-term impacts as a result of removal of a small area of vegetation, however measures would be implemented to facilitate revegetation.

The proposal would have an overall positive visual impact as a result of the replacement of the visually obtrusive HLT with a less bulky structure.

It is considered that the benefits of the proposal in minimising ongoing maintenance costs for the HLT and providing continuity and reliability of services while improving communications links to Burwood Beach WWTW outweigh the mostly minor and short-term impacts.

REVIEW OF ENVIRONMENTAL FACTORS EXHIBITION

This review of environmental factors will be on display for public comment. The documents will be available as a pdf file on the Hunter Water Corporation website. Public submissions can be made and will be considered when determining if the proposal will be approved.

TABLE OF CONTENTS

1 INTRODUCTION

Hunter Water Corporation is proposing to demolish the existing Merewether 2 High Level Tank (HLT) located at 129 Scenic Drive, Merewether, and construct a telecommunications tower at the same site. The HLT forms part of the water reticulation system and due to operational changes is no longer required and is therefore proposed for demolition. Existing telecommunications installations that forms part of the Hunter Water operating network are mounted on the HLT and it is therefore proposed to construct a tower to provide an alternative mounting structure.

The key features of the proposal include:

- Installing a temporary timber pole up to 21 metres high between existing installations on site to allow continuity of communications during construction
- Demolishing the HLT structure and removing all materials from site
- Constructing a 23 metre high concrete monopole plus headframe and antenna arrangement (for a total height of 27 metres) at the site of the demolished HLT
- Relocating four collinear antennae (ultra-high frequency (UHF) radio communications) and one 300 millimetre microwave dishes from the HLT to the new tower
- Installing one new 300 millimetre microwave dish on the tower to communicate with the Burwood Beach Wastewater Treatment Works (WWTW).

The potential environmental impacts of the proposal to demolish the HLT and construct a telecommunications tower at the same address (the proposal) have been assessed in accordance with the environmental impact assessment requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Hunter Water Corporation (Hunter Water) is the determining authority and proponent of the proposal in accordance with Division 5.1 of the (EP&A Act).

The purpose of this minor works REF is to describe the proposed works and assess the potential construction and operation environmental impacts with consideration of the factors listed in clause 228 of the *Environmental Planning and Assessment Regulation 2000*. The REF identifies safeguards to avoid or mitigate identified impacts.

2 PROPOSAL DETAILS

2.1 Proposal identification

Proposal name	Merewether 2 High Level Tank (HLT) demolition and new communications tower
Reference number	HW2016-530/56/3
Proposal location	The proposal would be located on Hunter Water owned land at 129 Scenic Drive, Merewether (Lot 6, DP 776283). The site is accessed via Hickson Street
Local Government Area	The proposal would be located in the Newcastle Local Government Area (LGA)
Land zoning	SP2 Infrastructure

2.2 Existing environment

The proposal would be located on Hunter Water owned land at 129 Scenic Drive, Merewether. The location of the proposal is shown in Figure *2-1* and Figure *2-2* and images of the site are provided in Plate *2-1* to Plate *2-6*.

The proposal site includes a number of existing structures including the HLT proposed for demolition, a Telstra communications tower, three small buildings and associated fencing and bollards. The infrastructure is located on the Hunter Water owned site (Lot 6, DP 776283).

The proposal site is located on a ridgeline directly adjacent to the sealed roadway of Hickson Street and the boundary of Glenrock State Conservation Area (SCA). The area is generally known as the Hickson Street Lookout and is a popular public access point to Glenrock State Conservation Area (SCA) and Burwood Beach for various recreational activities.

A public access walking track runs through the Hunter Water site providing access to Glenrock SCA. The track leads to a hang gliding launch area and viewing platform, and raised boardwalk to Burwood Beach. The road reserve of Hickson Street adjacent to the proposal site is used for public parking by people accessing Glenrock SCA and is often at or near capacity. The NSW National Parks and Wildlife Services has indicated that the area attracts on average 674 visitors per day.

Approximately 50 per cent of the Hunter Water site consists of vegetation contiguous with the bushland of Glenrock SCA. The vegetation comprises dense shrubby forest vegetation dominated by Prickly-leaved Paperbark. It does not conform with a threatened ecological community and no threatened species are known to be present. Further details are provided in section 5.3

Hickson Street is a residential street that runs along the ridgeline that separates the suburb of Merewether from Glenrock SCA. The nearest residential receiver is located about 25 metres to the north.

Figure 2-1: Proposal location and site context

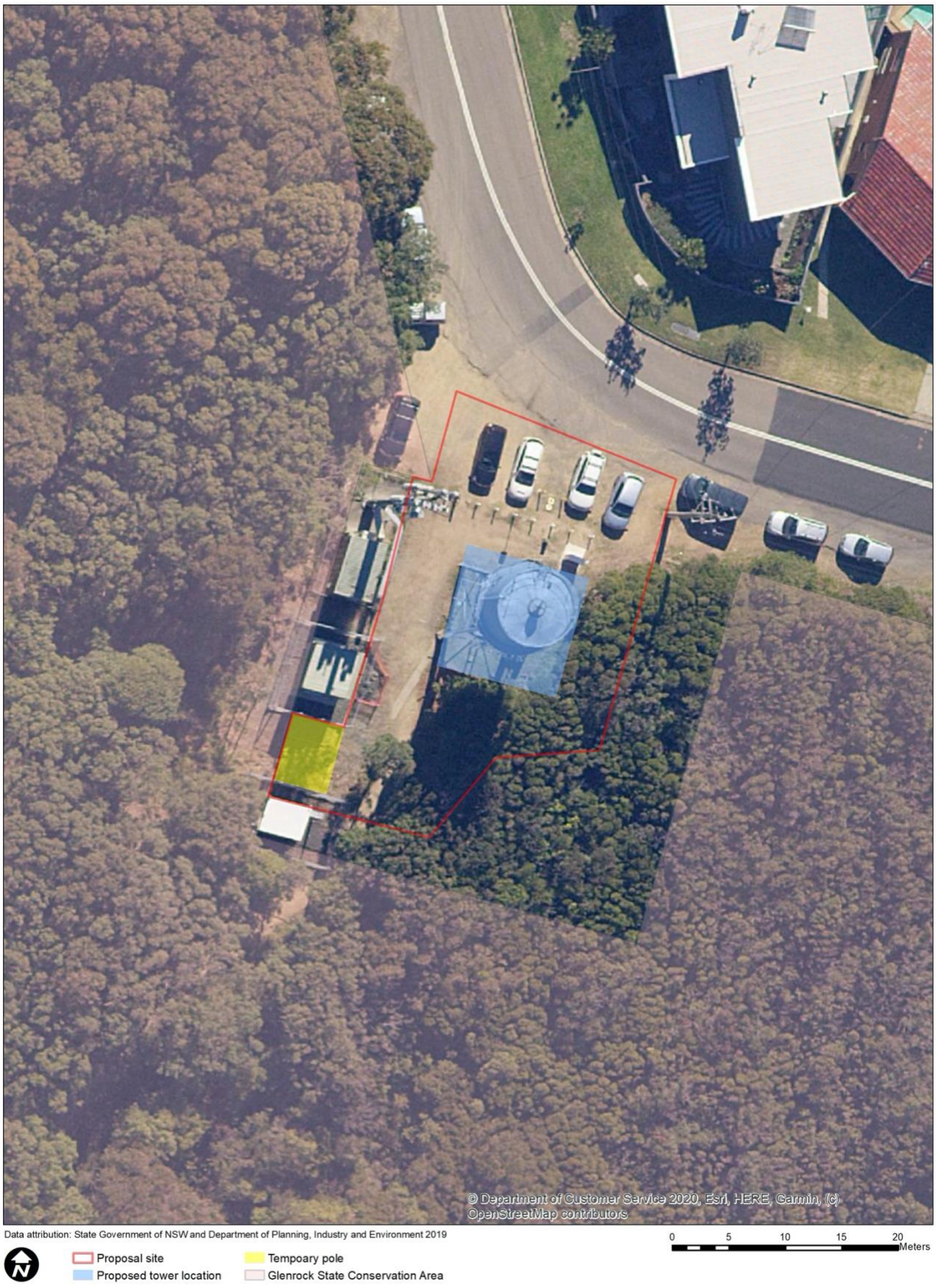

Figure 2-2: Proposal site

Plate 2-1 Proposal site looking west from Hickson Street

Plate 2-2 Proposed site for temporary timber pole

Plate 2-3 Base of HLT

Plate 2-4 HLT and public walking track entrance to Glenrock SCA

Plate 2-5 Vegetation adjacent to HLT site that may require removal

Plate 2-6 Hickson Street road reserve adjacent to proposal site

2.3 Proposal description

Description of works	The proposal would be carried out in two main stages, demolition of the Merewether 2 HLT and construction of the new tower. Stage one would involve the installation of a temporary timber pole to mount relocated existing communication equipment to maintain essential communications throughout the duration of the proposal followed by demolition of the HLT. The removal of the tank can occur once the communications equipment has been relocated to the temporary pole. The pole would be located between an existing Hunter Water building and Vodafone compound on the site (refer Figure *2-2*). The demolition phase would include removal of the above ground steel structures and associated fixing, pipelines and cables. All demolished material would be removed from site. The site of the tank would be cleared after the removal works in preparation for the new tower. Stage two would involve the construction of a new 23 metre high monopole at the site of the demolished HLT. The total height of the structure including the headframe and antenna arrangement would be 27 metres. Work includes removal of the old footings and slabs and excavation works for the new concrete slab foundation. The new tower would consist of a concrete monopole with a six metre by six metre concrete slab foundation. Detailed design drawings for the tower including an elevation view are provided in Appendix A. The tower would provide a mount for telecommunications equipment. The equipment would include four collinear antennae (UHF radio communications) and two 300 millimetre microwave dishes. The antennae and one dish are existing installations mounted on the HLT. The additional dish would be new and would provide a communication link to Burwood Beach WWTW. The existing and new installations would form part of the Hunter Water communications network that facilitates the operation of its water and wastewater networks. The communications tower facility would include installation of a security fence around the perimeter of the concrete slab.
Construction methodology	**Stage 1** Stage one, the demolition of the HLT, would be carried out using the methodology described below:

Site establishment

- Establishing site access and work area including signage and traffic/pedestrian management as required
- Establishing environmental controls including delineating exclusion areas, erosion and sedimentation controls and signage
- Vegetation removal to allow installation of temporary timber pole and safe access around the HLT.

Installation of temporary pole

- Installing the temporary timber bore by boring to three metres and lifting pole into place.
- Relocate communication equipment from HLT to temporary timber pole.
- Decommissioning of redundant power supply and communication cables that are attached to HLT.

Demolition

- Establishing containment measures required to capture debris including paint during the removal process.
- Decommissioning of the supply lines to HLT by localised excavation and capping of pipe ends.
- Demolition of HLT components by breaking up the structure into sections/segments and removing using a crane and cherry picker (it is expected a crane would be onsite for two to three days).
- Loading into truck and hauling out of demolished materials to licensed facility.

Site restoration

- Removing all waste and redundant material from site, prior to construction of the new tower.

Stage 2

Stage two, the construction of the tower, would be carried out using the methodology described below:

Site establishment

- Establishing site access and work area including signage and traffic/pedestrian management as required.
- Establishing environmental controls including delineating exclusion areas, water management controls, erosion and sedimentation controls and signage.

Tower installation

- Removal of the old footings, slab, and buried services within the footprint of the proposed work area, and disposal offsite.
- Preparing the foundation site by levelling an area of six metres by six metres with a small excavator.
- The tower would be installed by anchoring the pole in a bored hole footing (buried pole base). The footing would be six metres deep and one metre in diameter. The piling method would be confirmed by the successful contractor and would take up to three days to complete
- Placing the pole by using a crane and backfilling the hole
- Constructing the concrete slab to form the foundation of the tower, placing formwork and reinforcement, cabling conduits and pouring the slab
- Installing security fencing around the perimeter to the tower, anchored to the concrete slab.

	<u>Cabling, antennae and dish installation</u> • Installing antennae and dishes to the tower using a crane • Connecting cabling to existing telecommunications kiosk with some minor trenching within existing cleared areas of the site. <u>Site restoration</u> • Removing temporary timber pole by cutting off at ground level • Stabilising disturbed surfaces including use of turf or seeding a cover crop to provide an area suitable for future maintenance vehicle and plant access. The appropriate method would be agreed with the Hunter Water project manager based on site specific conditions. • Removing all waste and redundant material from site.
Ancillary facilities	Given the minor scope and duration of the proposal, the establishment of a site compound with worker facilities would not be required, however a portaloo may be provided. A material laydown area would be established within the Hunter Water site adjacent to the work area and temporary fencing erected around the site. No ground disturbance or vegetation clearing would be required for laydown areas. Some vegetation removal would be required to provide access to the site of the temporary timber pole and safe working clearance around the HLT. It is estimated up to about 100 square metres would be removed, however this would be minimised where possible. Temporary parking of some construction related vehicles including piling rig and crane would encroach on the road reserve of Hickson Street managed by the City of Newcastle. No work would be required to facilitate the temporary parking however temporary traffic management would be required. In the event temporary stockpiling of spoil is required this would be accommodated within cleared areas immediately adjacent to the work site.
Operational requirements	The telecommunications tower would be a largely passive operational facility with minimal onsite operational requirements. Maintenance activities would be carried out as necessary and would be expected to result in minimal, short-term aesthetic impacts associated with the presence of workers and vehicles. The proposal would not result in any changes to the existing operation of the water supply network or wastewater network. Water pressure would not change as a result of the removal of the HLT from operation, with pressure managed through the new pumped flow and a control valve, making the need for HLT redundant. The telecommunication installations would be designed, installed and operated to comply with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) *Radiation Protection Standard Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz* (2002). The development of the proposal has been made with consideration of the NSW Governments *Telecommunications Facilities Guideline Including Broadband* (July 2010).
Equipment and plant	The following indicative plant and equipment would be required: • small excavator • hand tools, grinders • oxy-acetylene cutter • brushcutters • crane • piling rig • excavator • concrete truck

	• generator • light vehicles • water truck • cherry picker
Land tenure	The proposal would be located on Lot 6, DP 776283, a Hunter Water owned site. Access would be directly off Hickson Street via Scenic Drive. Some construction related vehicles may be temporarily parked within the City of Newcastle managed road reserve of Hickson Street directly adjacent to the proposal site. Consultation with City of Newcastle will continue regarding the use of the road reserve.
Commencement and expected duration of construction work	Subject to approval the proposal is expected to commence in mid to late 2021. Stage 1 would take about four weeks to complete, weather permitting. Stage 2 of the proposal is expected to take about three weeks to complete, weather permitting, and is expected to occur about four to eight weeks after stage 1.
Hours of construction work	Work would be undertaken during standard construction working hours as follows: • 7am to 6pm Monday to Friday • 8am to 1pm Saturdays • No work Sundays or public holidays.
Proposal objectives	The objectives of the proposal are to: • Allow uninterrupted communications between Hunter Water owned, water and wastewater operational sites • Improve the resilience and reliability of Hunter Water operational communications • Minimise social and environmental impacts. • Improve the safety of Hunter Water maintenance staff by demolishing the HLT.
Options considered and justification	The proposal was identified following a structural assessment of the Merewether 2 HLT that found the roof of the tank is in poor condition, requiring major refurbishment work. A review of the requirements for carrying out refurbishment of the tank identified potential operational reconfigurations to continue to meet the needs of customers. An options assessment process was subsequently carried out and considered the following options: 1. Continue to maintain the HLT for 25 years 2. Continue to maintain HLT and install fall arrest system on the ladders 3. Replace the HLT with permanent variable speed drives (VSDs), with a contingency plan and demolish the HLT 4. Replace the HLT with permanent VSDs, demolish the HLT and install a pressure reducing valve (PRV) to provide an automated alternative supply from New Lambton Heights System 5. Replace the HLT with permanent VSDs and generator and demolish the HLT 6. Replace the HLT with a new tank to meet the storage capacity requirement of Water Supply Code of Australia. Retaining the tank was not deemed preferable given the costs of ongoing maintenance and the impacts to customers from water supply disruptions

during any maintenance activities. Removing the tank also reduces the safety risks for personnel from maintaining the elevated structure.

It was determined that the preferred option is Option 4, removal of the tank and replacing the system with a VSD pumping system backed up with an alternative supply through a PRV from New Lambton Heights system. This option has the benefit of allowing the removal of the tank and subsequent ongoing maintenance requirements and providing an automated system for rezoning water supply when needed.

The decision to remove the HLT resulted in a need for construction of an alternative structure to support the communications installations. A review of site constraints including proximity to existing structures and buried services, distance for the HLT to allow for safe demolition and optimising the height of communications infrastructure while accounting for tree growth initially identified a site directly adjacent to the HLT. In this scenario the new tower would be constructed prior to demolition of the HLT.

The consideration of options also reviewed the opportunity to include a microwave dish to communicate to Burwood Beach WWTW. This would require the height of the tower to be raised from the current height of the HLT to provide line of sight to the WWTW providing monetary benefits and non-monetary benefits such as high reliability. A review of the topography and growth of surrounding vegetation was carried out to determine the required height of the tower.

Following further consideration of the constructability of the new tower adjacent to the HLT and initial feedback through the consultation process, it was determined that the preferred location for the new tower is the same position as the HLT. Use of a temporary timber pole to provide continued communications would allow the sequence of demolition following by installation of the new tower. The location of the temporary timber is unsuitable for the permanent concrete pole due to space constraints. positioning the concrete pole in same location as the HLT would also allow the height of the pole to be reduced from 25 metres to 23 metres.

The installations on the tower would include the existing four antennae and one microwave dish from the HLT, and a new microwave dish to communicate with Burwood Beach WWTW.

The proposal would result in minor short-term impacts including noise, visual and parking and pedestrian disruptions. It would result in long-term impacts as a result of the removal of a small area of vegetation. The proposal would have an overall positive visual impact as a result of the replacement of the visually obtrusive HLT with a less bulky structure.

It is considered that the benefits of the proposal in minimising ongoing maintenance costs for the HLT and providing continuity of services while improving communications links to Burwood WWTW outweigh the mostly minor and short-term impacts.

3 STATUTORY CONTEXT

3.1 Environmental planning instruments

Newcastle Local Environmental Plan 2012

The Local Environmental Plan (LEP) relevant to the proposal is the Newcastle LEP 2012. The proposal would be located on land zoned SP2 Infrastructure.

State Environmental Planning Policy (Infrastructure) 2007

The State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) describes certain developments that may be carried out without consent in order to facilitate the delivery of infrastructure in NSW.

The proposal would include infrastructure to facilitate the delivery of both sewerage systems and water supply systems by Hunter Water. The relevant divisions of the ISEPP are therefore Division 18 Sewerage Systems and Division 24 Water Supply Systems.

Clause 106(3B) of ISEPP enables development for the purposes of sewerage reticulation systems to be carried out by or on behalf of a public authority without consent on any land. Clause 125(1) of ISEPP enables development for the purposes of water reticulation systems to be carried out by or on behalf of a public authority without consent on any land.

As the proposal would form part of the sewerage and water reticulation systems operated by Hunter Water, and Hunter Water is a public authority, it is considered permissible without consent pursuant to the provisions of ISEPP and can be assessed under Division 5.1 of the EP&A Act. Development consent from council is not required.

While the proposal is characterised for the purpose of sewerage and water supply systems, given the development includes a telecommunications facility, consideration of the requirements of Clause 114 of ISEPP that enables development for the purpose of telecommunications facilities to be carried out without consent on any land has also been made. Clause 114(2) includes additional consultation requirements for development of a tower or mast which have been addressed in the planning of the proposal. Relevant consultation activities are described in detail in section 4.

State Environmental Planning Policy (Coastal Management 2018)

State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) gives effect to the objectives of the *Coastal Management Act 2016* from a land planning perspective by specifying how development proposals are to be assessed if they fall within the coastal zone.

The proposal site is located within an area identified by the Coastal Management SEPP as “coastal use area”. Under clause 14 of the Coastal Management SEPP, development consent must not be granted to development on land identified as “coastal use area” unless the consent authority has considered the impact of the proposal on certain factors. Clause 14 is not directly applicable to Division 5.1 activities, however the factors referred to in the clause have been considered in this REF as shown in Table 3-1.

Table 3-1 Coastal Management SEPP factors for considerations

Coastal use area factor	REF reference
(a) (i) Existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability	Section 5.7

(a) (ii) Overshadowing, wind funnelling and the loss of views from public places to foreshores	Section 5.8
(a) (iii) The visual amenity and scenic qualities of the coast, including coastal headlands	Section 5.8
(a) (iv) Aboriginal cultural heritage, practices and places	Section 5.6
(a) (v) Cultural and built environment heritage	Section 5.5

3.2 Relevant legislation

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the NSW Environment Protection Authority (EPA). Part 3.2 of the POEO Act requires an Environment Protection Licence (EPL) for scheduled development work and the carrying out of scheduled activities. The proposal does not trigger these requirements.

Section 120 of the POEO Act prohibits the pollution of waters. The REF includes measures to address the risk of water pollution - see section 5.2.

Air pollution-related sections 124 to 126 (Chapter 5, Part 5.4., Division 1) of the POEO Act require activities to be conducted in a proper and efficient manner, while section 128 (Chapter 5, Part 5.4., Division 1) of the POEO Act requires that all necessary practicable means be used to prevent or minimise air pollution. Air quality is addressed in section 5.10.

Pollution of land and waste is covered by Part 5.6 of the POEO Act. The Act defines 'waste' for regulatory purposes and establishes management and licensing requirements for waste. It defines offences relating to waste and sets penalties. The POEO Act also establishes the ability to set various waste management requirements via the Protection of the Environment Operations (Waste) Regulation 2014.

Waste and resource use is addressed in section 5.11. Contamination is addressed in section 5.1.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) has objects for the conservation or nature and conservation of cultural value. The NPW Act enables reservation of land for national parks, historic sites, state conservation areas, regional parks, nature reserves and karst conservation reserves. It also provides for Aboriginal areas and protection of Aboriginal objects, wild rivers, wildlife refuges and conservation agreements.

The proposal site is located adjacent to the Glenrock State Conservation Area (SCA). While regulation under the NPW Act in relation to the SCA is not required for the proposal, consideration of relevant aspects that may impact on the SCA as outlined in the Guidelines for development adjoining land managed by the Office of Environment and Heritage (OEH, 2013) has been made in relevant sections of Chapter 3. These include erosion and sediment control, water management, pest management and ecological considerations, amenity impacts (eg air, noise, visual) and cultural heritage.

Potential impacts on Aboriginal areas and objects has been assessed in section 0.

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is directed at maintaining a healthy, productive and resilient environment consistent with the principles of ecologically sustainable development

(ESD). The BC Act sets out the assessment framework for threatened species and ecological communities.

Certain species of animals or plants are identified as endangered species, populations or communities or vulnerable species under the Act. Areas of land comprising the habitats of listed endangered species may also be declared critical habitat under the Act.

Where Part 5 of the EP&A Act applies, activities that are likely to have a significant impact on listed threatened species, populations, threatened ecological communities or their habitats must be the subject of a species impact statement and require the concurrence of the Chief Executive of the Department of Planning Industry and Environment (DPIE). This is unless the activity is a project to which Division 5.2 of the EP&A Act applies. Potential impacts on biodiversity as a result of the proposal are considered in section 5.3 and it is concluded that significant impacts are not likely.

Biosecurity Act 2015

The *Biosecurity Act 2015* (Biosecurity Act) (which repealed the *Noxious Weeds Act 1993*) provides a framework for safeguarding primary industries, natural environments and communities from a range of pests, diseases and weeds. The Biosecurity Act dictates that all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any plant have a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Two introduced species listed under Schedule 3 of the Biosecurity Regulation 2018 were recorded in the proposal site. The species are also all priority weeds in the Hunter region and one a Weed of National Significance (WoNS). These are considered in section 5.3.

Roads Act

The *Roads Act 1993* designates which authority is responsible for the management of what roads and provides a framework for that management. An approval to undertake works and structures in a public road (including removing or interfering with a work or a tree on a public road) is required under Section 138. Part 2 of Schedule 2 savings, transitional and other provisions states that Section 138 does not require a public authority to obtain a roads authority's consent to the exercise of the public authority's or network operator's functions in, on or over an unclassified road other than a Crown road.

The proposal would require use of a section of the road reserve of Hickson Street. This is not a classified road and therefore the roads authority is the relevant local council. Consultation with the City of Newcastle will continue prior to the work to confirm management of the Hickson Street road reserve impacted.

Environment Protection and Biodiversity Act 1999 (Commonwealth)

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix B and section 5.3.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that the proposal would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of Agriculture, Water and the Environment is not required.

Civil Aviation Safety Regulations 1998 (Commonwealth)

Part 139 of the Civil Aviation Safety Regulations 1998 specifies reporting regulations that apply to tall structures and plumes. The regulation requires that any object that extends to a height of 110 metres or more above ground level must be notified to the Civil Aviation Safety Authority (CASA). In addition, the Royal Australian Air Force (RAAF) requires information on structures that are 30 metres or more above ground level within 30km of an aerodrome or 45 metres or more above ground level elsewhere that may pose a specific hazard to their operations.

The proposed tower would be located within 30 kilometres of the Williamtown RAAF base. The tower with mounted antenna would be a maximum 27 metres above ground level and therefore the reporting requirements do not apply.

4 CONSULTATION

4.1 ISEPP consultation requirements

Part 2 General, Division 1 of the ISEPP prescribes consultation to be undertaken by a public authority prior to the commencement of certain activities. A review of the ISEPP consultation requirements for the proposal is provided in Table 4-1. The review identified consultation with Department of Planning Industry and Environment (DPIE) and Subsidence Advisory.

In addition to the requirements summarised in Table 4-1, consideration of the consultation requirements for certain telecommunication facilities contained in clause 114(2) of the ISEPP have been applied to the proposal. Clause 114(2) requires that written notice is made to the council of an area, and the occupiers of any adjoining land, prior to undertaking development of a communications tower or mast.

Hunter Water wrote to adjoining landholders, all residents/landholders of Hickson Street and City of Newcastle on 21 December 2020. Following amendments to the proposal design, Hunter Water again wrote to City of Newcastle on 17 June 2021 and adjoining landholders, all residents/landholders of Hickson Street in June 2021 to inform them of the changes. Copies of correspondence are provided in Appendix C.

Details of ISEPP consultation outcomes are provided in section 4.2.

Table 4-1 Infrastructure SEPP consultation requirements

Is consultation with Council required under clauses 13-15 of ISEPP?	Yes/No
Is the proposal likely to have a substantial impact on stormwater management services which are provided by council?	No
Is the proposal likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?	No
Will the proposal involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of any part of the system?	No
Will the proposal involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?	No
Will the proposal involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow? The proposal would temporarily enclose an area of the road reserve of Hickson Street resulting in a temporary impact on availability of public parking. Hunter Water wrote to City of Newcastle on 21 December 2020 in accordance with the requirements of the ISEPP. A response was received on 31 January 2021 and details are provided in section 4.2. Copies of correspondence are provided in Appendix C.	Yes
Will the proposal involve more than minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No
Is the proposal likely to have a more than minor or inconsequential impact on a local heritage item (that is not also a State heritage item) or a heritage conservation area?	No

(*Note: local heritage item means —* *(a) a place, building, work, relic, tree, archaeological site or Aboriginal object that is identified as a heritage item (or by a similar description) in a local or regional environmental plan, or* *(b) an item of local heritage significance, as defined by the Heritage Act 1977, that is the subject of an interim heritage order in force under that Act or is listed as an item of local heritage significance on the State Heritage Inventory under that Act.)*	
Is the proposal located on flood liable land? If so, will the works change flood patterns to more than a minor extent?	No
Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land? Note: See interactive map here: https://www.planning.nsw.gov.au/policy-and-legislation/coastal-management. Note the coastal vulnerability area has not yet been mapped. Note: a certified coastal zone management plan is taken to be a certified coastal management program	No
Is consultation with a public authority other than Council required under clauses 15 and 16 of ISEPP?	**Yes/No**
Is the proposal characterised as stormwater management systems under Division 20 and located on flood liable land? If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.	No
Is the proposal adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*, or on land acquired under that Act? The proposal site is located adjacent to the Glenrock State Recreation Area (SCA). Hunter Water wrote to the National Parks and Wildlife Service (NPWS) that sits within the Environment, Energy and Science Group of DPIE on 21 December 2020 in accordance with the requirements of the ISEPP. A response was received on 1 February 2021 and details are provided in section 4.2. Hunter Water provided a written update to NPWS on 17 June 2021 to inform them of amendments to the proposal design. Copies of correspondence are provided in Appendix C.	Yes
Is the proposal on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No
Is the proposal adjacent to an aquatic reserve or a marine park declared under the *Marine Estate Management Act 2014*?	No
Does the proposal consist of a fixed or floating structure in or over navigable waters?	No
Is the proposal on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? The proposal site is located in an area mapped as being in a Mine Subsidence District. Hunter Water wrote to Subsidence Advisory NSW on 21 December 2020 in accordance with the requirements of the ISEPP. Stamped development plans endorsed by Subsidence Advisory NSW were received on 18 January 2021.	Yes

Hunter Water provided an update to Subsidence Advisory on 17 June 2021 to inform them of amendments to the proposal design and seek endorsement of the revised plans. Stamped development plans endorsed by Subsidence Advisory NSW were received on 18 June 2021. Copies of correspondence are provided in Appendix C.	

4.2 ISEPP consultation outcomes

The outcomes of consultation carried out in accordance with the requirements of ISEPP are summarised in Table 4-2. The table includes concerns raised as a result of the consultation and where these are addressed in the REF.

Table 4-2 Issues raised through ISEPP consultation

Agency / community	Issue raised	Response / where addressed in REF
City of Newcastle	The development should demonstrate that all components of the proposal are 'development permitted without consent', or 'exempt development' and therefore a development application to council is not required.	Section 3.1
	The design of the proposal should address Compliance with the Principle of NSW Telecommunications Facilities Guidelines including Broadband (2010) as per section 114 (20)(c) of ISEPP.	Section 3.2
	Councils records identify the site as potentially containing REMS vegetation. The REF should have regard to the relevant provisions of the BC Act 2016.	Section 5.3
	The notification letter was not supported by detailed plans therefore it was not possible to provide comment on visual impacts. The REF should address likely visual impacts and impacts on views.	Section 5.8
	The REF should assess impacts of the proposal on any trees located near the works and protection measures during installation.	Section 5.3
	The site is identified as having acid sulphate soils and the REF should assess impacts and where a management plan is required.	Section 5.1
	Any stormwater from any proposed areas is to be conveyed to the existing property stormwater drains by way of a sealed pipe system.	Section 5.2
	The site is located in a Mine Subsidence District and the REF should have regard to relevant requirements of Subsidence Advisory NSW.	Section 4.1
	The notification indicates the site is located off Hickson Street. Council records identify the land as 129 Scenic Drive, Mereweather.	Noted
DPIE (National Parks and Wildlife Service)	Impact of proposal on access and parking for visitors to Hickson Street walking track, gliding pad and lookout including regular wedding ceremonies, Newcastle Hang Gliding Club and Newcastle Paragliding Club.	Section 5.7

Subsidence Advisory	No issues raised. Plan approval provided 18 January 2021 (amended approval 18 June 2021)	Appendix C
Adjoining landholders	Disagrees with tower placement and concern about decreasing property value. Suggestion to position at rear of current water tower.	Section 2.3
	Concern about impact of removing the HLT on water pressure.	Section 2.3 and 5.9
	Enquiry about positioning the new tower closer to the existing Telstra tower.	Section 2.3
	Enquiry about whether the new tower is related to the 5G communication system.	Section 2.3
	Enquiry about whether the existing telecommunications tower remain in place?	Section 5.9
	Concern about visual impact of height of new tower and enquiry about possible alternatives to allow a lower option.	Section 2.3 and 5.8
	Concern about noise generated by existing installations that has occurred in last 6 to 12 months. Future work should ensure that the noise effect is eliminated.	Section 5.4
	Enquiry about any interruptions to water supply, source of water and changes to water pressure.	Section 5.9

4.3 Department of Primary Industries

Will the proposal involve dredging or reclamation works in a waterway?	Yes/No
This includes any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land.	No

5 ENVIRONMENTAL ISSUES IDENTIFICATION

This section provides a description of potential impacts associated with the proposal and specifies measures to mitigate identified impacts. All aspects of the environment potentially impacted by the proposal are considered. A summary of the consideration of factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* is provided in Appendix B. A summary of the matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is provided in Appendix B.

5.1 Topography, soils and geology

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the work require excavations or other ground disturbing activities?	Yes	The demolition of the HLT would result in minor ground disturbance to remove the footing pads for each leg of the structure. The proposal would require minor earthworks to install the temporary timber pole, to level the site for construction of the new tower and trenching for associated cable connections. Some vegetation removal would be required to allow the work to occur and would result in minor ground disturbance. The timber pole would be installed by boring to three metres. Minor recontouring would be required prior to construction of the concrete slab that would form part of the tower's foundation. In addition to the recontouring for the concrete slab, a bored pile up to six metres deep and one metre in diameter would be required to anchor the tower. This activity would generate spoil that would be reused for onsite landscaping if appropriate or removed from site for appropriate disposal. The dimensions of the concrete slab for the tower would be six metres by six metres. The depth of excavations would extend about 500 millimetres. Topsoil would be separated and retained on site for restoration. Excavated material would be reused onsite for backfill and restoration if appropriate. Excess spoil would be removed from site for reuse or disposed of in accordance with appropriate waste classification requirements.	NA
Would the work require plant/vehicular movements on unsealed areas?	Yes	The proposal site is located adjacent to a sealed public road however vehicles and plant would be required to move over the unsealed road verge area and unsealed area of the proposal site. Movements on	NA

		unsealed areas would be limited in extent and consistent with the current use of the roadside for public parking.	
Could the work occur in an area of high erosion risk (eg, due to nature of soils, topography)?	Yes	The proposal site is located in an area that may pose an erosion risk due to the local topography. The proposal site is largely flat however the boundary of the site slopes steeply to the east and south into the bushland area of Glenrock SCA. The soils of the proposal site are identified on the NSW Government eSpade mapping resource as Killingworth soil landscape. Water erosion is a limitation of this soil landscape and therefore, given the exposure of soils during the demolition and construction work, there would be a risk of impacts from erosion on the sensitive receiving environment. An erosion and sediment control plan would be developed as part of the Construction Environmental Management Plan (CEMP) and would specify controls to minimise ground disturbance and prevent the release of sediment off site. Site restoration would include measures to ensure exposed surfaces are stabilised progressively wherever possible.	eSpade v2.1 – 2 June 2020 updated 12 February 2021
Could the work impact on or have the potential to impact on Acid Sulphate Soils (ASS)?	No	The proposal site is not mapped as having a probability of occurrence of ASS on the NSW ASS risk mapping. The proposal site is mapped as Class 5 ASS in the Newcastle LEP 2012. ASS are not typically found in areas mapped as Class 5. Given the risk mapping and the elevation of the site, ASS are not expected.	NSW ASS risk mapping – 2 June 2020 updated 12 February 2021 Newcastle LEP 2012 – 2 June 2020 updated 12 February 2021
Could the work impact on areas of known salinity risk?	No	The proposal would not impact on areas of known salinity risk.	ePlanning spatial viewer – 12 February 2021
Could the work result in disturbance of contaminated land?	No	A list of the NSW Environment Protection Authority (EPA) contaminated land record of notices (12 February 2021) for the suburb of Merewether returned no known contaminated sites. A search of the list of NSW contaminated sites notified to the EPA (as of 14 January 2021) returned one record for the suburb of Merewether. The location of this record is not located in the vicinity of the proposal site. Disturbance of contaminated land is not expected. The presence of potential hazardous material in the HLT structure including lead paint would be confirmed through testing prior to commencement of the demolition. If lead paint is present a lead management plan would be	NSW EPA contaminated land record of notices – 2 June 2020 updated 12 February 2021 List of notified NSW contaminated sites – 2 June 2020 updated 12 February 2021

		prepared and appropriate containment measures implemented to ensure capture of lead containing debris. Any contaminated materials would be removed from site and disposed of in accordance with the requirements of the NSW Environment Protection Authority Waste Classification Guidelines (2014)	

5.2 Hydrology and water quality

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Could the work impact a water catchment area? Do any of the work areas drain directly to Hunter Water special areas?	No	The proposal would not impact on a water supply catchment area and no areas would drain directly to Hunter Water special areas.	Hunter Water Protecting our Drinking Water Guideline and the *Hunter Water Regulation 2015* – 12 February 2021
Could the work impact directly or indirectly on a waterway? (including creek crossings and underboring a waterway)	No	The proposal site is not located in close proximity to a waterway and no direct or indirect impacts are expected.	NA
Is the work located on flood prone land? Could the work result in impacts to flooding regimes and flows? Could the work be impacted by flooding?	No	The proposal is located on a ridgeline and is not mapped as being in a flood planning area. The proposal would not result in an impact on flooding regimes. Impacts on the proposal in the event of a flood are not expected given the location of the site.	Newcastle Council flood risk mapping – 2 June 2020 updated 12 February 2021
Would the work be likely to encounter groundwater or require discharge of accumulated water?	No	The proposal is not expected to encounter groundwater. No free groundwater was encountered during geotechnical investigations for the proposal (GHD, 2020). Any wastewater produced by the piling work would be captured and removed from site for appropriate disposal.	Geotechnical investigation report (GHD, April 2020)
Would the works result in permanent changes to existing surface drainage patterns?	No	The proposal would not result in changes to surface drainage patterns. A small impermeable area would be created by the tower slab, however given the small area and extensive surrounding unsealed nature of the area, potential for impacts on drainage have not been identified. The construction of the structure and restoration of the site would be carried out to avoid channelling and pooling of water.	NA

5.3 Biodiversity

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the work require vegetation removal?	Yes	The proposal site consists of cleared areas and vegetation that is contiguous with the bushland area of Glenrock SCA. The proposal would require the removal of vegetation to allow plant access and provide safe allowance for the operation of equipment. A site inspection was carried out by the Hunter Water ecologist on 27 April 2021. The outcomes of the inspection and subsequent impact assessment are provided in Appendix D. The vegetation that would be impacted by the proposal is described below. **HLT demolition and tower construction** The vegetation adjacent to the HLT site that would be impacted by the proposal consists of a low forest dominated by a dense canopy of Prickly-leaved Paperbark (*Melaleuca nodosa*). Broad-leaved Mahogany (*Eucalyptus umbra*) occurs as a sub-dominant species. Understorey species present include Lilly Pilly (*Acmena smithii*), Coffee Bush (*Breynia oblongifolia*), Mutton Wood (*Myrsine variabilis*), Sweet Pittosporum (*Pittosporum undulatum*) and Mock Olive (*Notelaea longifolia*). The sparse groundlayer is characterised by vines and scramblers such as Native Grape (*Cayratia clematidea*), Snake Vine (*Stephania japonica*), Wombat Berry (*Billardia scandens*), Native Raspberry (*Rubus parvifolius*), Kangaroo Vine (*Cissus antarctica*) and the occasional Spiny-headed Mat-rush (*Lomandra longifolia*), Basket Grass (*Oplismenus aemulus*) and Blue Flax-lily (*Dianella caerulea*). In the worst-case scenario of vegetation within five metres of the HLT being removed, up to 100 square metres of the above would be impacted. The area of vegetation impacted would be minimised where possible. **Temporary pedestrian access** The temporary pedestrian access would traverse shrubby forest vegetation with a canopy dominated by Broad-leaved White Mahogany (*Eucalyptus umbra*), understorey dominated by Sweet Pittosporum and Bracken Fern (*Pteridium esculentum*) and sparse groundcover dominated by Kidney Weed (*Dichondra repens*), Basket Grass, Snake	Merewether Communications Tower – Revised Ecological Assessment – 7 June 2021

		Vine and Ground Asparagus (*Asparagus aethiopicus*). Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*) is also present. Some minor trimming of branches may be required, however impacts on vegetation in this area would be negligible. **Temporary timber pole** The proposed site for the temporary timber pole includes a small number of remnant native trees and shrubs. The work would require the removal of one Broad-leaved Mahogany, one Prickly-leaved Paperbark, one Sweet Pittosporum. Lantana would also require removal. The vegetation that would be impacted by the proposal does not form part of a threatened ecological community (TEC) listed on the BC Act or EPBC Act, and no listed threatened species or potential habitat of threatened fauna were observed during the site survey.	
Would the work occur within the Tree Protection Zone of any trees? (Defined as: 12 x diameter of the trunk at 1.4m high)	Yes	Minor components of the proposal would occur in the tree protection zone (TPZ) of trees retained in the vicinity of the proposal including the temporary pedestrian access. Controls on the placement of plant, materials and vehicle parking including clear delineation of the limit of clearing and impact would be implemented to prevent impact on the TPZ of any trees.	NA
Could the work impact directly or indirectly on *Biodiversity Conservation Act 2016 or Fisheries Management Act 1994* listed species or threatened ecological community or areas of outstanding biodiversity value under the BC Act or critical habitat under the FM Act?	No	The site survey carried out by a Hunter Water ecologist (refer Appendix D) did not identify any threatened species and concluded the vegetation within the proposal site does not conform with a TEC. The proposal site does not provide potential habitat for fauna species listed on the BC act and/or EPBC Act. No hollow-bearing trees would be impacted and no nests were observed. Given the limited extent and duration of the proposal and that no threatened species or TECs were identified, no direct or indirect impacts on listed species or communities are expected. Mitigation measures have been included in section 6.1 to ensure appropriate controls are implemented during the demolition and construction work.	Merewether Communications Tower – Revised Ecological Assessment – 7 May 2021
Could the work impact directly or indirectly on an *Environment Protection and Biodiversity Conservation Act 1999* listed species, ecological community or migratory species?	No	The EPBC protected matters search identified a number of threatened species and two threatened ecological communities that may occur in or may relate to the area in which the proposal occurs. The species are noted as being species or species habitat known to occur in the area, likely to occur in the area, or foraging feeding or related behaviour likely to occur in the area.	Protected Matters database – 2 June 2020 updated 12 February 2021 Merewether Communications Tower –

		No listed threatened species were identified during the site inspection and there are no significant ecological constraints in terms of threatened species/communities or habitat. Given the limited extent and duration of the proposal, potential impacts on EPBC listed species or communities are not expected.	Revised Ecological Assessment – 7 May 2021
Could the work impact (directly or indirectly) on areas mapped in the Coastal Management SEPP, littoral rainforests, marine parks, national parks estate, biodiversity stewardship sites or wilderness areas?	No	The proposal would be located adjacent to the Glenrock SCA and within the Coastal Management SEPP mapped "coastal use area". The proposal activities would take place on the Hunter Water owned site ad from the adjoining road reserve. There would be on direct impacts on the SCA area or coastal processes. In the absence of appropriate controls there would be potential for indirect impacts as a result of vegetation removal and ground disturbance. Given the nature of the site, and the confined extent of the proposal, the potential for indirect impacts would be adequately managed by the implementation of identified controls. The clearing limit would be defined by flagging tape or similar for the duration of the proposal to prevent accidental intrusion into adjoining vegetation. Clearing would be carried out in a way to control any weeds and all weedy material would be bagged and removed from site for disposal. Erosion and sediment controls would be implemented to prevent the release of sediment from the site.	ePlanning spatial viewer – 2 June 2020 updated 12 February 2021
Could the work impact (directly or indirectly) on aquatic or riparian vegetation including seagrasses, mangroves or saltmarshes?	No	The proposal would not impact directly or indirectly on aquatic or riparian vegetation.	NA
Would the work require the disturbance or removal of any priority or environmental weeds listed in the *Hunter Regional Strategic Weed Management Plan 2017-2022*?	Yes	The site survey carried out by the Hunter Water ecologist identified the presence of the following three weed species listed as priority weeds in the *Hunter Regional Strategic Weed Management Plan 2017-2022:* • Lantana (*Lantana camara)* • Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*) • Ground Asparagus (*Asparagus aethiopicus)*. Other weed species observed on site include Mickey Mouse Plant (*Ochna serrulate)* and Senna (*Senna pendula subsp. glabrata).* Weed control measures would be required during construction work to prevent the spread of weeds and to contain any weedy material for	*Hunter Regional Strategic Weed Management Plan 2017-2022* – 2 June 2020 updated 12 February 2021 Merewether Communications Tower – Revised Ecological Assessment – 7 May 2021

		disposal. Controls have been included in section 6.1 to ensure the General Biosecurity Duty obligations of the Biosecurity Act are met.	
Would the work impact on fish passage?	No	The proposal would not impact fish passage.	NA
Would the work have potential to displace fauna or create a barrier to fauna movements?	No	The proposal would not result in a barrier to fauna movement and it is not expected to displace fauna given the limited extent. A Brush Turkey nest was observed outside the proposed five metre clearing zone and would be protected from any potential impacts by the implementation of controls provided in section 6.1.	NA

5.4 Noise and vibration

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Are there any sensitive receivers in the vicinity of the proposal? (eg residential, schools, church, important native fauna populations)	Yes	The proposal is located on a residential street with residential receivers located to the north and east of the proposal site. The nearest receiver is about 20 metres to the north of the proposal site. The adjacent Glenrock SCA is frequented by passive recreation users with access to the Hickson Street track leading to the gliding pad and Burwood Beach adjacent to the proposal site. The gliding pad / lookout area is also a popular wedding ceremony location and is about 120 metres south from the proposal site.	NA
Could the proposal result in construction noise impacts for longer than three weeks, or outside of standard working hours? Was a quantitative noise assessment undertaken?	Yes	The duration of the proposal would be up to four weeks for the demolition of the HLT and up to three weeks for the construction of the new tower. The two stages would be separated by about two months when no proposal related construction activities would occur. The work would not be continuous and noise generating activities would not impact receivers for the entire duration of the demolition and construction work, however, given the proximity to residential receivers, a quantitative noise assessment was carried out to predict potential noise impacts. The Transport for NSW Construction and Maintenance Noise Estimator Tool available on the Transport for NSW website was used to predict noise levels. The establishment of Noise Management Levels (NMLs) was in accordance with the *NSW Interim Construction Noise Guidelines (INCG)* (DECC, 2010). The findings of the assessment are described below.	NA

Could the proposal result in noise impacts on receivers during construction?	Yes	The demolition and construction activities for the proposal would result in noise generating activities as a result of vegetation removal, the operation of plant including cranes, piling rig, concrete truck and cutting tools. Noise would be intermittent and would occur during standard working hours. The distance based (noisiest plant) assessment method contained within the Transport for NSW Construction and Maintenance Noise Estimator Tool was used to predict noise impacts on receivers. The estimator tool includes pre-defined representative noise environments that assign a rating background level (RBL) and corresponding NMLs. The R1 category was selected as the most appropriate for the proposal site. The RBL for standard working hours for this category is 40dB(A) and NML 50dB(A). **Stage 1 – HLT demolition** A 5 tonne excavator was selected as the noisiest plant for the demolition of the HLT. The findings of the assessment predicted noise levels during standard working hours would: • exceed the NML for a distance of 95 metres • be moderately intrusive (10 to 20 dB(A) above background) for a distance of 35 metres • No receivers would experience highly intrusive noise (>30 dB(A) or be highly noise affected (>75 dB(A)) by this activity. **Stage 2 – Tower construction** A bored piling rig was selected as the noisiest plant for the construction of the tower. The findings of the assessment predicted noise levels during standard working hours would: • exceed the NML for a distance of 305 metres • be moderately intrusive (10 to 20 dB(A) above background) for a distance of 135 metres • be highly intrusive (>30 dB(A) above background) for a distance of 50 metres • The highly noise affected level defined by the ICNG of 75 dB(A) is predicted to impact receivers within 30 metres of the activity. This would impact up to two residential receivers.	Transport for NSW Construction and Maintenance Noise Estimator tool (www.rms.nsw.gov.au/about/environment/reducing-noise)

		The above predicted levels are based on all receivers having direct line of sight to the activity. With the exception of some residential properties on Hickson Street, receivers would be shielded from the work by the first row of houses as well as the topography of the area and would likely experience noise levels less than predicted. Consideration was given to the potential for noise to impact passive recreation receivers at the gliding pad including events/weddings. The NML for passive recreation in developed settlements is 60 dB(A). This level is predicted to be exceeded within 85 metres of the tower construction and 25 metres of the demolition work when noisiest plant operating. This would impact people walking past the site to access Glenrock SCA but would not result in noticeable noise impacts at the gliding pad. The predicted noise levels indicate that when high noise generating plant is operating, residential receivers would be impacted to varying degrees. The noise impacts would occur during standard working hours and would be for a duration of two to three days. Mitigation measures have been included in section 6.1 to minimise noise and to ensure potentially affected receivers are notified of the work.	
Could the proposal result in noise impacts on receivers during operation?	No	The operation of the new communications tower would not result in noise impacts on receivers. Concern was raised regarding the potential for the tower to result in noise during windy conditions. Similar installations in the Hunter Water network are not known to result in noise impacts, however, should the new tower generate unacceptable noise, Hunter Water would review and take appropriate action to rectify the issue.	NA
Could the proposal result in vibration impacts on nearby properties or infrastructure?	No	The proposal is not expected to result in vibration impacts on nearby properties or infrastructure. The British Standard 7385 Part 2 – 1993 Evaluation and measurement for vibration in buildings (BS 7835) provides guidance on the distances within which vibration can cause cosmetic damage to buildings. The distance within which bored piling may cause cosmetic damage to buildings is two metres. In the event plant selection varies from that described a review of potential vibration and working distances will be carried out to ensure no damage occurs to nearby structures or infrastructure.	British Standard 7385 Part 2 – 1993 Evaluation and measurement for vibration in buildings

5.5 Non-Aboriginal heritage

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Were all relevant heritage database searches carried out?	Yes	A search of relevant heritage databases identified one heritage listed item in proximity to the proposal site. One listed item is the Glenrock early coalmining sites associated with the adjacent Glenrock SCA. This item is an archaeological item listed on the National Parks and Wildlife s.170 register with the state heritage register listing number 00988. The curtilage of the Glenrock early coal-mining sites is directly adjacent to the proposal site, corresponding with the Glenrock SCA.	NSW Heritage inventory Commonwealth EPBC heritage list Hunter Water s.170 register National Parks and Wildlife Service s.170 register Newcastle LEP 2012 2 June 2020, 12 February 2021
Could the works impact on an item of heritage significance or a heritage conservation area?	No	The proposal site is located adjacent to the curtilage of the Glenrock early coalmining sites listed on the National Parks and Wildlife s.170 register. Given the minor nature and extent of the construction activities no indirect impacts on this area would occur. The proposal would result in minor ground disturbance as a result of vegetation removal, demolition of the existing HLT footings, installation of the temporary timber pole and construction of the communications tower foundations. This ground disturbance would not encroach on the curtilage of the listed site.	NA
Could the works impact on areas of archaeological potential?	No	The proposal site is not a listed archaeological site. The adjoining Glenrock early coalmining sites heritage item is listed as an archaeological item associated with historical coal mining activities in the area. The proposal would result in minor ground disturbance as a result of demolition of the existing HLT footings and construction of the communications tower foundations. This ground disturbance would not encroach on the curtilage of the listed site. Measures included in Section 6.1 would be implemented in the event of an unexpected find.	NA

5.6 Aboriginal heritage

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the work require ground disturbance?	Yes	The proposal would result in ground disturbance as a result of vegetation removal, demolition of the existing HLT foundation, and construction of the new tower foundations and associated cable connections.	NA
Has an Aboriginal Heritage Information Management System (AHIMS) search been completed and were any known Aboriginal items or places identified within or in the vicinity of the proposal site?	Yes	A search of the AHIMS data under licence to Hunter Water was undertaken on 7 February 2021. Fives sites were identified within one kilometres of the proposal site, and one site within 200 metres. The site within 200 metres being Hickson ST AS1 (AHIMS # 38-4-1717), a small artefact scatter identified by Peter Townsend (Awabakal Local Aboriginal Land Council), about 150 metres south of the proposal site. The scatter comprised seven artefacts, eroding out of an existing track. No Aboriginal objects or sites have been recorded at the location of the proposed works.	Hunter Water licenced AHIMS data – 7 February 2021 and 24 May 2021
Would the work occur in or near sensitive landscape features as defined in the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (2010)?	Yes	Areas within 200 metres of waters are identified as landscape features of interest in the Due Diligence Code of Practice. The proposed work would be located within 200 metres of a tributary of Murdering Gully (to the east) and an unnamed tributary creek line to the south. As discussed above, the proposed work would also located within 200 metres of an existing Aboriginal site.	Hunter Water Archaeologist correspondence – 10 March 2021 and 24 May 2021
Could harm to AHIMS listed sites or places or landscape features be avoided?	Yes	While the proposed work would be located within a landform or archaeological interest (within 200 metres of a watercourse), parts of the area have been subject to clearing and observable disturbance through the installation and ongoing maintenance of the existing facility. During a site inspection undertaken for the proposal it was observed that all remnant A horizon topsoil has either been removed through modern disturbance or has been subject to natural erosional processes. A subsequent site inspection on 11 May 2021 to review the amended proposal site was carried out. While sites within the local area have been identified upon eroded soils (including along the same track where the communications tower is located), no Aboriginal objects were observed in the area and no areas with potential to retain subsurface Aboriginal objects were observed. While remnant vegetation remains within the area, no mature or culturally modified trees were observed.	Hunter Water Archaeologist correspondence – 10 March 2021 and 24 May 2021

		No area of A horizon soil was observed that would retain Aboriginal objects. The Code of Practice states that 'land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable'. It is clear from the results of the site inspection that parts of the area have been subject to clear and observable disturbance. Where this disturbance was not clear (in areas where vegetation is present), no remnant A horizon soil profile was observed. As discussed above, no Aboriginal objects or soils with the potential to retain subsurface archaeological deposits were observed Based on this and the results of nearby investigations, there is low-nil potential for the proposal to impact Aboriginal objects or sites. As a result the proposal may proceed with caution.	

5.7 Traffic and access

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the works occur on a public road and could the proposal disrupt traffic flow or access during construction?	Yes	The proposal site is located directly adjacent to Hickson Street, a public road. While the demolition and construction work would be located wholly within the Hunter Water owned site, there is inadequate room for large plant such as a crane and piling rig to be placed within the site boundary. Parking for large plant and work related vehicles would therefore be required on the cleared road reserve of Hickson Street directly adjacent to the site. This would result in short-term impacts on the availability of public parking and pedestrian access. Formal parking spaces are not allocated in the area, however, it is estimated that about eight nose to kerb parking spots would be impacted at times during the demolition of the HLT and construction of the tower. Appropriate controls would be installed to provide safe access around the work site and clearly communicate the work site. There would be minimal impacts on traffic flow or access to private property during construction.	NA

Could the proposal disrupt pedestrian or cycle access during construction?	Yes	The proposal site is located adjacent to the start of a public path that leads though Glenrock SCA to Burwood Beach via the Hickson Street (Merewether) Gliding Pad. The area is a popular recreation area. In addition to impacts on public parking, pedestrian access to the path through the Hunter Water site leading to the Gliding Pad and Burwood Beach would at times be disrupted. The public path passes directly adjacent to the HLT and when some activities such as crane operations take place public access to the path would be restricted. Alternative access would be provided at all times and would include diverting people around the western boundary of the site or using a spotter to direct people along the path. Any disruptions or diversions would be clearly signposted to ensure pedestrian and cyclist movements around the construction zone are communicated and safe alternative access provided.	NA
Could the proposal result in permanent changes to traffic flow or access during operation?	No	The proposal would not result in permanent changes to traffic flow or access.	NA
Could the proposal result in impacts on available parking during construction or operation?	Yes	The area on Hickson Street adjacent to the proposal site is used as informal parking for people accessing the adjacent Glenrock SCA for recreation. The proposal would temporarily impact up to eight public parking spaces during construction. Based on nose-to-kerb parking and a standard allowance of 2.6 metres per space, this represents a loss of less than ten percent of available parking spaces in the road verge on the eastern side of Hickson Street.	NA

5.8 Visual environment

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Could the proposal be visible by residential or other sensitive receivers?	Yes	The proposal would be visible to residential properties and the general public who utilise the area for access to the Glenrock SCA and Burwood Beach. Given the height of the proposed tower it would also be visible from broader areas including parts of Burwood Beach, Glenrock SCA, south to Dudley and north to Bar Beach. Images of viewpoints to the site are provided in Plate *5-1* to Plate *5-4*.	NA

		The existing visual environment of the proposal site and immediate area consists of the Hunter Water HLT, a Telstra communications tower, three small buildings and associated infrastructure including small cabinets, bollards, and fencing. The surrounding visual character is dominated by the bushland of Glenrock SCA to the east, south and west, and residential dwellings to the north. Views to the site as a whole are generally from areas in the immediate vicinity. For residents with direct views of the site, the structures are a dominant visual feature. There are more distant viewpoints to the taller structures of the site from areas such as parts of Burwood Beach and Glenrock SCA, Dudley and Bar Beach. For the public using the track through the site to access Glenrock SCA, the site is only visible while in the immediate vicinity due to vegetation screening. The impact of the proposal on the visual environmental and landscape character is discussed further below.	
Would the proposal result in permanent changes to the visual environment through installation of any above ground infrastructure or removal of vegetation?	Yes	The changes to the structures on the site as a result of the proposal would be clearly visible. The proposal would result in a permanent visual change due to the removal of a small area of vegetation and the type and size of structures located at the site. The changes would be in two stages. The first stage would comprise the removal of vegetation, permanent removal of the bulky and visually prominent HLT structure and installation of a temporary timber pole to allow continuous operation of communication equipment during construction. The second stage would comprise the installation of the permanent tower structure at the site. The height of the new tower relative to the existing structures at the site is shown in Appendix A. While the new tower would be higher, it would have less bulk than the HLT that would be removed.	NA
Would the work be located in an area of high scenic value?	Yes	The proposal is located in an area of high scenic value being on the boundary of Glenrock SCA and leading to an area that provides coastal and bushland views. The area is highly utilised by the public for recreation and the bushland character is highly valued by residents and the general public.	NA

		The proposal would have a short-term negative visual impact for receivers during the demolition and construction of the communications tower. This would be a result of the presence of construction related plant and equipment. This would result in a short-term visual impact for residents in the immediate vicinity and for the general public visiting the area. It would also result in a potential visual change from broader viewpoints including Dudley and Bar Beach. Following the demolition of the HLT and construction of the new tower, the proposal would have an overall positive visual impact. While the new tower would be approximately nine metres taller than the existing HLT (including the headframe and antenna arrangement), the overall magnitude of the proposal is considered to be less as the new tower would be slimmer and less obtrusive than the visually bulky HLT. The new tower would be higher, however it would not obstruct views to, or from, the site. Viewpoints through the site would be improved by the removal of the HLT structure. A visual representation of the proposed change to the site is provided in Figure *5-1*. An elevation view of the proposed tower relative to existing structures on the site is provided in Appendix A. The proposal would be consistent with the existing use and would be expected to result in a negligible to minor impact on the landscape character given the nature of existing structures at the site.	
Would the work require additional lighting during construction or operation?	No	The proposal would not require additional lighting during construction or operation.	NA

Plate 5-1 view of site looking north from start of walking track in Glenrock SCA

Plate 5-2 view of site from Burwood Beach

Plate 5-3 view of site from Hickson Street looking west

Plate 5-4 view of site from opposite side of Hickson Street looking south

Before: Hickson Street looking south

After: Hickson Street looking south

Figure 5-1: Visual representation of proposal (source: Merewether Communication Tower structural design (GHD, 2021)

5.9 Socioeconomic, landuse and services

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Could the work impact private property including access?	No	The proposal would not result in impacts to private property including access. The proposal would occur on Hunter Water land with some plant parking occurring on the adjacent road reserve area during construction (refer section 5.7). The proposal site would be accessed via the public road. Construction traffic volumes would be small and infrequent and are not expected to result in queuing or delays on this road. Access to private property would be maintained at all times. There would be a short-term impact on public access through the site to the Glenrock SCA during construction. This is discussed in section 5.7.	NA

		There would be no change to access during operation and no long-term impacts on private property including access.	
Could the work impact busy commercial areas or local businesses?	No	There are no commercial areas or local businesses in the vicinity of the proposal and no impacts are expected. The proposal would take place adjacent to the Glenrock SCA and result in temporary disruptions to public access through the site to the Hickson Street walking track, gliding pad and lookout. Alternative access would be provided at all times to allow users to access these areas. Public notifications would be made to communicate any changes and disruptions to the public and would also target activities such as wedding ceremonies and gliding events.	NA
Could the work result in a loss of an existing landuse either during construction or operation?	Yes	There would be a temporary loss of up to eight public parking spaces during the demolition and construction work. This would be for a short duration and would be communicated to the public. The existing landuse of the proposal site is for the provision of Hunter Water operations and telecommunications. The site is owned by Hunter Water and no land acquisition is required. The proposal would support ongoing Hunter Water operations by providing reliable communications. The existing Telstra Tower and related infrastructure would not be impacted by the work and would remain.	NA
Would the proposal result in the installation of a structure or facility that could be considered objectionable or a nuisance?	Yes	The construction of the new telecommunications tower may be viewed by some as objectionable from a visual perspective. The visual impact of the tower is discussed in section 5.8 and while there would be a short-term negative impact as a result of an additional structure prior to the demolition of the HLT. The removal of the HLT would have an overall positive impact on the visual environment.	NA
Would the work require disruption to water or sewerage services?	No	The proposal to remove the HLT is not expected to result in a change in water pressure. The water delivery system is being altered to maintain pressure by pumped flow and a control valve, making the HLT redundant. Hunter Water would monitor the system following the proposal and optimise pressure where required.	NA

5.10 Energy and air quality

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Could the work result in air quality impacts on sensitive receivers during construction or operation? (eg dust, odours)	Yes	Given the minor nature of the proposal and minimal ground disturbance, construction of the proposal is not expected to result in substantial air quality impacts during construction. There may be some dust generation in the immediate vicinity from clearing, minor earthworks and movement of plant and vehicles on unsealed areas. Measures to mitigate impacts from dust have been proposed. The operation of the proposal would not result in air quality impacts.	NA
Would the work involve the use of fuel-driven machinery or equipment (other than from vehicles transporting personnel to site)?	Yes	The work would involve the use of a small number of fuel driven plant and equipment on site during construction. This would result in minor emissions.	NA
Would the operation of the proposal result in high energy use and was energy use considered in the design development?	No	The operation of the proposal would not result in a change in energy use.	NA

5.11 Waste and resource use

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the work result in generation of 'non-hazardous' waste? If so, how would this be managed?	Yes	The proposal would result in generation of the following waste: • Green waste – native vegetation would be mulched and reused on site and any other green waste, including weedy material generated as a result of vegetation clearing would be removed from site for appropriate disposal. • Spoil – where relevant, excess spoil unable to be reused on site would be separated and disposed of at an appropriate facility or reused on Hunter Water projects if appropriate.	NA
Would the work result in the generation of 'wastewater' (e.g. process wastewater, chlorinated water, sediment-laden water, drilling fluid, groundwater generated by drilling)?	Yes	The proposal may generate wastewater in the form of fluid used in the piling process. Water would be managed according to a water management procedure included in the CEMP.	NA

Would the work result in asbestos, contaminated soils or other hazardous waste?	No	The proposal would not result in asbestos, contaminated soils or other hazardous waste. Confirmation of the presence or not of lead paint on the HLT structure would be done prior to commencement of any work and appropriate management measures implemented during removal to contain any lead containing material.	NA
Have opportunities for waste reduction and/or reuse been considered?	No	Given the minimal resources required and potential for waste generation, waste reduction opportunities were not considered.	NA

5.12 Hazards and risks

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Would the proposal be located in a bushfire risk area or have potential to result in a bushfire risk?	Yes	The proposal is located in an area mapped as vegetation category 1 which is considered to have the highest risk for bushfire. The proposal would have minimal potential to result in bushfire, however in the event hot works are required, restrictions would be put in place to minimise any fire risk and declared fire bans adhered to.	ePlanning spatial view – 5 June 2020 updated 12 February 2021
Would the work include handling hazardous chemicals or dangerous goods?	No	The proposal would not require the handling of hazardous chemicals or dangerous goods.	NA
Would the proposal be located in a coastal area that could be subject to coastal hazards?	No	The proposal would not be subject to coastal hazards.	NA
Would the work result in any other hazards or risks to the environment?	No	No additional hazards or risks to the environment have been identified.	NA

5.13 Cumulative impacts

Risk identification	Yes/No	Description of potential impact	Source and date (if relevant)
Could impacts from other projects interact with the proposal?	No	Cumulative impacts as a result of other projects are not anticipated.	Newcastle DA tracker – 5 June 2020 updated 12 February 2021

6 ENVIRONMENTAL SAFEGUARDS AND OTHER REQUIREMENTS

6.1 Mitigation measures

This section provides a list of environmental mitigation measures to be implemented to reduce the potential for environmental impacts during the construction and operation of the proposal. The measures must be incorporated as conditions of contract in any contract or work specification for the proposal and a Construction Environmental Management Plan (CEMP) for the works.

Aspect	Ref no.	Mitigation measure
General	G1	A construction environmental management plan will be prepared prior to commencement of work to document the implementation of controls to avoid or minimise impacts, including but not limited to those contained in this REF. The CEMP will include clearly marked maps showing the construction disturbance zone, material laydown areas, access and no-go zones.
	G2	All project personnel will be inducted on the environmental sensitivities of the work site including: • Site access restrictions, parking, placement of any equipment or material • Vegetation clearing limits and the importance of avoiding disturbance to adjoining vegetation and in particular Glenrock SCA land • Noise control and minimisation measures to reduce impacts on receivers during inductions and toolbox talks. • Soil and water management.
	G3	Notification is to be provided to National Parks and Wildlife Service at least 14 days prior to commencement of work to allow information to be included on the Glenrock SCA information webpage if deemed necessary.
	G4	Potentially impacted receivers including residences and the Newcastle Hang Gliding and Paragliding clubs will be notified prior to the commencement of the work and provided with relevant project information and contact information for project personnel.
Soils	E1	An erosion and sediment control plan will be developed as part of the CEMP.
	E2	Erosion and sediment controls are to be implemented and maintained consistent with Managing Urban Stormwater: Soils and Construction. Fourth Edition ed. Sydney (NSW) (Landcom, 2004) (the Blue Book). Controls will: • prevent sediment moving off-site and sediment laden water entering any watercourse, drainage line, or drain inlets • divert clean surface flow around exposed areas and stockpiles • reduce water velocity and capture sediment • minimise the amount of material tracked onto paved surfaces • be cleaned out before 70% capacity of controls is reached. Controls would be regularly monitored and maintained until such time as the affected area is stabilised.
	E3	Parking of vehicles and storage of plant/equipment is to occur in clearly designated existing cleared areas. Vehicles and machinery must not be parked outside the designated areas.

	E4	Earthworks will not occur during wet weather events where the mobilisation and offsite transportation of sediment might occur.
	E5	Stockpiles will have appropriate erosion control devices installed to control runoff and prevent sedimentation where possible. Double handling will be avoided to minimise the need to stockpile material on site.
	E6	The existing groundcover in the footprint of the work will be maintained as far as possible to assist in erosion and sediment control.
	E7	A dedicated fully contained concrete washout area will be established and clearly signposted.
	E8	Disturbed areas will be stabilised as soon as practical after completion of works. Erosion and sediment controls will not be removed until suitable ground cover is achieved in accordance with the Blue Book.
Biodiversity	B1	The disturbance footprint including access and material laydown and parking areas will be clearly demarcated with flagging tape or similar to ensure vegetation is not disturbed outside of the area required to construct the tower.
	B2	There will be strictly no access directly for the worksite to adjoining vegetated areas of National Parks estate (Glenrock SCA) by project related plant and vehicles.
	B3	If clearing of vegetation on the eastern side of the HLT is required to facilitate access by heavy machinery, a barrier is to be installed between the Brush Turkey mound and the work site to prevent disturbance of the nest and as much of the tree canopy as possible is to be kept intact so that the mound remains shaded.
	B4	All vehicles, equipment, clothing and footwear will be checked on entry to the site, and all mud / soil clods and weed propagules, such as seed-heads, removed and placed in a sealed bag for disposal at a licensed waste management facility (arrive clean, leave clean).
	B5	Native vegetation cleared will be mulched and spread along the interface between the cleared areas and adjoining bush as a weed suppressant.
	B6	Non-native vegetation (including Ground Asparagus, Lantana, Bitou Bush) which requires clearing from the site will be disposed of at a waste management facility licensed to accept green waste.
	B7	Prior to commencing work, gloves and a handling bag (e.g. pillow case) will be available in the event that an injured animal or dependent young needs to be retrieved during the tree removal activities.
	B8	The contact details for the local wildlife rescue organisation will be kept in a location easily accessible by all site staff. The licenced wildlife rescue group in the area is Hunter Wildlife Rescue (Ph: 0418 628 483).
	B9	The canopy of all trees will be checked immediately prior to tree felling to ensure no roosting birds (e.g. owls, nightjars, tawny frogmouths) or nests are present. If roosting birds are identified in a tree to be felled, gently nudge the tree to encourage the animal(s) to move on.
	B10	Should injured animals or dependent young be found on-site during tree felling, Hunter Wildlife Rescue (Ph: 0418 628 483) will be contacted to arrange for the animal to be taken into care. If safe to do so, use gloves to pick up the animal and place in a cloth bag, pillow case or box and keep in a quiet, dark, warm (but not hot) location until the animal can be transferred to a wildlife carer

	B11	If a nest with nestlings is found within any of the trees to be removed, the nest and nestlings will be carefully removed, placed in a box and Hunter Wildlife Rescue (Ph: 0418 628 483) contacted to organise for the nestlings to be taken into care.
	B12	If a snake requires relocation, a licenced reptile handler will be contacted. Do not try to handle the snake. Note that it is offence under NSW legislation to harm or kill a snake.
	B13	If any threatened species are discovered before or during the work that may be at direct risk from the proposal, work will stop immediately and contact the Project Manager and Hunter Water Environmental Planner.
	B14	Following construction disturbed areas will be stabilised with clean mulch and replanting using tubestock of Prickly-leaved Paperbark (*Melaleuca nodosa*), Sweet Pittosporum (*Pittosporum undulatum*), Spiny-headed Mat-rush (*Lomandra longifolia*) and Blue Flax-lily (*Dianella caerulea*) to reinstate the current vegetation cover.
Noise and vibration	N1	Potentially affected receivers will be notified of the work at least five working days prior to commencement and provided with expected dates and duration of noisy activities. Contact details will be provided for use in the event of a complaint.
	N2	Equipment will be turned off when not in use.
	N3	Construction vehicles including trucks will not be allowed to queue on local roads or if it is required for safety reasons, engines will be switched off.
	N4	Where possible, all plant are to utilise a broad band reverse alarm and the need to use reversing manoeuvres will be minimised.
	N5	A complaint management procedure will be developed. Community complaints will be allocated to a responsible contractor representative immediately to facilitate the implementation of corrective actions. The details of the complaint will also be circulated to the applicable construction personnel, including the Hunter Water Contracts Manager for action, where required.
Traffic and access	T1	An access and traffic control plan will be developed and include controls to manage pedestrian access, parking and traffic flow during construction.
	T2	Expected disruptions to parking availability and access to the Hickson Street walking track will be clearly signposted and communicated in advance of the work.
	T3	Private property accesses will be maintained during the works.
	T4	The construction site will be planned to minimise impacts on parking.
	T5	Access to the Hickson Street walking track will be maintained where possible or appropriate alternative access provided.
Water	W1	A water management procedure will be included in the CEMP and include measures for management of wastewater generated during construction. No water is to be released directly to a waterway and only clean water is to be released through appropriate sediment filters to allow local infiltration adjacent to the work site.

	W2	All chemicals and fuels required during construction will be stored in suitable bunded areas away from drainage lines. The capacity of the bunded area will be at least 110 per cent of the largest chemical container stored within the bunded area.
	W3	If refuelling of plant and equipment is required on site it will take place on flat ground within a bunded area large enough to contain 110 percent of the fuel containers contents. Off-site refuelling will occur as a priority where possible.
	W4	A dedicated concrete wash out bay will be established. The bay would be clearly signposted, impervious and bunded and located away from drainage flow paths.
	W5	If an incident or spill occurs the Hunter Water Contracts Manager and Environmental Planner is to be notified immediately and the Incident Management Procedures implemented.
	W6	The foundation slab of the new tower will be designed and constructed in a way to avoid channeling of stormwater resulting in scouring of adjacent soils.
Aboriginal Heritage	AH1	The principal contractor will ensure that any parties involved in the proposed works are aware that it is an offence under Section 86 of the NPW Act to harm or desecrate an Aboriginal object unless that harm or desecration is the subject of an Aboriginal Heritage Impact Permit (AHIP).
	AH2	In the event that an Aboriginal object (or objects) is uncovered during the proposed works, ground disturbance works should cease within 20 metres of the object(s) and the Hunter Water Archaeologist contacted. The Hunter Water Archaeologist will advise OEH and the relevant Aboriginal parties so that appropriate management strategies can be identified.
	AH3	In the unlikely event that human skeletal material is uncovered during the proposed construction works, all works should cease within 20 metres of the skeletal remains. Should the remains be verified as human, the NSW Police and DPIE will be contacted. No works will proceed within the vicinity of the skeletal remains until an appropriate course of action has been determined in consultation with NSW Police, DPIE and Aboriginal parties (if the remains are identified as Aboriginal).
Non-Aboriginal Heritage	H1	If Non-Aboriginal heritage items are discovered during the course of the project, all work will cease in the area and the Contractor will inform the Hunter Water Contracts Manager as soon as possible. Hunter Water will determine the preferred management approach and the local council and/or Heritage NSW (Department of Premier and Cabinet) will be notified via the Hunter Water Contracts Manager if required.
Air quality and energy	A1	Measures (including watering or covering of exposed areas) are to be used to minimise dust.
	A2	Potentially dust generating work will not be carried out during strong winds.
Visual	V1	Work areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
	V2	Reflective materials will be avoided where possible on all structures to minimise visual impact.
Socio-economic,	SO1	All underground services will be located and marked prior to any ground penetrating work.

landuse and services		
Waste and resource use	RU1	Resource management hierarchy principles are to be followed (in accordance with the *Waste Avoidance & Resource Recovery Act 2001*): • avoid unnecessary resource consumption as a priority • avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery) • disposal is undertaken as a last resort.
	RU2	The HLT will be tested of the presence of lead paint prior to the commencement of work. If lead paint is detected, the demolition work, including the removal, containment, transportation and disposal will be managed in accordance with AS/NZS 4361.1:2017 and the waste tracking requirements under Part 4 of the Protection of the Environment Operations (Waste) Regulation 2014
	RU3	All waste generated during the course of the works will be reused or removed from the work areas as soon as practicable and disposed of in accordance with waste regulations.
	RU4	Evidence of the lawful disposal or reuse of waste will be retained and provided to the HWC Contracts Manager on request.
	RU5	The work site(s) will be left clean and free of weeds, debris and other rubbish at the end of works.
Hazards and risks	H1	The telecommunications facility will be designed, installed and operated so that the maximum human exposure levels to radiofrequency emissions comply with Radiation Protection Standard 2002.
	H2	Emergency contacts will be kept in an easily accessible location. All workers will be advised of these contact details and procedures.
	H3	During designated “total fire ban” activities with the potential to cause fire will be reviewed and / or cease.

6.2 Licensing and other requirements

The proposal would not require any licences or permits in addition to the approval under Division 5.1 of the EP&A Act.

7 CERTIFICATION

This REF provides a true and fair review of the proposal and its potential impacts on the environment in accordance with the environmental impact assessment requirements of the EP&A Act.

Prepared by:

Meredith Thomas

Environmental consultant

Date: 23 July 2021

Reviewed by:

Stuart Hill

Environmental consultant

Date: 23 July 2021

APPENDIX A

Design drawings

HUNTER WATER CORPORATION

MEREWETHER – COMMUNICATION TOWER STRUCTURAL DESIGN

LOCALITY PLAN
NOT TO SCALE

DRAWING LIST:

16017-001	COVER SHEET, LOCALITY PLAN AND DRAWING LIST
16017-002	BEFORE AND AFTER PERSPECTIVES
16017-007	GENERAL ARRANGEMENT PLAN
16017-008	GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN
16017-009	CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS
16017-010	TYPICAL DETAILS
16017-011	ROCLA POLE ELEVATION VIEW
16017-012	HEADFRAME ARRANGEMENT
16017-013	HEADFRAME DETAILS
16017-014	HEADFRAME MATERIAL LIST

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

CONSULTANT DETAILS:
GHD
Level 3 GHD Tower 24 Honeysuckle Drive
Newcastle NSW 2300
T 61 2 4979 9999 F 61 2 9475 0725
E ntlmail@ghd.com.au www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
COVER SHEET, LOCALITY PLAN AND DRAWING LIST

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	–	16017	001	01

VERSION 4

Plot Date: 08/06/21 - 10:19 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-001_01.dwg

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

CONSULTANT DETAILS:
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T 61 2 4979 9999 F 61 2 9475 0725
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CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 30/06/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
BEFORE AND AFTER PERSPECTIVES

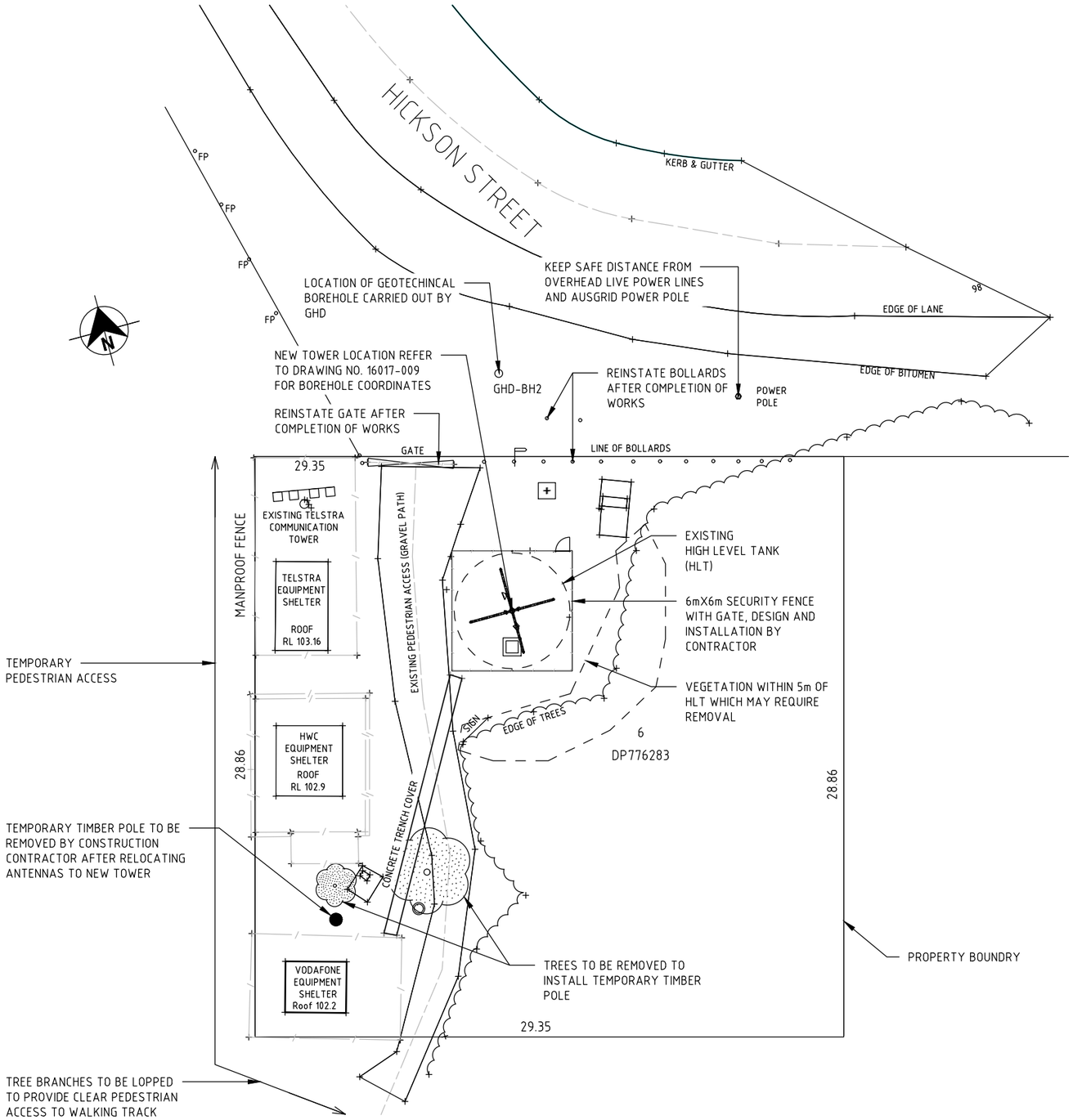
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	-	16017	002	02

VERSION 4

Plot Date: 08/06/21 - 10:20 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-002_02.dwg

NOTE:

1. ALL DRAWINGS SHALL BE READ IN CONJUCTION WITH TECHNICAL SPECIFICATIONS.
2. FOR EXISTING AND NEW UNDERGROUND SERVICES REFER TO DRAWING NO. 16017-008.



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2.5 0
HORIZONTAL SCALE 1:250

NEW SITE PLAN
SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

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12525175

HUNTER WATER

DESIGNED:	HR	DATE: 30/06/20	COMPANY: GHD PTY LTD
DRAWN:	AK	DATE: 07/12/20	COMPANY: GHD PTY LTD
CHECKED:	KR	DATE: 07/12/20	COMPANY: GHD PTY LTD
APPROVED:	NM	DATE: 07/12/20	COMPANY: GHD PTY LTD

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT PLAN

SIZE:	SCALE:	INDEX No.	DRAWING No.	SHEET	REV No.
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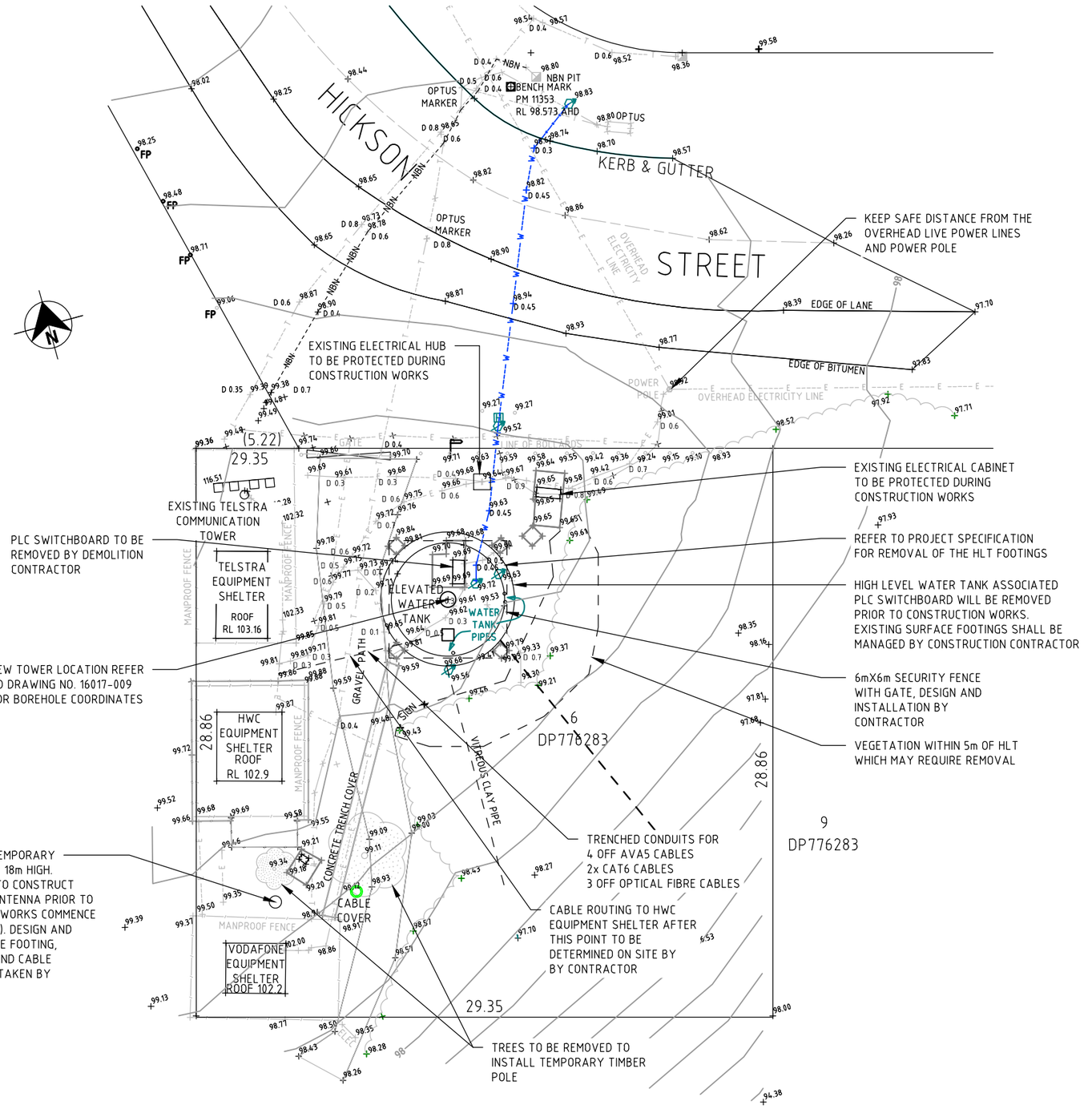

LEGEND:

- TREE
- COMMS PIT
- HYDRANT
- STOP VALVE
- ELECTRICAL BOX
- SIGN
- ELECTRICITY LINE & DEPTH
- WATER LINE & DEPTH
- TELEPHONE LINE & DEPTH
- NBN LINE & DEPTH

NOTE:

1. THE CONTRACTOR SHALL MARK EXACT LOCATION OF ALL EXISTING AND NEW UNDERGROUND SERVICES AT WORK AREA AND PROTECT AGAINST DAMAGE.

0 2.5 5.0 7.5 10
2.5 0
HORIZONTAL SCALE 1:250

SITE PLAN WITH UNDERGROUND SERVICES

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
4	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

CONSULTANT DETAILS:
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CONSULT. REFERENCE No. 12525175

HUNTER WATER

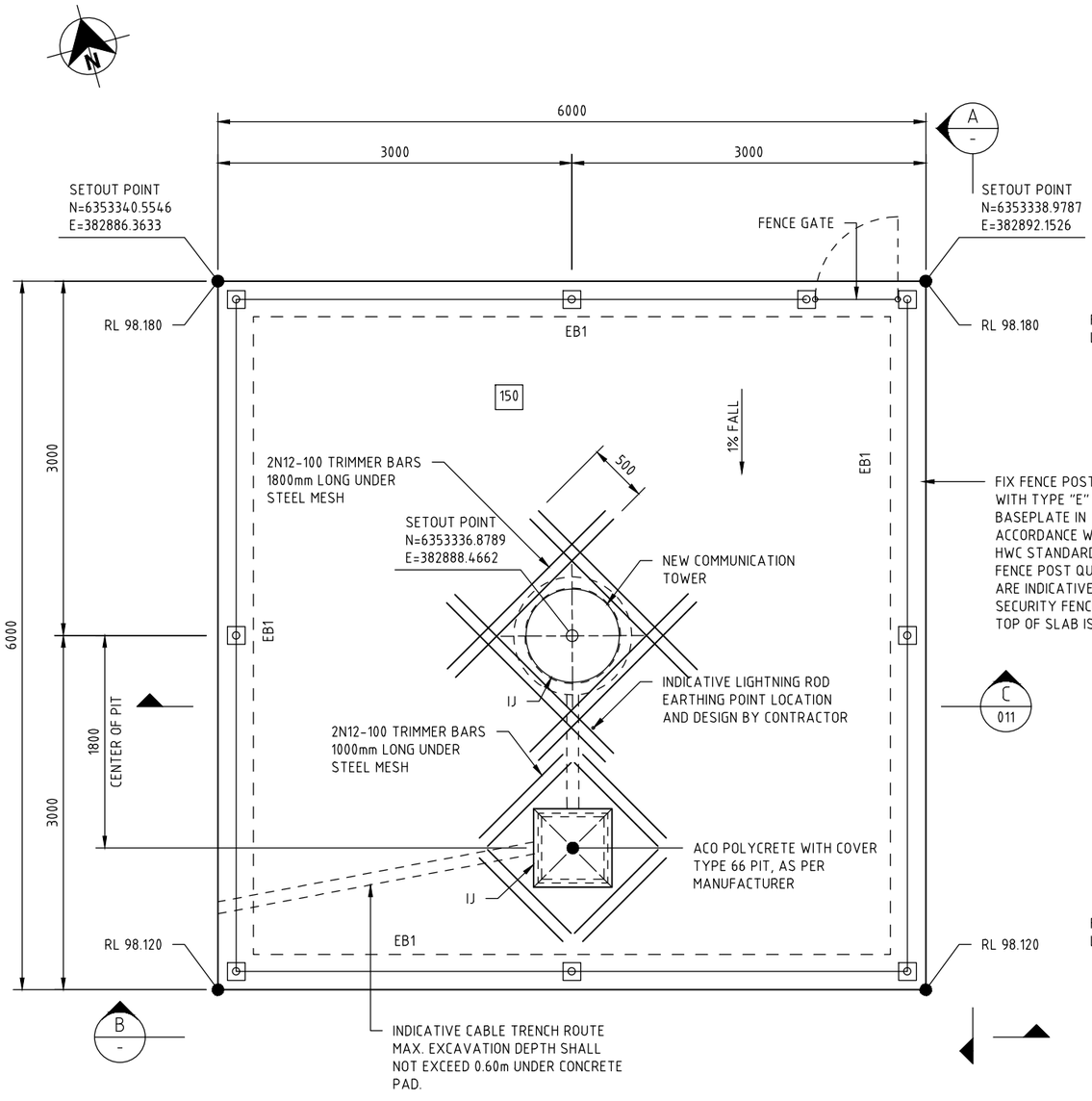
DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

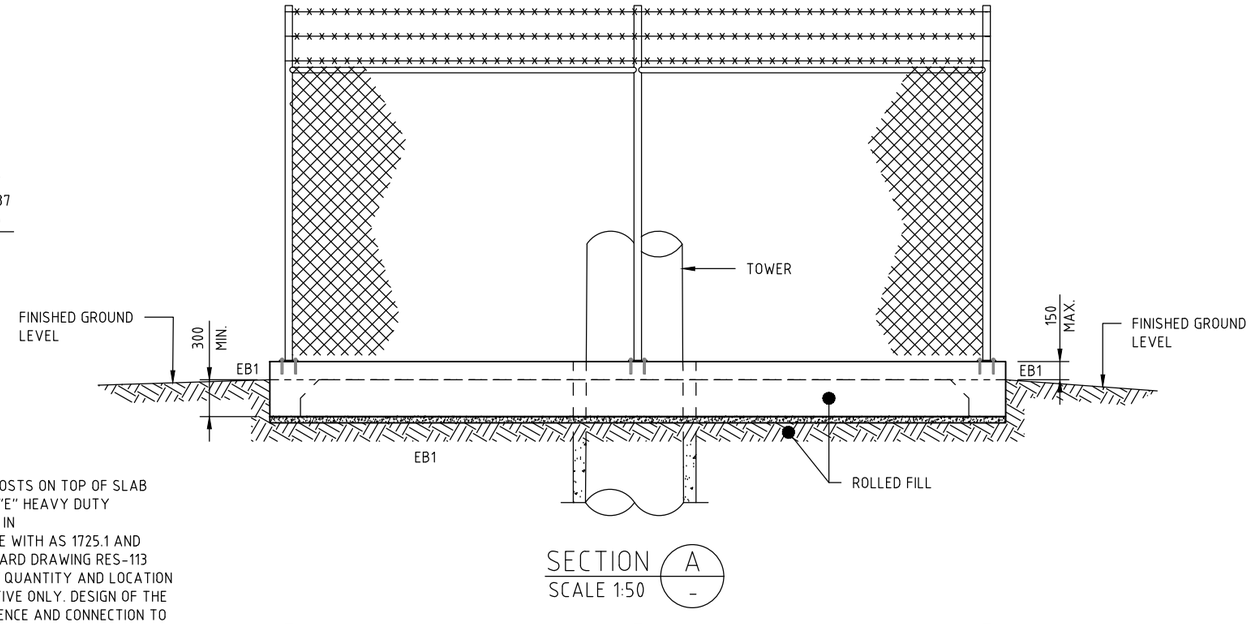
STRUCTURAL DESIGN
GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	008	04

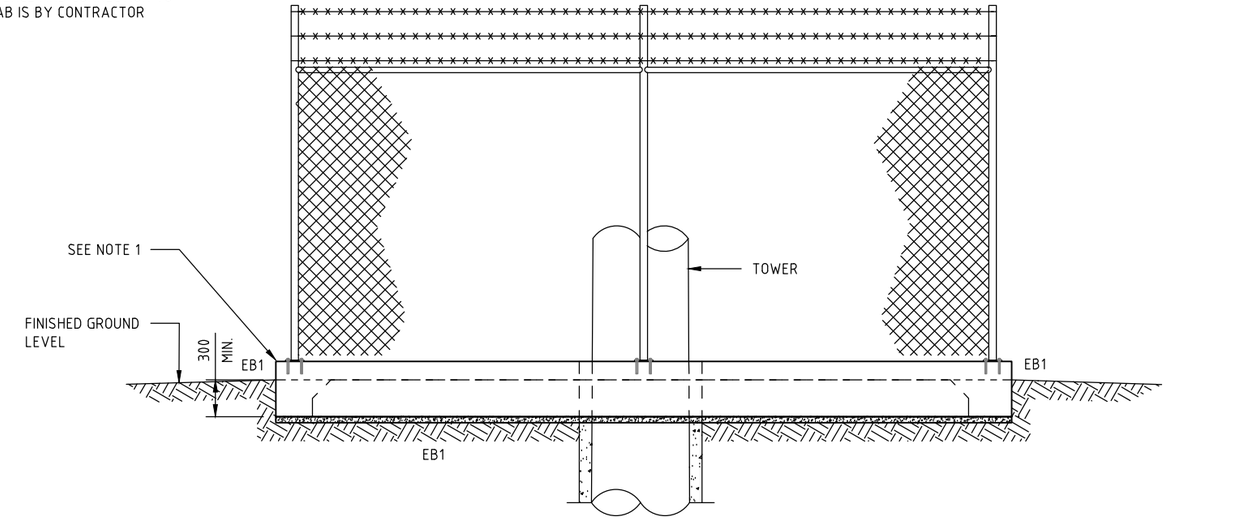
Plot Date: 11/06/21 - 10:40 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-008_04.dwg



PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

HORIZONTAL SCALE 1:50

CONCRETE GROUND BEAMS SCHEDULE

MARK	SIZE	REINFORCEMENT
EB1	EDGE BEAM 300 W x 450 D	3L11 - TM BOTT. WITH R10 - 600 LIGS

SLAB REINFORCEMENT

THICKNESS	REINFORCEMENT
150	SL82 TOP

NOTE:

1. CHEMICAL ANCHORS FOR THE FENCE POSTS SHALL BE HILTI RE 500 V3 + HIT-V HOT DIP GALVANIZED FULL THREADED 4-M12 STUDS GRADE 5.8 OR APPROVED EQUIVALENT WITH EFFECTIVE EMBEDMENT OF 150 mm AND MINIMUM 80 mm EDGE DISTANCE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

LEGEND:

IJ - DENOTES ISOLATION JOINT

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

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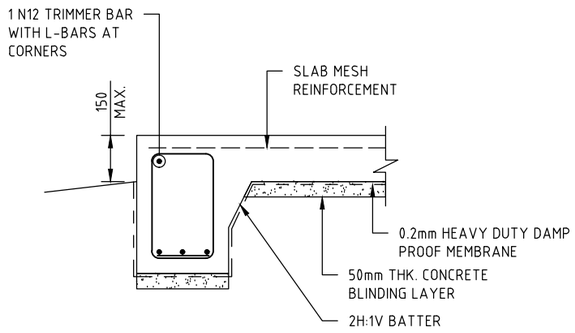
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN
STRUCTURAL DESIGN
CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS

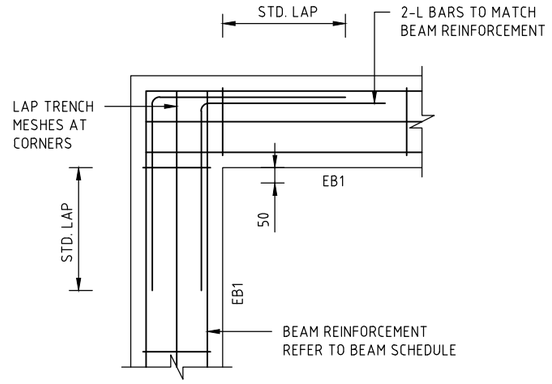
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	009	03

VERSION 4

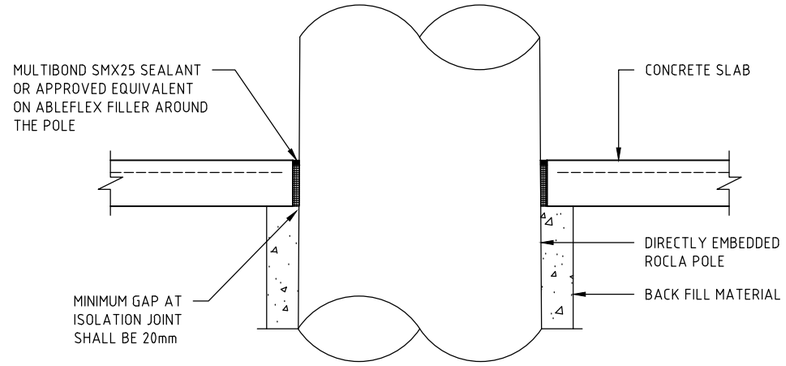
Plot Date: 11/06/21 - 10:41 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-009_03.dwg



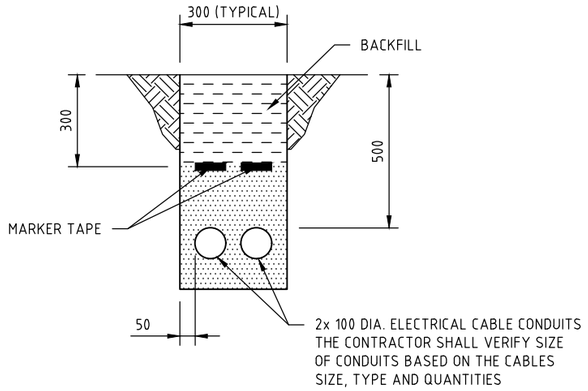
TYPICAL EDGE BEAM (EB1) DETAIL
SCALE 1:20



TYPICAL CORNER FOOTING REINFORCEMENT DETAIL
SCALE 1:20



ISOLATION JOINT (IJ) DETAIL
SCALE 1:20



TYPICAL TRENCHED CONDUITS DETAIL
SCALE 1:20

0 0.2 0.4 0.6 0.8
0.2 0
HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

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CONSULT. REFERENCE No. 12525175

HUNTER WATER

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CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
TYPICAL DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:20	-	16017	010	01

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-010_01.dwg

NOTES:

1- THE POLE SHALL BE INSTALLED TO AN ORIENTATION TO ALLOW INSTALLATION OF THE HEADFRAME IN THE INDICATED ORIENTATION WITH CABLE OPENING AT THE BOTTOM NEAREST TO THE PIT. THE ORIENTATION OF TOP FERRULES SHALL ALLOW FOR CORRECT BEARING OF THE DISH ANTENNAS.

2- CABLE TRAY ROUTING AND ARRANGEMENT IS BY CONTRACTOR.

3- ALL CABLES SHALL BE ROUTED AND FIXED INSIDE THE POLE. ATTACHMENT OF CABLE TRAY OVER THE POLE IS NOT ALLOWED.

4- ACCESS TO THE HEADFRAME AND THE POLE IS ONLY POSSIBLE BY ELEVATED WORKING PLATFORM. ADDITION OF CLIMBING MEANS SUCH AS STEP BOLTS OR LADDERS ARE NOT ALLOWED.

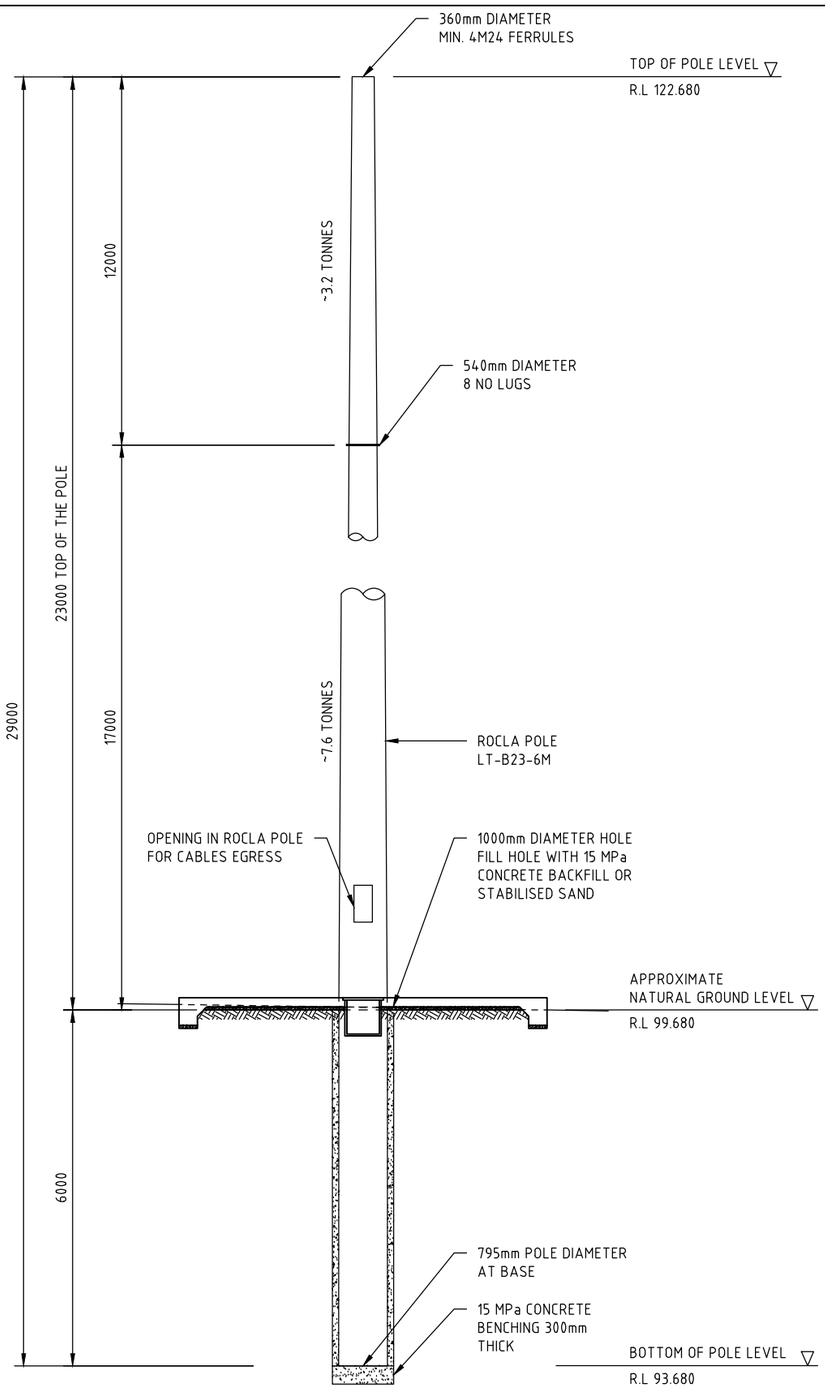
5- THE BACKFILL AROUND THE POLE SHALL BE FLOWABLE STABILISED SAND OR BLINDING CONCRETE OF STRENGTH GREATER THAN THE CLAYEY SAND THAT IS REPLACED.

6- THE BACKFILL SHALL NOT ARCH BETWEEN THE POLE AND SIDE OF THE HOLE TO PREVENT CREATION OF VOIDS.

7- REFER TO GEOTECHNICAL REPORT NUMBER 12525175 FOR GEOTECHNICAL PROPERTIES OF THE SOIL. CONTRACTOR SHALL ALLOW FOR AN ON-SITE COMPETENT GEOTECHNICAL ENGINEER TO INSPECT THE ENCOUNTERED SOIL STRATA AND MATERIAL AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

8- THE POLE SHALL BE TEMPORARILY SUPPORTED UNTIL THE BACKFILL GAINS REQUIRED STRENGTH. THE HEADFRAME SHALL ONLY BE INSTALLED AFTER THE TEMPORARY SUPPORTS ARE REMOVED. PLANNING AND DESIGN OF THE REQUIRED TEMPORARY WORKS ARE BY CONTRACTOR.

9-THE CONTRACTOR SHALL VERIFY THE NATURAL GROUND LEVEL SHOWN IN THIS DRAWING AT THE LOCATION OF THE POLE AND REPORT DISCREPANCIES.



SECTION C
SCALE 1:100 009

NOTE:
FENCE NOT SHOWN FOR CLARITY

CONSTRUCTION ISSUE

0 1.0 2.0 3.0 4.0
1.0 0
HORIZONTAL SCALE 1:100

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

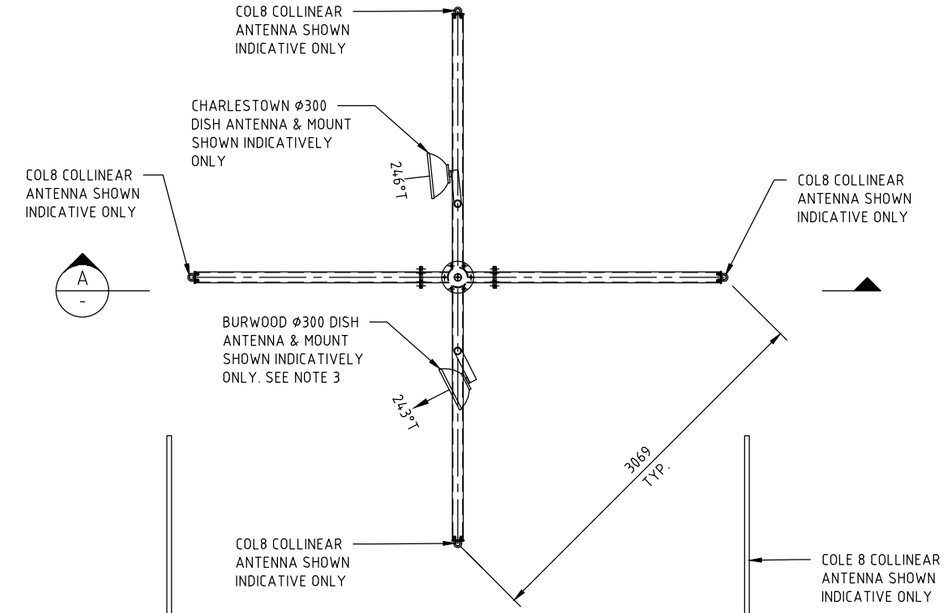
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
ROCLA POLE ELEVATION VIEW

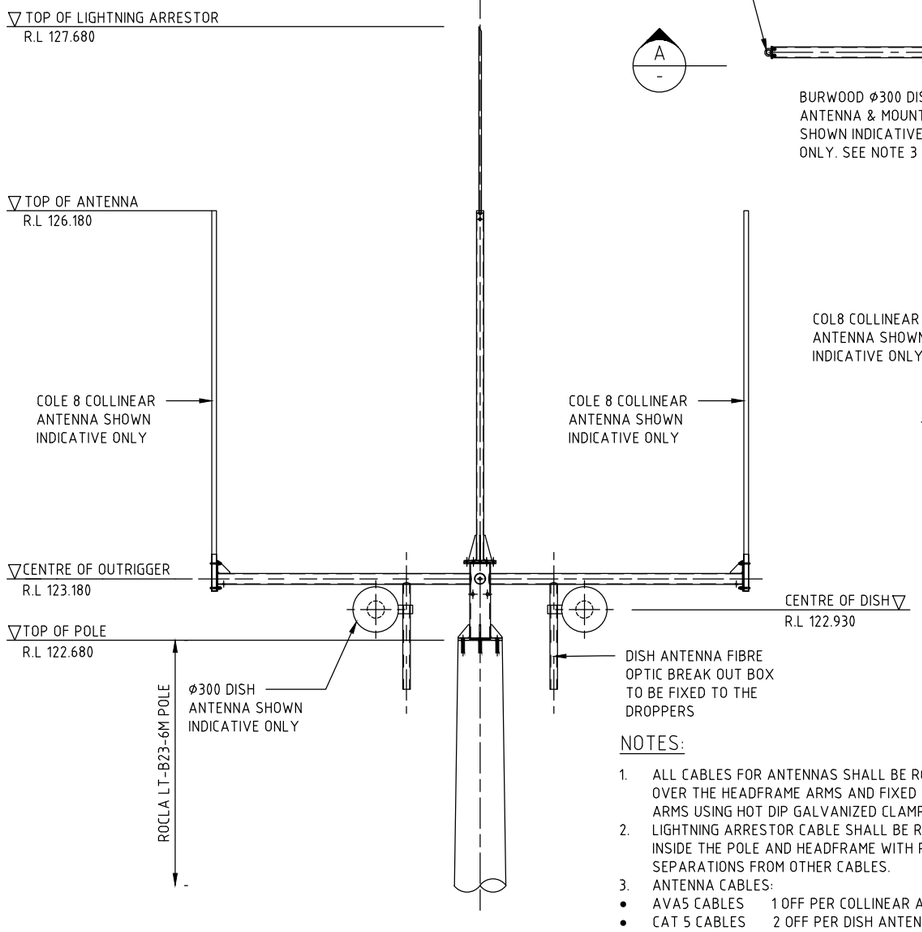
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:100	-	16017	011	03

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-011_03.dwg

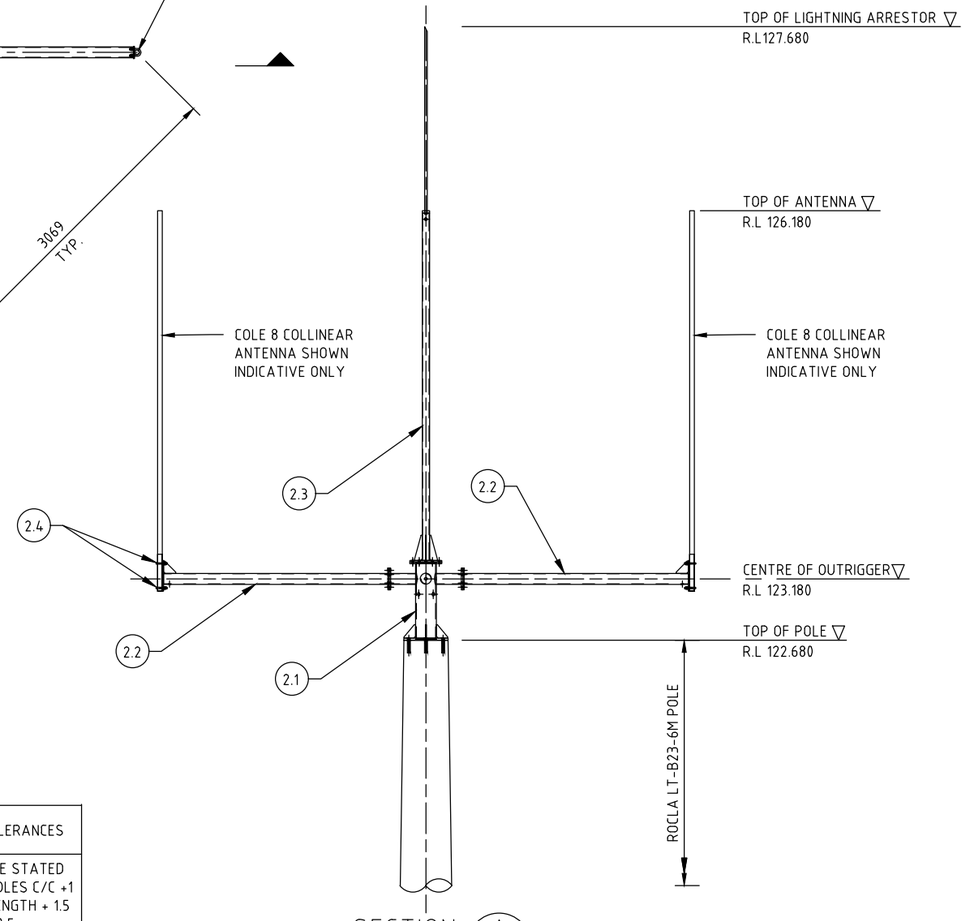
ITEM	DESCRIPTION	QTY
2.1	MOUNTING FRAME	1
2.2	OUTRIGGER	2
2.3	LIGHTNING POLE	1
2.4	'U' BOLT + 4-M12 NUTS + 2-M12 SPRING WASHER	8



PLAN AT RL 25.5m
SCALE 1:50



WEST ELEVATION
SCALE 1:50



SECTION A
SCALE 1:50

NOTES:

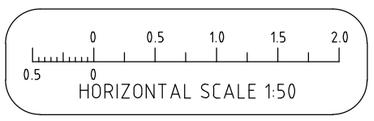
1. ALL CABLES FOR ANTENNAS SHALL BE ROUTED OVER THE HEADFRAME ARMS AND FIXED TO THE ARMS USING HOT DIP GALVANIZED CLAMPS.
2. LIGHTNING ARRESTOR CABLE SHALL BE ROUTED INSIDE THE POLE AND HEADFRAME WITH REQUIRED SEPARATIONS FROM OTHER CABLES.
3. ANTENNA CABLES:
   - AVA5 CABLES 1 OFF PER COLLINEAR ANTENNA
   - CAT 5 CABLES 2 OFF PER DISH ANTENNA
   - INSTALLATION OF BURWOOD DISH WILL BE BY OTHERS AND IS NOT PART OF THIS SCOPE. INSTALLATION AND ROUTING OF ALL CABLES INCLUDING CABLES FOR THIS DISH IS PART OF THIS SCOPE.
4. DETAILED SHOP DRAWINGS SHALL BE PREPARED BY CONTRACTOR AND SUBMITTED TO THE PRINCIPAL FOR REVIEW AND COMMENT PRIOR TO FABRICATION OF THE HEADFRAME.
5. FOR PROTECTIVE COATING OF THE HEADFRAME STEEL STRUCTURE REFER TO PROJECT SPECIFICATIONS.

FABRICATION TOLERANCES
UNLESS OTHERWISE STATED 1. LINEAR & HOLES C/C +1 2. OVERALL LENGTH + 1.5 3. HOLE DIA. +0.5 4. ANGULAR + 30°

SITE BOLTS:

ARM CONNECTIONS: M16x60 LONG 8.8/TB HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS AND TWO NUTS-18 FASTENER ASSEMBLIES REQUIRED

HEADFRAME TO POLE CONNECTION: M24 8.8/S HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS TO SUIT FERRULES - 4 FASTENER ASSEMBLIES REQUIRED



HORIZONTAL SCALE 1:50

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
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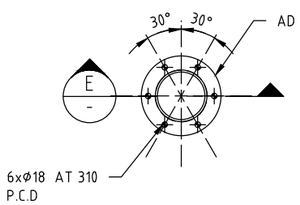
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

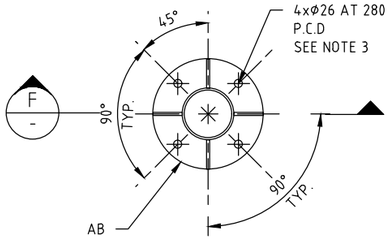
STRUCTURAL DESIGN
HEADFRAME ARRANGEMENT

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	012	03

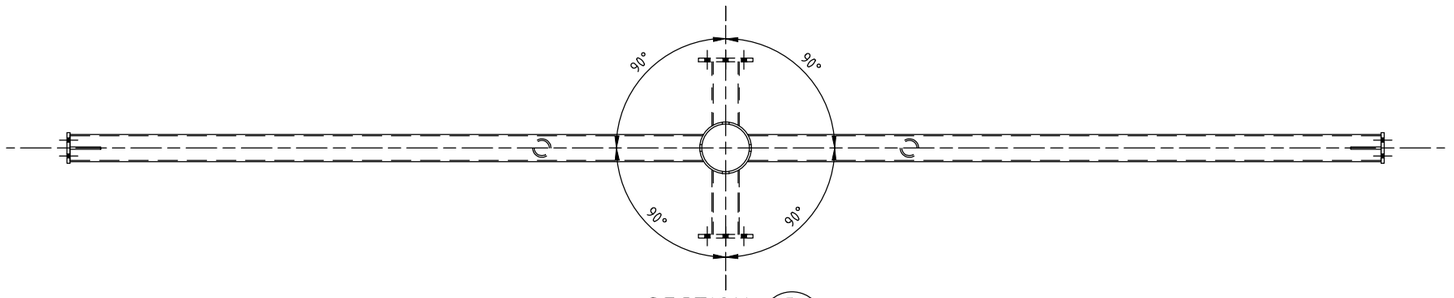
Plot Date: 08/06/21 - 10:24 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-012_03.dwg



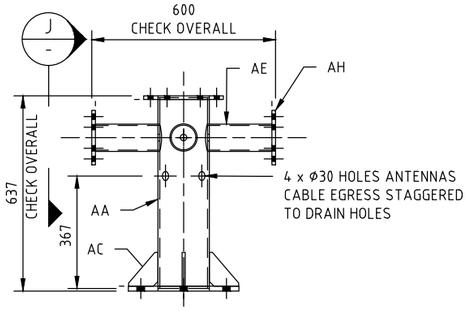
SECTION A
SCALE 1:20



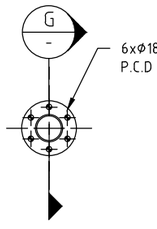
SECTION C
SCALE 1:20



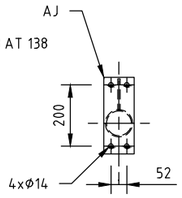
SECTION B
SCALE 1:20



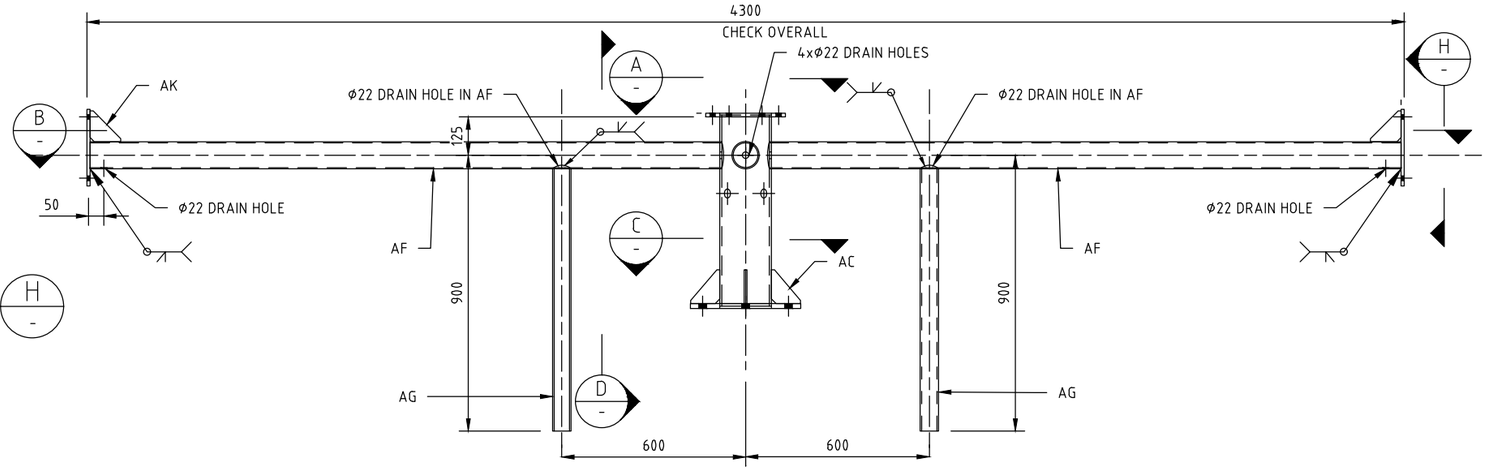
SECTION D
SCALE 1:20



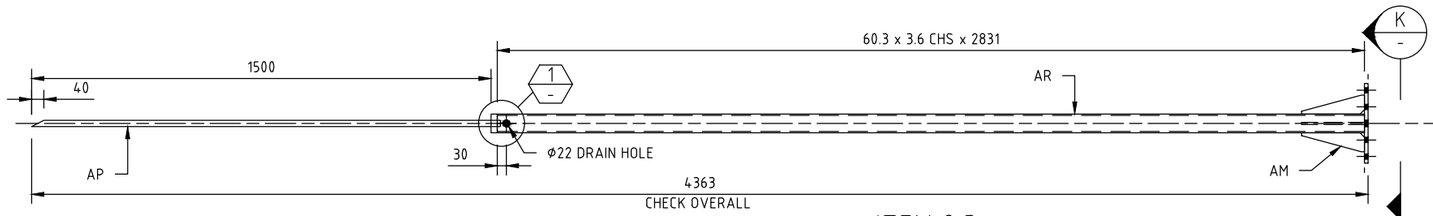
SECTION J
SCALE 1:20



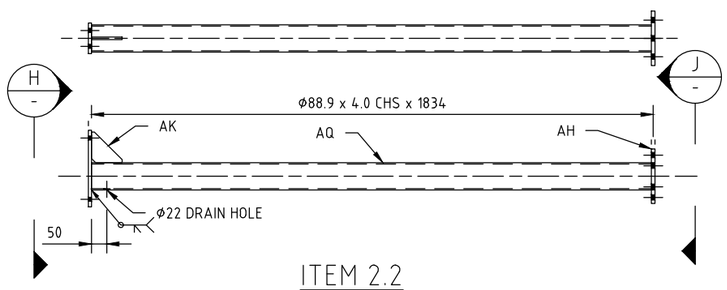
SECTION H
SCALE 1:20



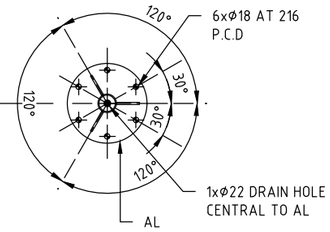
ITEM 2.1
SCALE 1:20



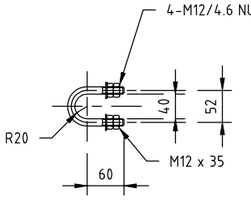
ITEM 2.3
SCALE 1:20



ITEM 2.2
SCALE 1:20



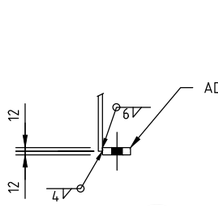
SECTION K
SCALE 1:20



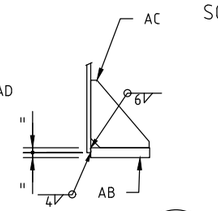
ITEM 2.4
SCALE 1:10

NOTES:

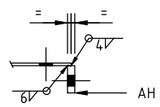
1. REFER TO DRAWING NO. 16017-014 FOR MATERIAL LIST.
2. 'U' BOLTS ARE TO BE FORMED BY HOT BENDING WHILE HEATED TO 600°C & AIR COOLED.
3. THE CONTRACTOR SHALL SEEK ADVICE AND OBTAIN CERTIFICATE FOR ADEQUACY OF THE HEADFRAME CONNECTION TO THE POLE FROM THE HEADFRAME DESIGNER. THIS INCLUDES THE ADEQUACY OF THE BOLTS, BASEPLATES, STIFFENERS AND WELD OF BASEPLATE TO PART NUMBERS "AA" AND "AC".



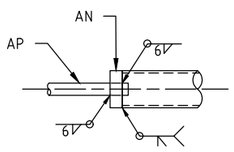
SECTION E
SCALE 1:20



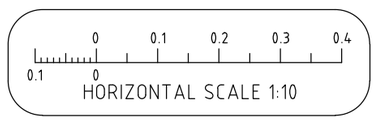
SECTION F
SCALE 1:20

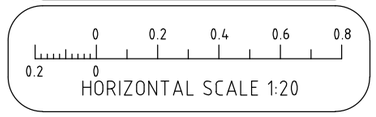


SECTION G
SCALE 1:20



DETAIL 1
SCALE 1:20





CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

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CONSULT. REFERENCE No.
12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

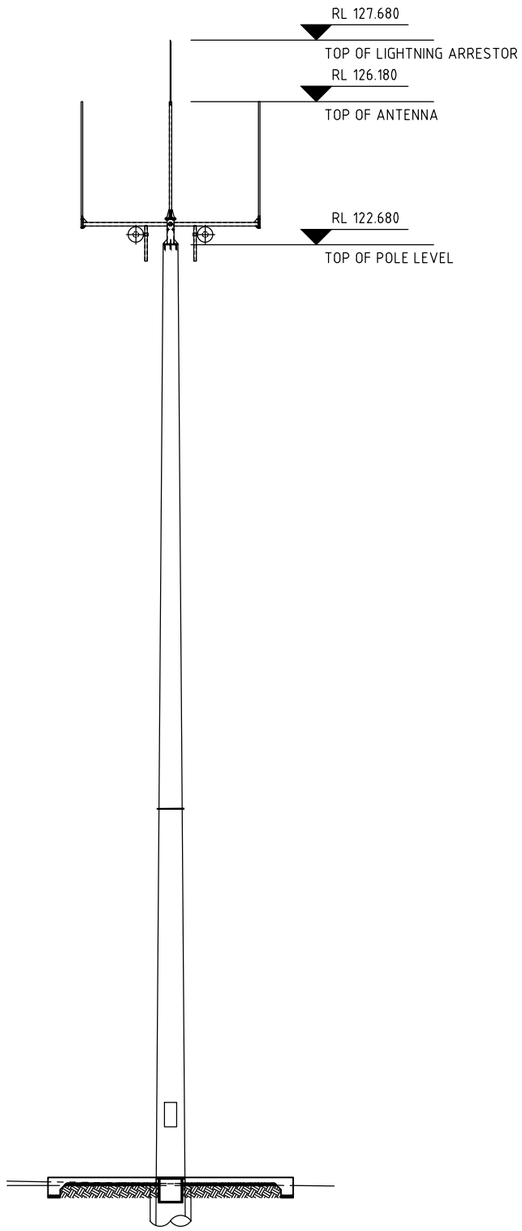
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	AS SHOWN	-	16017	013	02

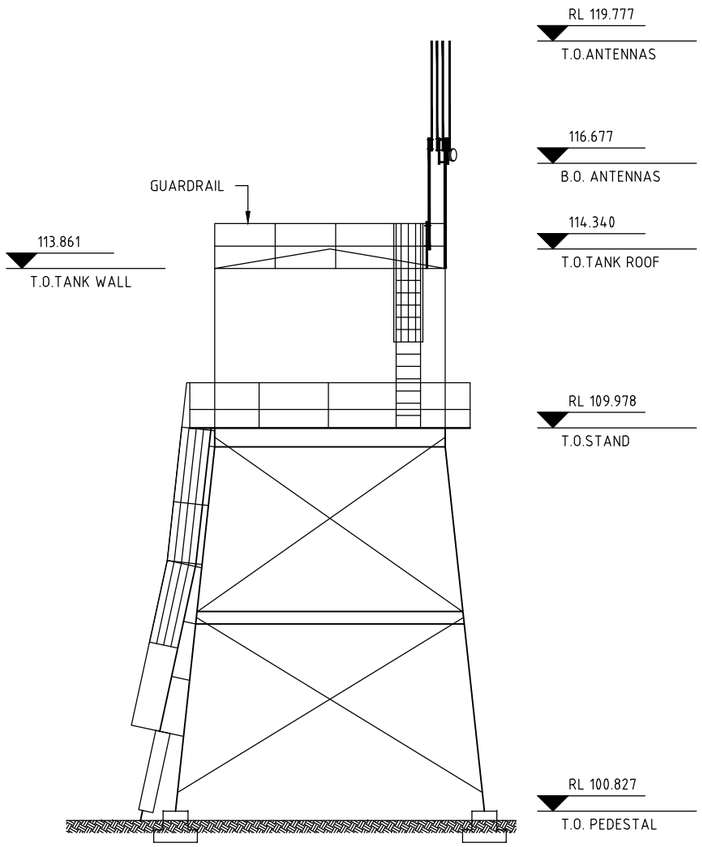
VERSION 4

Plot Date: 08/06/21 - 10:25 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-013_02.dwg



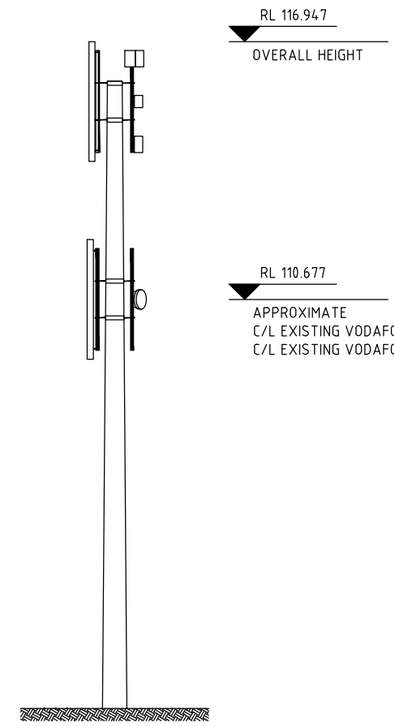
PROPOSED TOWER

SCALE 1:100



EXISTING TANK - TO BE DEMOLISHED

SCALE 1:100

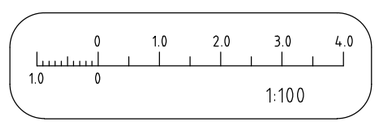


EXISTING TELSTRA TOWER - TO REMAIN

SCALE 1:100

NOTES:

1. RL's ARE APPROXIMATE AND ARE SHOWN FOR APPROXIMATE RELATIVE HEIGHT OF TOWERS.



No.	REVISION DETAILS	DWN	DATE
A	ISSUED FOR INFORMATION	SPB	20/07/21

CONSULTANT DETAILS:
GHD
Level 3 GHD Tower 24 Honeysuckle Drive
Newcastle NSW 2300
T 61 2 4979 9999 F 61 2 9475 0725
E nltmail@ghd.com.au
www.ghd.com.au

CONSULT. REFERENCE No.
12525175

HUNTER WATER

DESIGNED: HR	DATE: 20/07/21	COMPANY: GHD PTY LTD	
DRAWN: SPB	DATE: 20/07/21	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 20/07/21	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 20/07/21	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

SCHEMATIC ELEVATION VIEW

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:100	-	16017	015	0A

VERSION 4

Plot Date: 21/07/21 - 15:48 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-015_0A.dwg

APPENDIX B

Clause 228(2) factors and matters of national environmental significance

Clause 228(2) checklist

The following factors listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* have been considered to assess the likely impacts of the proposal on the environment.

Factor	Impact
(a) Any environmental impact on a community? There would be potential for short-term negative impacts on the community from the implementation of the proposal including noise, access and visual impacts. There would be a long-term visual impact from the telecommunications structure. Measures have been proposed to minimise these potential impacts.	Minor negative
(b) Any transformation of a locality? The proposal would result in the installation of a visible structure on an existing Hunter Water operational site in keeping with existing use this would result in a short-term negative transformation of the visual quality of the locality. The demolition of the HLT following construction of the tower would result in an overall minimisation of visual impacts as the remaining structures would be less visually obtrusive.	Short-term negative Long-term positive
(c) Any environmental impact on the ecosystems of a locality? The proposal would not result in an impact on ecosystems in the locality given the limited scope and extent of work.	Nil
(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The proposal would not result in a long-term reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality. There would be a potential for a short-term reduction in the aesthetic and recreational value of the adjoining Glenrock SCA as a result of disruptions to public access and the presence of construction related plant.	Short-term minor negative
(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The proposal would not impact on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.	Nil
(f) Any impact on habitat of any protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)? The proposal would not result in an impact on habitat of protected animals.	Nil
(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The proposal would not endanger any species of animal, plant or other form of life.	Nil

(h) Any long-term effects on the environment? There would be no long-term impacts on the environment.	Nil
(i) Any degradation of the quality of the environment? There would be potential for short-term impacts on the quality of the environment during the work. Measures have been proposed to minimise potential impacts.	Short-term minor negative
(j) Any risk to the safety of the environment? The proposal would not result in a risk to the safety of the environment.	Nil
(k) Any reduction in the range of beneficial uses of the environment? There would be no reduction in the range of beneficial uses of the environment.	Nil
(l) Any pollution of the environment? The proposal would not result in any pollution of the environment given the implementation of proposed mitigation measures.	Nil
(m) Any environmental problems associated with the disposal of waste? No environmental problems associated with the disposal of waste are anticipated.	Nil
(n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply? The proposal would not result in an increase demand for resources which are, or are likely to become, in short supply.	Nil
(o) Any cumulative environmental effect with other existing or likely future activities? There would be no cumulative environmental effect with other activities.	Nil
(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The proposal would not result in an impact on coast processes or hazards.	Nil

Matters of National Environmental Significance

The following matters of national environmental significance have been considered as required by the environmental assessment provisions of the EPBC Act. This review assists in determining whether the proposal should be referred to the Australian Government Department of the Environment and Energy.

Environmental factor	Impact
Any impact on a World Heritage property? There are no world heritage properties in the vicinity of the proposal site. Direct or indirect impacts are not expected.	Nil
Any impact on a National Heritage place? There are no National Heritage places in the vicinity of the proposal site. Direct or indirect impacts are not expected.	Nil
Any impact on a wetland of international importance (often called 'Ramsar' wetlands)? There are no wetlands of international importance in the vicinity of the proposal site. The Hunter estuary wetlands are located within 10	Nil

kilometres of the proposal site however direct or indirect impacts are not expected.	
Any impact on nationally threatened species, ecological communities or migratory species? A number of Commonwealth listed threatened species, migratory species and three communities have potential to occur in the broader area. No threatened species or communities were identified at the proposal site. The minor nature and scale of the proposal is such that impacts on these species or communities are not expected.	Nil
Any impact on a Commonwealth marine area? The proposal sites are not located in the vicinity of a Commonwealth area. Direct or indirect impacts are not expected.	Nil
Does the proposal involve a nuclear action (including uranium mining)? The proposal does not involve a nuclear action.	Nil
Any impact on a water resource, in relation to coal seam gas development and large coal mining development? The proposal would not impact on a coal seam gas or large coal mining development.	Nil
Additionally, any impact (direct or indirect) on the environment of Commonwealth land? The proposal would not result in a direct or indirect impact on the environment of Commonwealth land.	Nil

APPENDIX C

Correspondence

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657 (T)
enquiries@hunterwater.com.au
hunterwater.com.au

22 December 2020

Our Ref: HW2016-530/53/10

THE OCCUPIER
Proposed upcoming works in your area

Dear OCCUPIER,

Proposed Communications Tower at Hickson Street Merewether

Hunter Water is proposing to construct a communications tower on Hunter Water owned land off Hickson Street, Merewether (Lot 6, DP 776283 - refer Attachment A). We plan to demolish the water tank at this site due to its age. The new communications tower will allow the existing radio antennas and communication dish currently installed on the tank to be relocated prior to its demolition.

The proposed tower will be a 25-metre concrete pole, which will allow for an additional 30cm diameter communication dish to be installed to improve communications for Burwood Beach Wastewater Treatment Works. This will improve communication reliability, reduce operating costs and provide for growth into the future.

The proposed tower is located wholly within Hunter Water land. Some vegetation would need to be removed for its construction, and this would be managed in accordance with the project approval requirements.

The pole would be a neutral colour to help it blend in with the surrounding environment. See Attachment B for a visual representation of how the site would look once the new structure has been constructed and the water tank demolished.

Hunter Water is preparing a Review of Environmental Factors (REF) for the proposed tower, which will consider potential environmental impacts, including impacts on biodiversity and the community. The REF will be placed on public exhibition in early 2021, allowing surrounding residents and interested community members to provide input on the proposal.

We are now seeking early feedback about the proposed communications tower from landowners and residents in the immediate project area, and will also be liaising with City of Newcastle, NSW National Parks and Wildlife Service and Subsidence Advisory NSW.

Given the time of year, we have extended the feedback period until late January. If you have any questions or would like to comment on this proposal, please email andrew.moss@hunterwater.com.au by Thursday 28 January 2021.

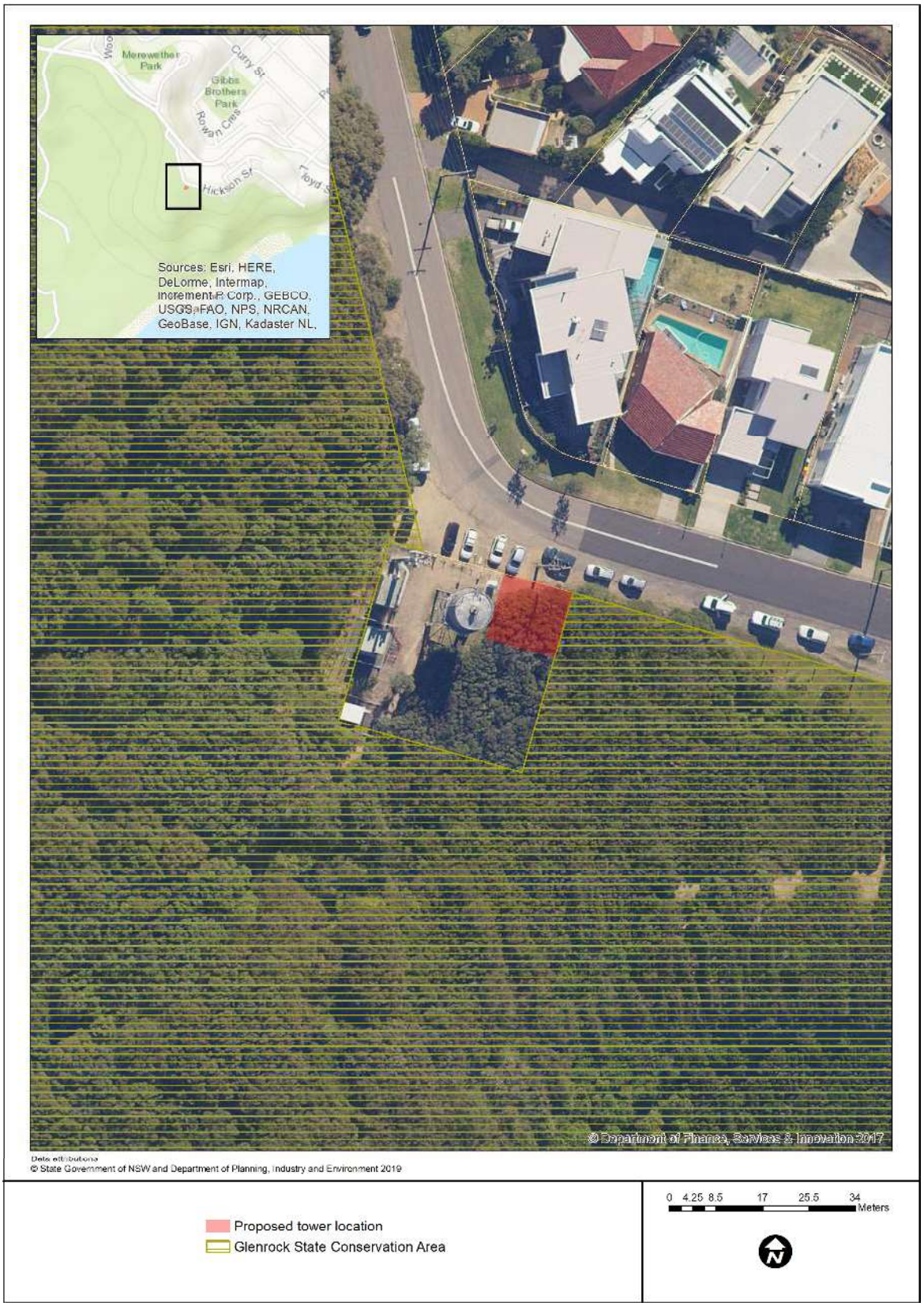
Please note this inbox will be unattended from 23 December to 7 January inclusive, so you will not receive a response during that time.

Yours faithfully,

Andrew Moss

Senior Project Manager

Attachment A
Proposed location of communications tower



Attachment B
Visual representation of communications tower (before and after)

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657
enquiries@hunterwater.com.au
hunterwater.com.au

25 June 2021

Our Ref: HW 2016-530/53/10

Addressee
Proposed work in your area
Address 1
Address 2
Address 3

Dear Resident/Customer,

Proposed communications tower at Hickson Street Merewether – amended design

As previously communicated, Hunter Water is proposing to construct a communications tower on Hunter Water owned land off Hickson Street, Merewether (Lot 6, DP 776283 - refer Attachment A). We plan to demolish the ageing water tank at this site as part of a project to improve reliability of water supply to our customers. We have recently made a number of operational changes within the network, which makes the tank redundant and means it can be decommissioned without impacting current water pressure or supply to our customers.

The existing radio antennas and communication dish installed on the tank will be relocated to the new tower to ensure continued operation. This equipment provides communications coverage essential for the monitoring and control of our water and wastewater networks.

Amended design

The original tower design consisted of a 25-metre tall pole to be constructed adjacent to the tank. Following further investigations, including consideration of site constraints and constructability, and feedback from the consultation process, the design has been amended to reduce the pole height to 23m. The new pole will now be constructed on the same footprint as the tank, meaning less vegetation will need to be removed.

To maintain continuity of communications while the tank is being demolished and the permanent tower constructed, a temporary timber pole will be installed on the site. This pole will be removed at the completion of the work.

Attachment B contains a visual representation of the proposed tower. The full design drawings can be viewed online at yourvoice.hunterwater.com.au/hicksonst.

As mentioned previously, the tower height will allow for a new 30cm diameter communication dish to be installed to improve communications for Burwood Beach Wastewater Treatment Works. This work would be completed as part of a separate project.

Review of Environmental Factors

We are finalising a Review of Environmental Factors (REF) for the proposal, which will consider potential environmental and community impacts. The REF will be placed on public exhibition in the coming weeks and we will let you know when it is available for comment.

Get in touch

If you have any questions or would like to provide further comment on the updated design before the public exhibition period, please contact Andrew Moss via email at andrew.moss@hunterwater.com.au or call 1300 657 657 (8am to 5pm).

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location

Attachment B
Visual representation of communications tower (before and after)

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
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36 Honeysuckle Drive
NEWCASTLE NSW 2300
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enquiries@hunterwater.com.au
hunterwater.com.au

21 December 2020

Our Ref: HW2016-530/53/10

The Chief Executive Officer
City of Newcastle
PO Box 489
Newcastle NSW 2300

Dear Mr Bath,

Proposed Communications Tower at Hickson Street Merewether

Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land off Hickson Street, Merewether (Lot 6, DP 776283, refer Attachment A). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower prior to the demolition.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

Under Clause 114 of the ISEPP, Hunter Water is required to provide City of Newcastle with written notice of the intention to undertake development of a tower or mast.

The proposed tower would be a 25-metre concrete pole. An additional 30cm diameter communication dish is to be installed to improve communications to Burwood Beach Wastewater Treatment Works. The tower will be a neutral colour to help it blend in with the surrounding environment and reduce the visual impact.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

See Attachment B for a visual representation of how the site will look once the new tower has been constructed and the water tank demolished.

Hunter Water is preparing a Review of Environmental Factors (REF) for the proposal. The REF will consider potential environmental impacts of the proposal including impacts on biodiversity and the community. We propose to publicly exhibit the REF in early 2021.

The development of the tower design would consider the NSW Governments *Telecommunications Facilities Guideline Including Broadband* (July 2010). Construction of the new tower is expected to start in the first half of 2021, with the demolition of the old water tank to follow.

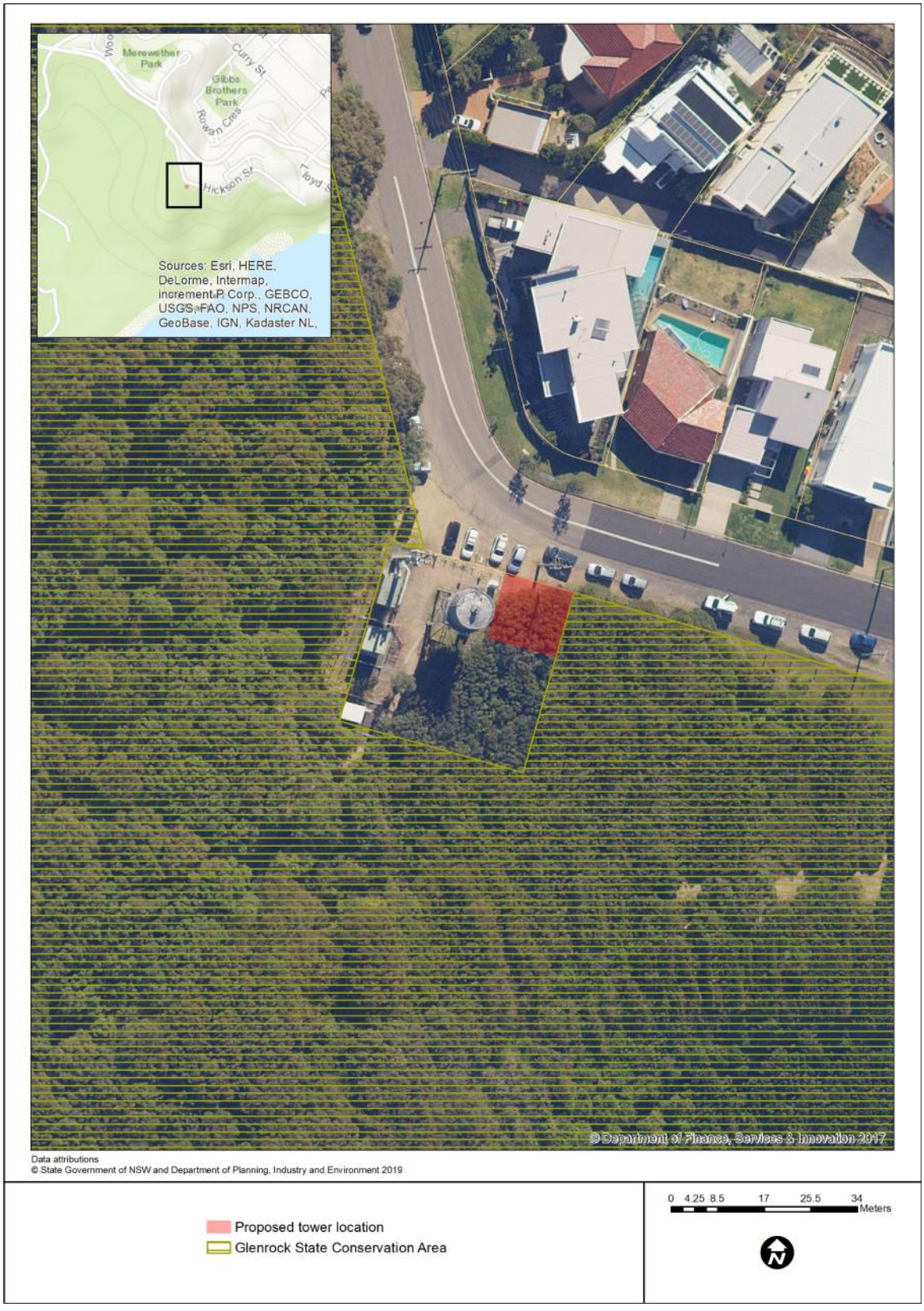
In accordance with the consultation requirement of the ISEPP we would like to give City of Newcastle this opportunity to provide comment on the proposal. We also welcome a meeting with the relevant council officers to discuss the proposal, including community impacts and the need to consider any ongoing or proposed works within the area.

Please contact Andrew Moss to arrange a meeting or forward any comment by email to andrew.moss@hunterwater.com.au by Thursday 28 January 2021.

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location



Attachment B
Visual representation of communications tower (before and after)

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657 (T)
enquiries@hunterwater.com.au
hunterwater.com.au

17 June 2021

Our Ref: HW2016-530/53/10

The Chief Executive Officer
City of Newcastle
PO Box 489
Newcastle NSW 2300

Dear Mr Bath,

Proposed communications tower at Hickson Street Merewether - amended design

As advised in December 2020, Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land located at 29 Scenic Drive Merewether (off Hickson Street, Lot 6, DP 776283, refer Attachment A). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

The original tower design consisted of a 25m tall concrete pole to be constructed adjacent to the tank. Following further investigations, including consideration of site constraints and constructability, and feedback from the consultation process, the design has been amended to reduce the pole height to 23m. The new pole will now be constructed on the same footprint as the tank, meaning less vegetation will need to be removed.

To maintain continuity of communications while the tank is being demolished and the permanent tower constructed, a temporary timber pole will be installed on the site. This pole will be removed at the completion of the work.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

Refer attached for the design drawings of the proposed tower.

Hunter Water is finalising a Review of Environmental Factors (REF) for the proposal, which will consider potential environmental and community impacts. The REF will be placed on public exhibition in the coming weeks.

The development of the tower design has considered the NSW Government's *Telecommunications Facilities Guideline Including Broadband* (July 2010).

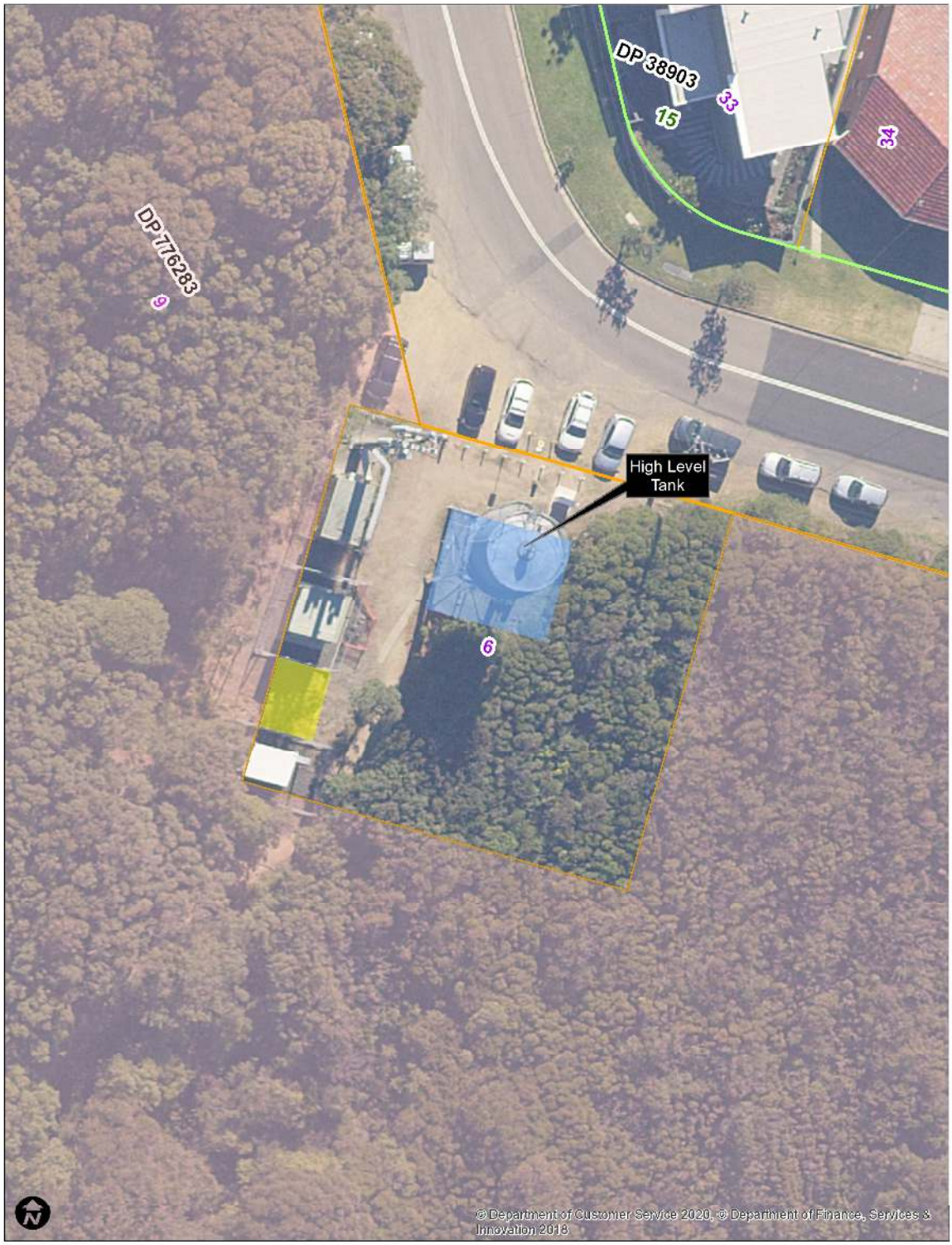
In accordance with the consultation requirement of the ISEPP we would like to give City of Newcastle this opportunity to provide comment on the amended proposal.

Please forward any comment by email to andrew.moss@hunterwater.com.au by Friday 9 July 2021.

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location



Attachment B
Design drawings of proposed communications tower

HUNTER WATER CORPORATION

MEREWETHER – COMMUNICATION TOWER STRUCTURAL DESIGN

LOCALITY PLAN
NOT TO SCALE

DRAWING LIST:

16017-001	COVER SHEET, LOCALITY PLAN AND DRAWING LIST
16017-002	BEFORE AND AFTER PERSPECTIVES
16017-007	GENERAL ARRANGEMENT PLAN
16017-008	GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN
16017-009	CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS
16017-010	TYPICAL DETAILS
16017-011	ROCLA POLE ELEVATION VIEW
16017-012	HEADFRAME ARRANGEMENT
16017-013	HEADFRAME DETAILS
16017-014	HEADFRAME MATERIAL LIST

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

CONSULTANT DETAILS:
GHD
Level 3 GHD Tower 24 Honeysuckle Drive
Newcastle NSW 2300
T 61 2 4979 9999 F 61 2 9475 0725
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www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
COVER SHEET, LOCALITY PLAN AND DRAWING LIST

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	–	16017	001	01

VERSION 4

Plot Date: 08/06/21 – 10:19 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-001_01.dwg

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

CONSULTANT DETAILS:
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CONSULT. REFERENCE No.
12525175

HUNTER WATER

DESIGNED: HR	DATE: 30/06/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

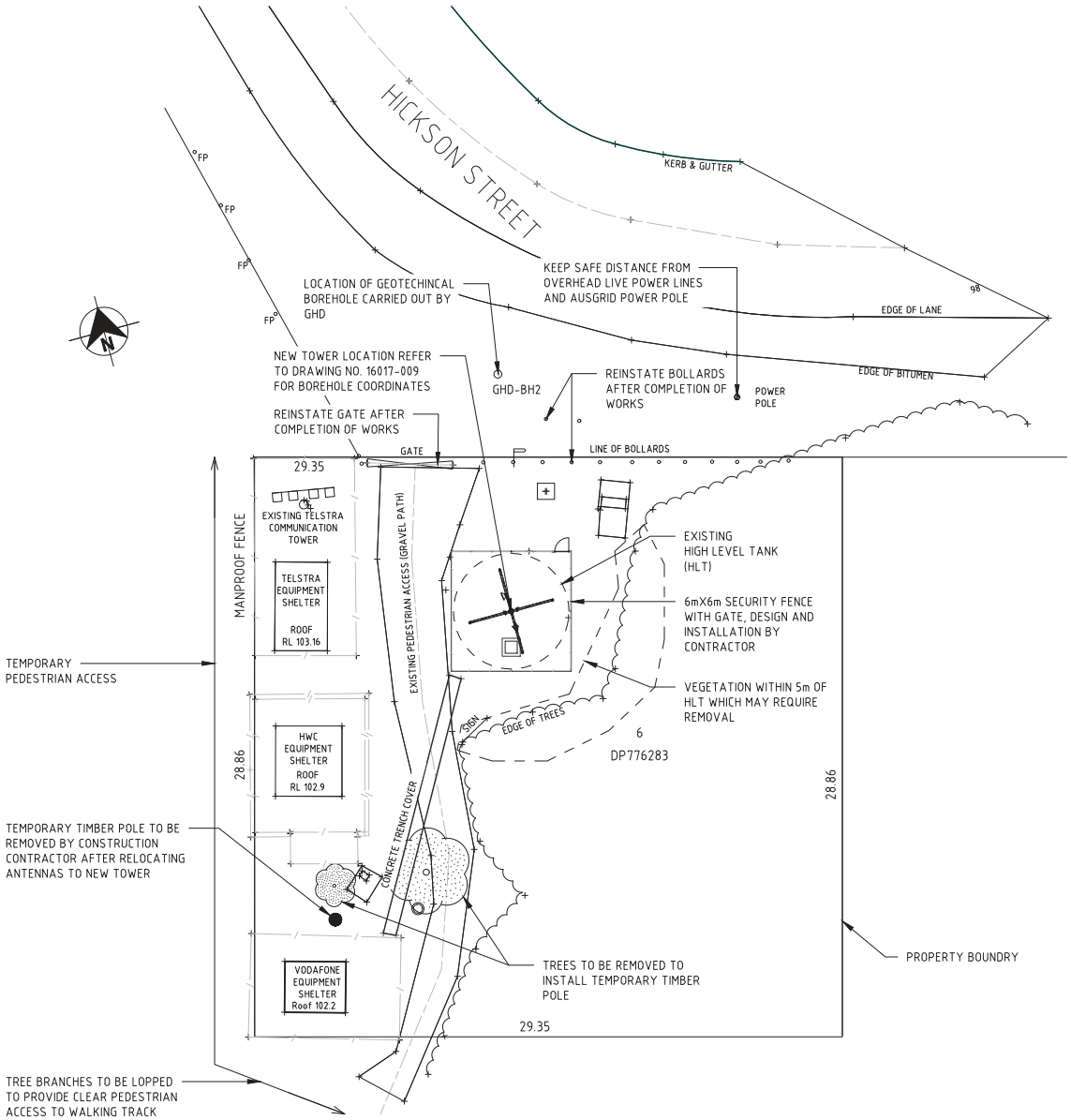
STRUCTURAL DESIGN
BEFORE AND AFTER PERSPECTIVES

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	-	16017	002	02

Plot Date: 08/06/21 - 10:20 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-002_02.dwg

NOTE:

1. ALL DRAWINGS SHALL BE READ IN CONJUCTION WITH TECHNICAL SPECIFICATIONS.
2. FOR EXISTING AND NEW UNDERGROUND SERVICES REFER TO DRAWING NO. 16017-008.



NEW SITE PLAN

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

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CONSULT. REFERENCE No. 12525175

HUNTER WATER

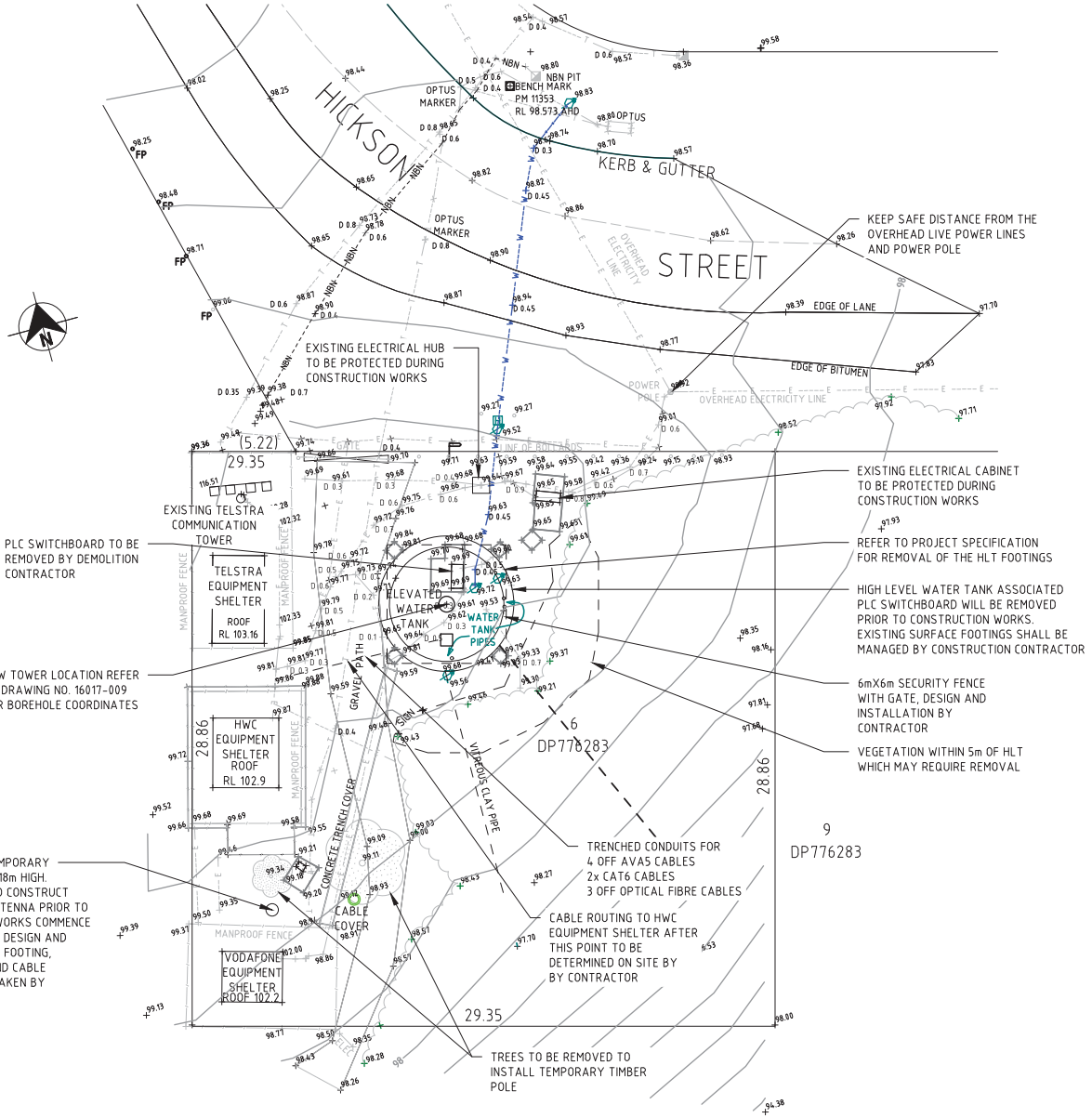
DESIGNED: HR	DATE: 30/06/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	007	03

Plot Date: 08/06/21 - 10:21 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-007_03.dwg



LEGEND:

- TREE
- COMMS PIT
- HYDRANT
- STOP VALVE
- ELECTRICAL BOX
- SIGN
- ELECTRICITY LINE & DEPTH
- WATER LINE & DEPTH
- TELEPHONE LINE & DEPTH
- NBN LINE & DEPTH

NOTE:

1. THE CONTRACTOR SHALL MARK EXACT LOCATION OF ALL EXISTING AND NEW UNDERGROUND SERVICES AT WORK AREA AND PROTECT AGAINST DAMAGE.

0 2.5 5.0 7.5 10
2.5 0
HORIZONTAL SCALE 1:250

SITE PLAN WITH UNDERGROUND SERVICES

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
4	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

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www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

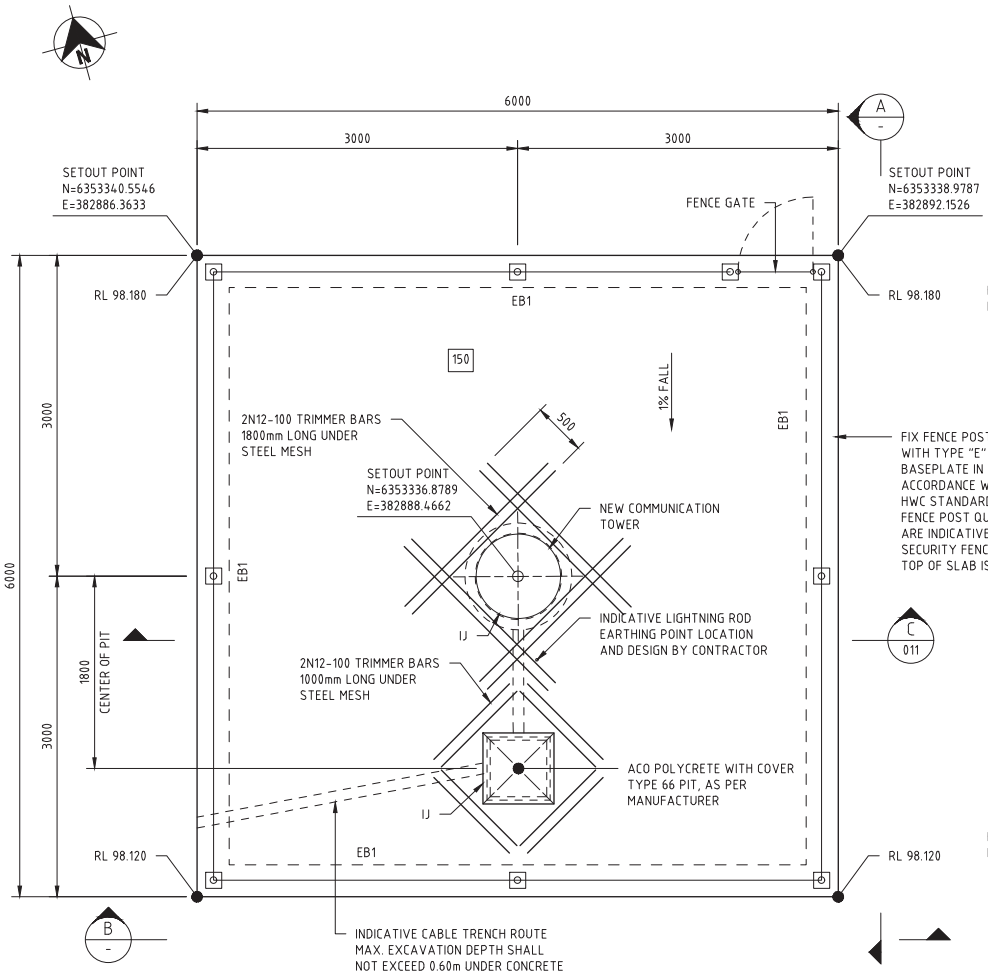
DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

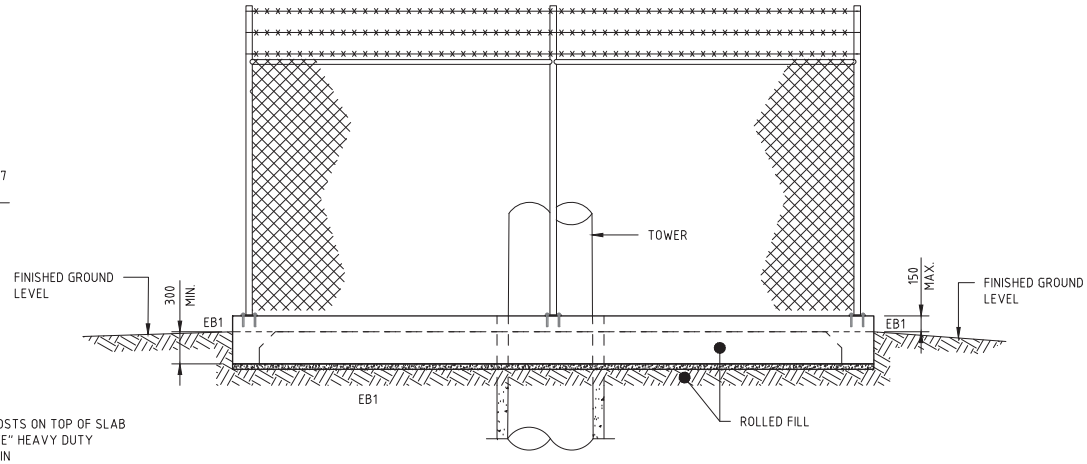
STRUCTURAL DESIGN
GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	008	04

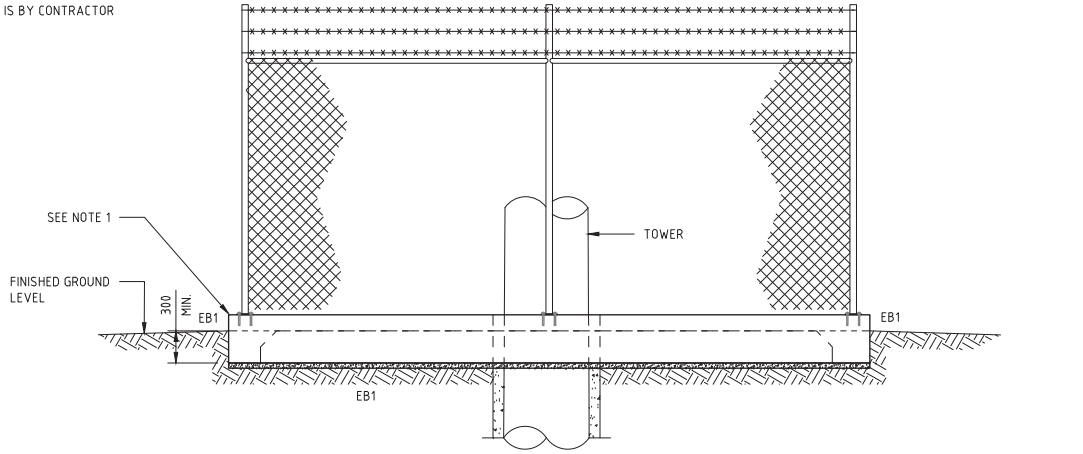
Plot Date: 11/06/21 - 10:40 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-008_04.dwg



PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

CONCRETE GROUND BEAMS SCHEDULE		
MARK	SIZE	REINFORCEMENT
EB1	EDGE BEAM 300 W x 450 D	3L11 - TM BOTT. WITH R10 - 600 LIGS

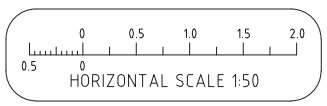
SLAB REINFORCEMENT	
THICKNESS	REINFORCEMENT
150	SL82 TOP

NOTE:

1. CHEMICAL ANCHORS FOR THE FENCE POSTS SHALL BE HILTI RE 500 V3 + HIT-V HOT DIP GALVANIZED FULL THREADED 4-M12 STUDS GRADE 5.8 OR APPROVED EQUIVALENT WITH EFFECTIVE EMBEDMENT OF 150 mm AND MINIMUM 80 mm EDGE DISTANCE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

LEGEND:

IJ - DENOTES ISOLATION JOINT



CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

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CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

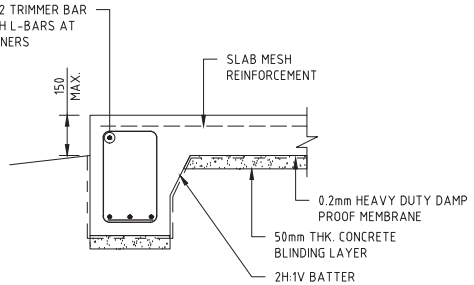
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS

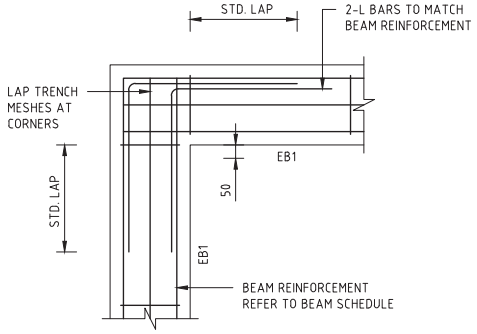
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	009	03

VERSION 4

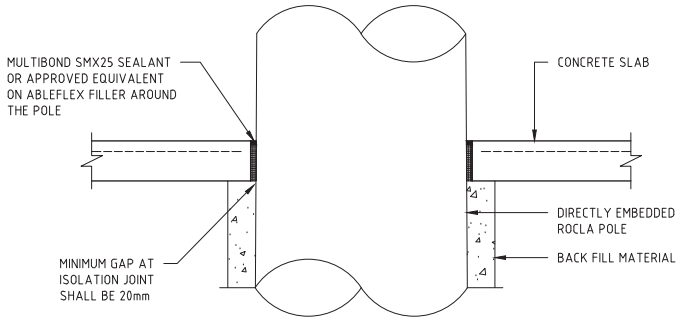
Plot Date: 11/06/21 - 10:41 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-009_03.dwg



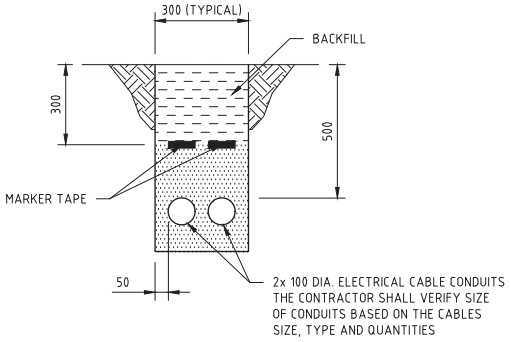
TYPICAL EDGE BEAM (EB1) DETAIL
SCALE 1:20



TYPICAL CORNER FOOTING REINFORCEMENT DETAIL
SCALE 1:20



ISOLATION JOINT (IJ) DETAIL
SCALE 1:20



TYPICAL TRENCHED CONDUITS DETAIL
SCALE 1:20

0 0.2 0.4 0.6 0.8
0.2 0
HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

CONSULTANT DETAILS:
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CONSULT. REFERENCE No.
12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
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CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
TYPICAL DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:20	-	16017	010	01

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-010_01.dwg

NOTES:

1- THE POLE SHALL BE INSTALLED TO AN ORIENTATION TO ALLOW INSTALLATION OF THE HEADFRAME IN THE INDICATED ORIENTATION WITH CABLE OPENING AT THE BOTTOM NEAREST TO THE PIT. THE ORIENTATION OF TOP FERRULES SHALL ALLOW FOR CORRECT BEARING OF THE DISH ANTENNAS.

2- CABLE TRAY ROUTING AND ARRANGEMENT IS BY CONTRACTOR.

3- ALL CABLES SHALL BE ROUTED AND FIXED INSIDE THE POLE. ATTACHMENT OF CABLE TRAY OVER THE POLE IS NOT ALLOWED.

4- ACCESS TO THE HEADFRAME AND THE POLE IS ONLY POSSIBLE BY ELEVATED WORKING PLATFORM. ADDITION OF CLIMBING MEANS SUCH AS STEP BOLTS OR LADDERS ARE NOT ALLOWED.

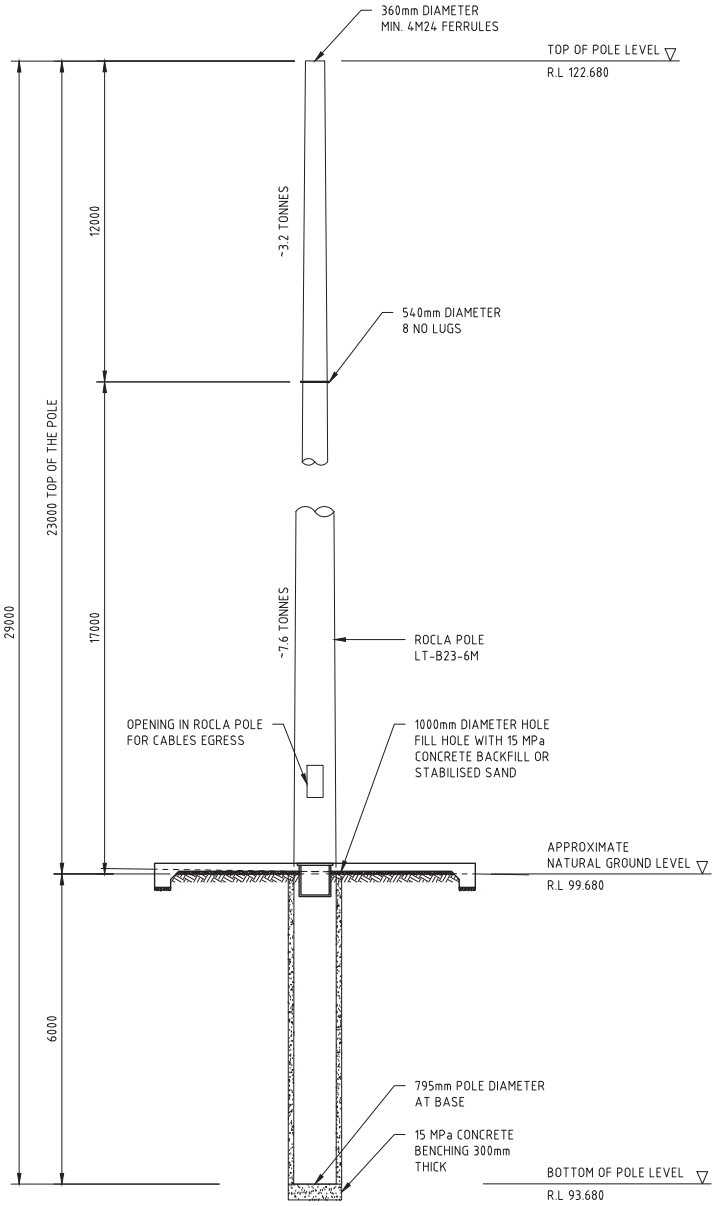
5- THE BACKFILL AROUND THE POLE SHALL BE FLOWABLE STABILISED SAND OR BLINDING CONCRETE OF STRENGTH GREATER THAN THE CLAYEY SAND THAT IS REPLACED.

6- THE BACKFILL SHALL NOT ARCH BETWEEN THE POLE AND SIDE OF THE HOLE TO PREVENT CREATION OF VOIDS.

7- REFER TO GEOTECHNICAL REPORT NUMBER 12525175 FOR GEOTECHNICAL PROPERTIES OF THE SOIL. CONTRACTOR SHALL ALLOW FOR AN ON-SITE COMPETENT GEOTECHNICAL ENGINEER TO INSPECT THE ENCOUNTERED SOIL STRATA AND MATERIAL AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

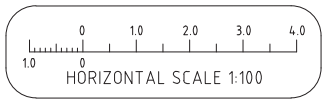
8- THE POLE SHALL BE TEMPORARILY SUPPORTED UNTIL THE BACKFILL GAINS REQUIRED STRENGTH. THE HEADFRAME SHALL ONLY BE INSTALLED AFTER THE TEMPORARY SUPPORTS ARE REMOVED. PLANNING AND DESIGN OF THE REQUIRED TEMPORARY WORKS ARE BY CONTRACTOR.

9-THE CONTRACTOR SHALL VERIFY THE NATURAL GROUND LEVEL SHOWN IN THIS DRAWING AT THE LOCATION OF THE POLE AND REPORT DISCREPANCIES.



SECTION C / 009
SCALE 1:100

NOTE:
FENCE NOT SHOWN FOR CLARITY



CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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CONSULT. REFERENCE No. 12525175

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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

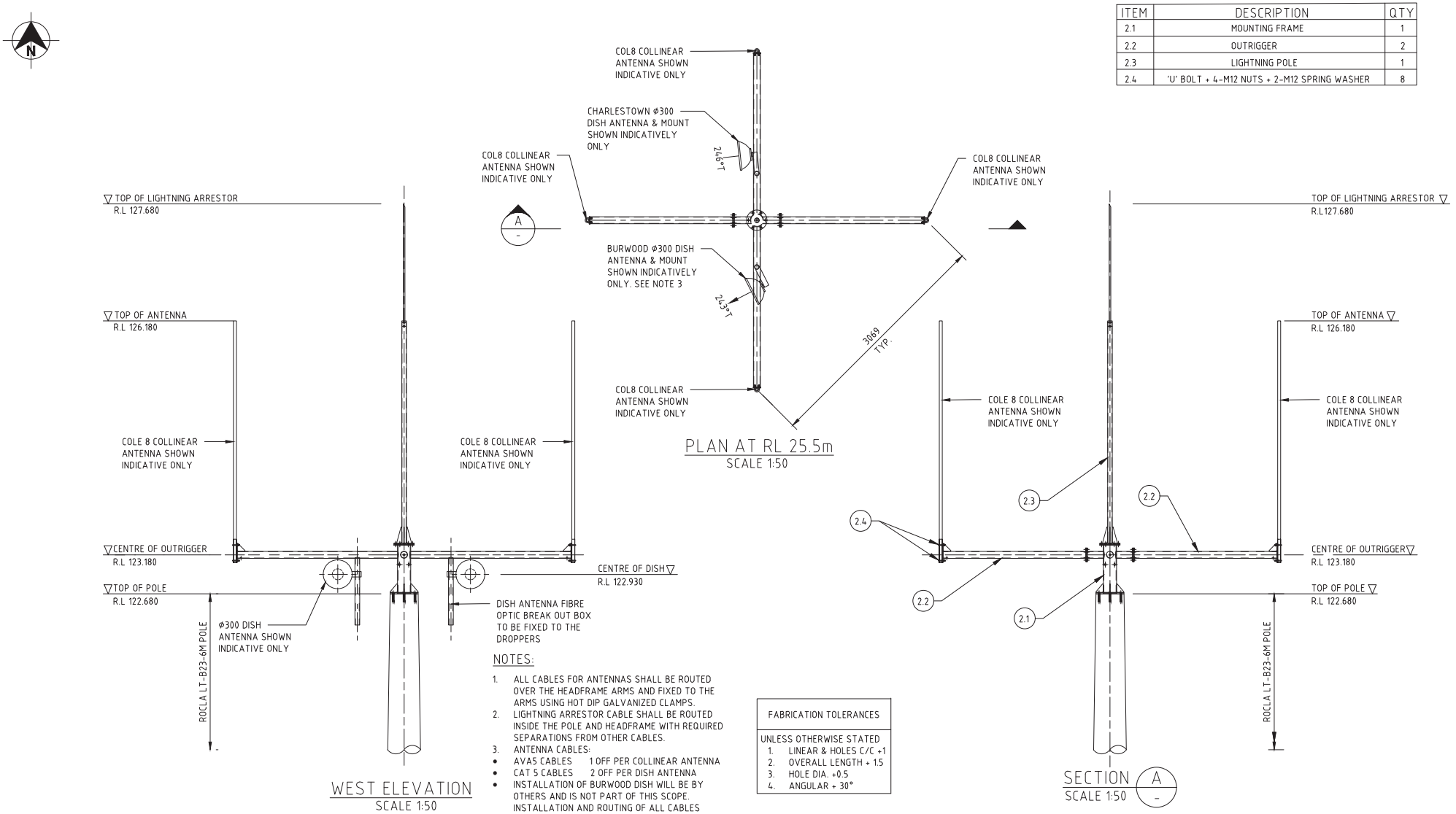
STRUCTURAL DESIGN
ROCLA POLE ELEVATION VIEW

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:100	-	16017	011	03

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-011_03.dwg

ITEM	DESCRIPTION	QTY
2.1	MOUNTING FRAME	1
2.2	OUTRIGGER	2
2.3	LIGHTNING POLE	1
2.4	'U' BOLT + 4-M12 NUTS + 2-M12 SPRING WASHER	8



NOTES:

1. ALL CABLES FOR ANTENNAS SHALL BE ROUTED OVER THE HEADFRAME ARMS AND FIXED TO THE ARMS USING HOT DIP GALVANIZED CLAMPS.
2. LIGHTNING ARRESTOR CABLE SHALL BE ROUTED INSIDE THE POLE AND HEADFRAME WITH REQUIRED SEPARATIONS FROM OTHER CABLES.
3. ANTENNA CABLES:
   - AVA5 CABLES 1 OFF PER COLLINEAR ANTENNA
   - CAT 5 CABLES 2 OFF PER DISH ANTENNA
   - INSTALLATION OF BURWOOD DISH WILL BE BY OTHERS AND IS NOT PART OF THIS SCOPE. INSTALLATION AND ROUTING OF ALL CABLES INCLUDING CABLES FOR THIS DISH IS PART OF THIS SCOPE.
4. DETAILED SHOP DRAWINGS SHALL BE PREPARED BY CONTRACTOR AND SUBMITTED TO THE PRINCIPAL FOR REVIEW AND COMMENT PRIOR TO FABRICATION OF THE HEADFRAME.
5. FOR PROTECTIVE COATING OF THE HEADFRAME STEEL STRUCTURE REFER TO PROJECT SPECIFICATIONS.

FABRICATION TOLERANCES
UNLESS OTHERWISE STATED
1. LINEAR & HOLES C/C +1
2. OVERALL LENGTH + 1.5
3. HOLE DIA. +0.5
4. ANGULAR + 30°

SITE BOLTS:

ARM CONNECTIONS: M16x60 LONG 8.8/TB HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS AND TWO NUTS-18 FASTENER ASSEMBLIES REQUIRED

HEADFRAME TO POLE CONNECTION: M24 8.8/S HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS TO SUIT FERRULES - 4 FASTENER ASSEMBLIES REQUIRED

HORIZONTAL SCALE 1:50

CONSTRUCTION ISSUE

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0	CONSTRUCTION ISSUE	AK	07/12/20

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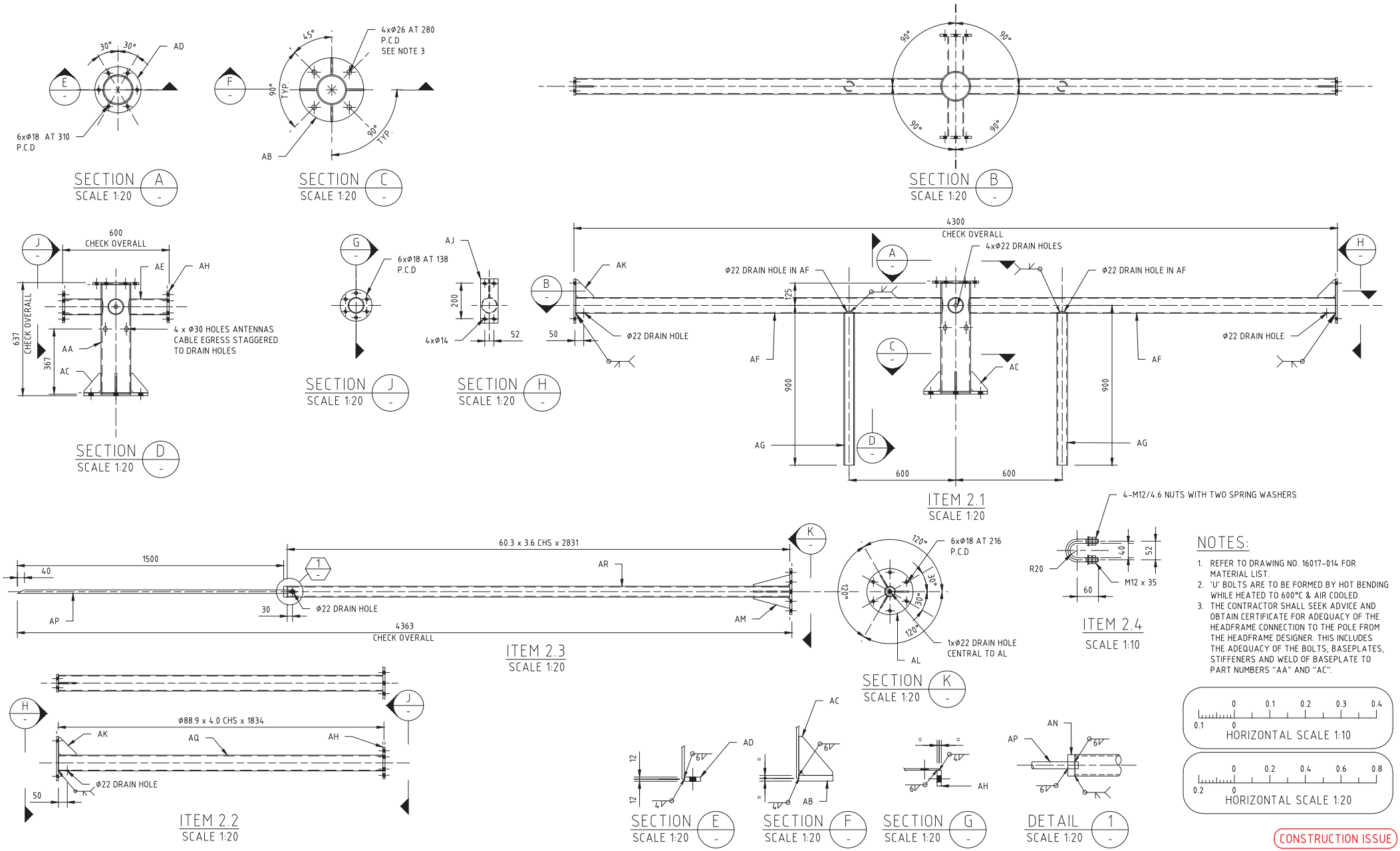
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME ARRANGEMENT

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	012	03

VERSION 4



NOTES:

1. REFER TO DRAWING NO. 16017-014 FOR MATERIAL LIST.
2. 'U' BOLTS ARE TO BE FORMED BY HOT BENDING WHILE HEATED TO 600°C & AIR COOLED.
3. THE CONTRACTOR SHALL SEEK ADVICE AND OBTAIN CERTIFICATE FOR ADEQUACY OF THE HEADFRAME CONNECTION TO THE POLE FROM THE HEADFRAME DESIGNER. THIS INCLUDES THE ADEQUACY OF THE BOLTS, BASEPLATES, STIFFENERS AND WELD OF BASEPLATE TO PART NUMBERS "AA" AND "AC".

HORIZONTAL SCALE 1:10

HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
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CONSULT. REFERENCE No. 12525175

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CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	AS SHOWN	-	16017	013	02

VERSION 4

Plot Date: 08/06/21 - 10:25 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-013_02.dwg

Hunter Water Corporation
ABN 46 228 513 446

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enquiries@hunterwater.com.au
hunterwater.com.au

21 December 2020

Our Ref: HW2016-530/53/10

National Parks and Wildlife Service
1 Wetlands Place
Shortland NSW 2307

Email: npws.lowerhunter@environment.nsw.gov.au

Dear Sir\Madam,

Proposed Communications Tower at Hickson Street Merewether

Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land off Hickson Street, Merewether (Lot 6, DP 776283 - refer Attachment A). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower prior to the demolition.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

Under the State Environmental Planning Policy (Infrastructure) 2007, Hunter Water is required to consult with the Office of Environment and Heritage (now Environment, Energy and Science Group) under clause 16 in regard to development on land adjacent to land reserved under the *National Parks and Wildlife Act 1974*

The proposed tower would be a 25-metre concrete pole. An additional 30cm dish will be installed on the new tower which will enable improved communications to Burwood Beach Wastewater Treatment Works. The tower will be a neutral colour to help it blend in with the surrounding environment and reduce the visual impact.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

See Attachment B for a visual representation of how the site will look once the new tower has been constructed and the water tank demolished.

Hunter Water is preparing a Review of Environmental Factors (REF) for the proposal. The REF will consider potential environmental impacts of the proposal including impacts on biodiversity and the community. We propose to publicly exhibit the REF in early 2021.

The development of the tower design will consider the NSW Government's *Telecommunications Facilities Guideline Including Broadband* (July 2010).

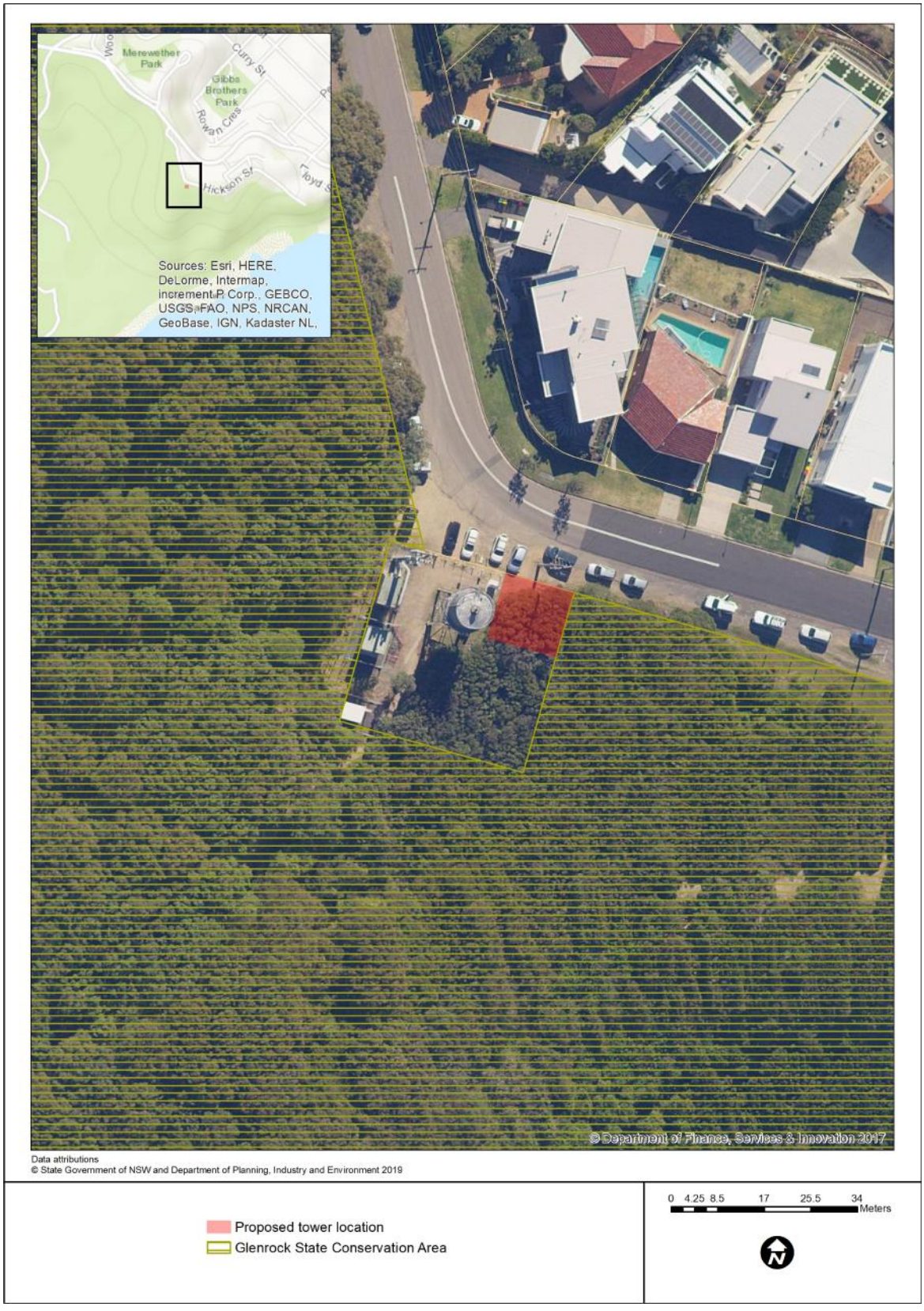
Construction of the new tower is expected to start in the first half of 2021, with the demolition of the old water tank to follow. We will liaise directly with National Parks and Wildlife Service Ranger, Katherine Harrison, regarding potential construction impacts.

In accordance with the consultation requirement of the ISEPP, we would like to give you this opportunity to provide comment on the proposal. Please forward any comment to Andrew Moss by email at andrew.moss@hunterwater.com.au by Thursday 28 January 2021.

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location



Attachment B
Visual representation of communications tower (before and after)

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

Hunter Water Corporation
ABN 46 228 513 446

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hunterwater.com.au

17 June 2021

Our Ref: HW2016-530/53/10

National Parks and Wildlife Service
1 Wetlands Place
Shortland NSW 2307

Email: npws.lowerhunter@environment.nsw.gov.au

Dear Sir\Madam,

Proposed communications tower at Hickson Street Merewether - amended design

As advised in December 2020, Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land located at 29 Scenic Drive Merewether (off Hickson Street, Lot 6, DP 776283, refer Attachment A). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

Under the State Environmental Planning Policy (Infrastructure) 2007, Hunter Water is required to consult with the Office of Environment and Heritage (now Environment, Energy and Science Group) under clause 16 in regard to development on land adjacent to land reserved under the *National Parks and Wildlife Act 1974.*

The original tower design consisted of a 25m tall concrete pole to be constructed adjacent to the tank. Following further investigations, including consideration of site constraints and constructability, and feedback from the consultation process, the design has been amended to reduce the pole height to 23m. The new pole will now be constructed on the same footprint as the tank, meaning less vegetation will need to be removed.

To maintain continuity of communications while the tank is being demolished and the permanent tower constructed, a temporary timber pole will be installed on the site. This pole will be removed at the completion of the work.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

Refer attached for the design drawings of the proposed tower.

Hunter Water is finalising a Review of Environmental Factors (REF) for the proposal, which will consider potential environmental and community impacts. The REF will be placed on public exhibition in the coming weeks

The development of the tower design has considered the NSW Government's *Telecommunications Facilities Guideline Including Broadband* (July 2010).

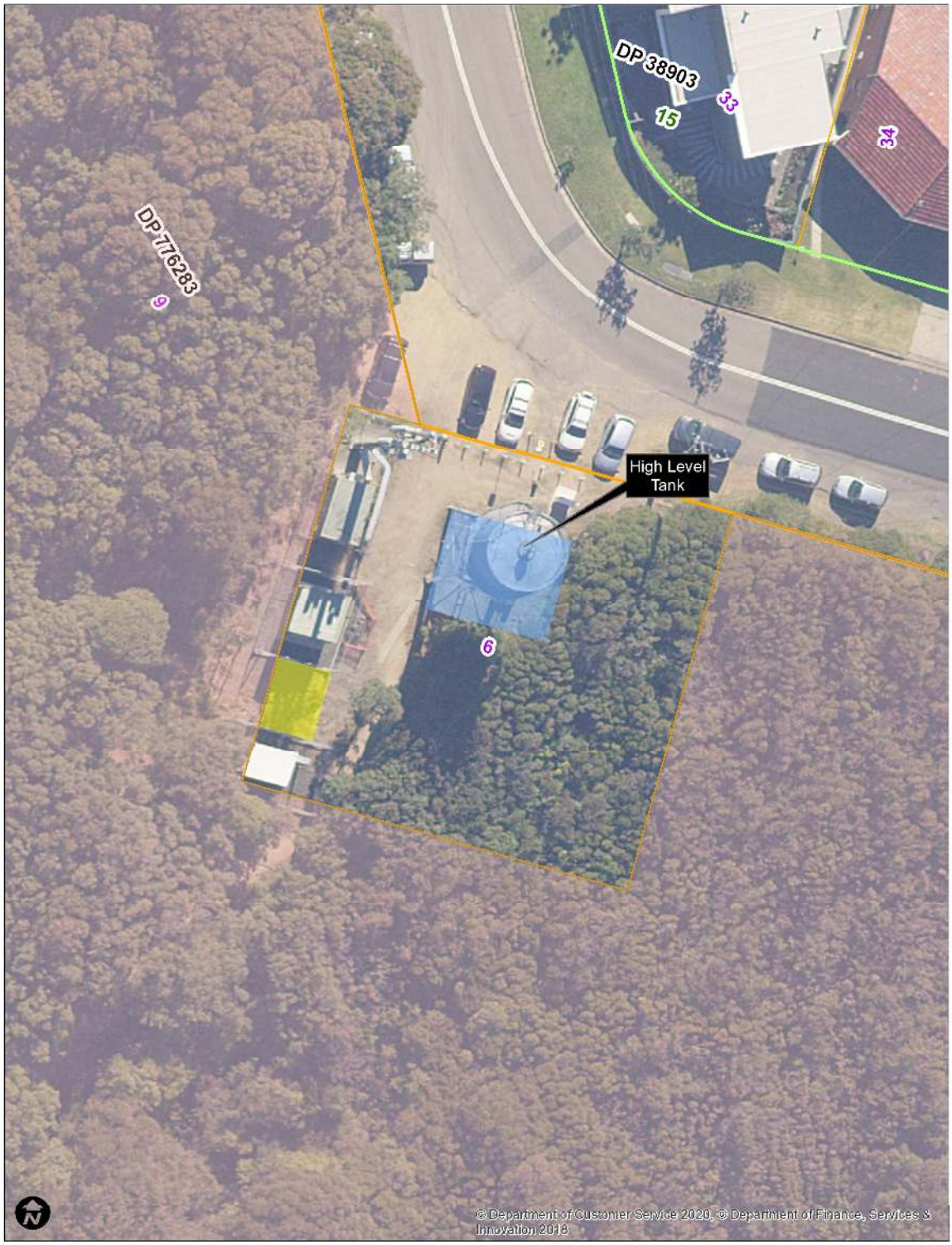
In accordance with the consultation requirement of the ISEPP we would like to give the National Parks and Wildlife Service this opportunity to provide comment on the amended proposal. Please forward any comment by email to andrew.moss@hunterwater.com.au by Friday 9 July 2021.

We will also continue to liaise directly with National Parks and Wildlife Service Ranger, Katherine Harrison, regarding the construction timeframe and potential construction impacts.

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location



Attachment B
Design drawings of proposed communications tower

HUNTER WATER CORPORATION

MEREWETHER – COMMUNICATION TOWER STRUCTURAL DESIGN

LOCALITY PLAN
NOT TO SCALE

DRAWING LIST:

16017-001	COVER SHEET, LOCALITY PLAN AND DRAWING LIST
16017-002	BEFORE AND AFTER PERSPECTIVES
16017-007	GENERAL ARRANGEMENT PLAN
16017-008	GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN
16017-009	CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS
16017-010	TYPICAL DETAILS
16017-011	ROCLA POLE ELEVATION VIEW
16017-012	HEADFRAME ARRANGEMENT
16017-013	HEADFRAME DETAILS
16017-014	HEADFRAME MATERIAL LIST

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
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CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
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TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
COVER SHEET, LOCALITY PLAN AND DRAWING LIST

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	–	16017	001	01

VERSION 4

Plot Date: 08/06/21 – 10:19 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-001_01.dwg

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

CONSTRUCTION ISSUE

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1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

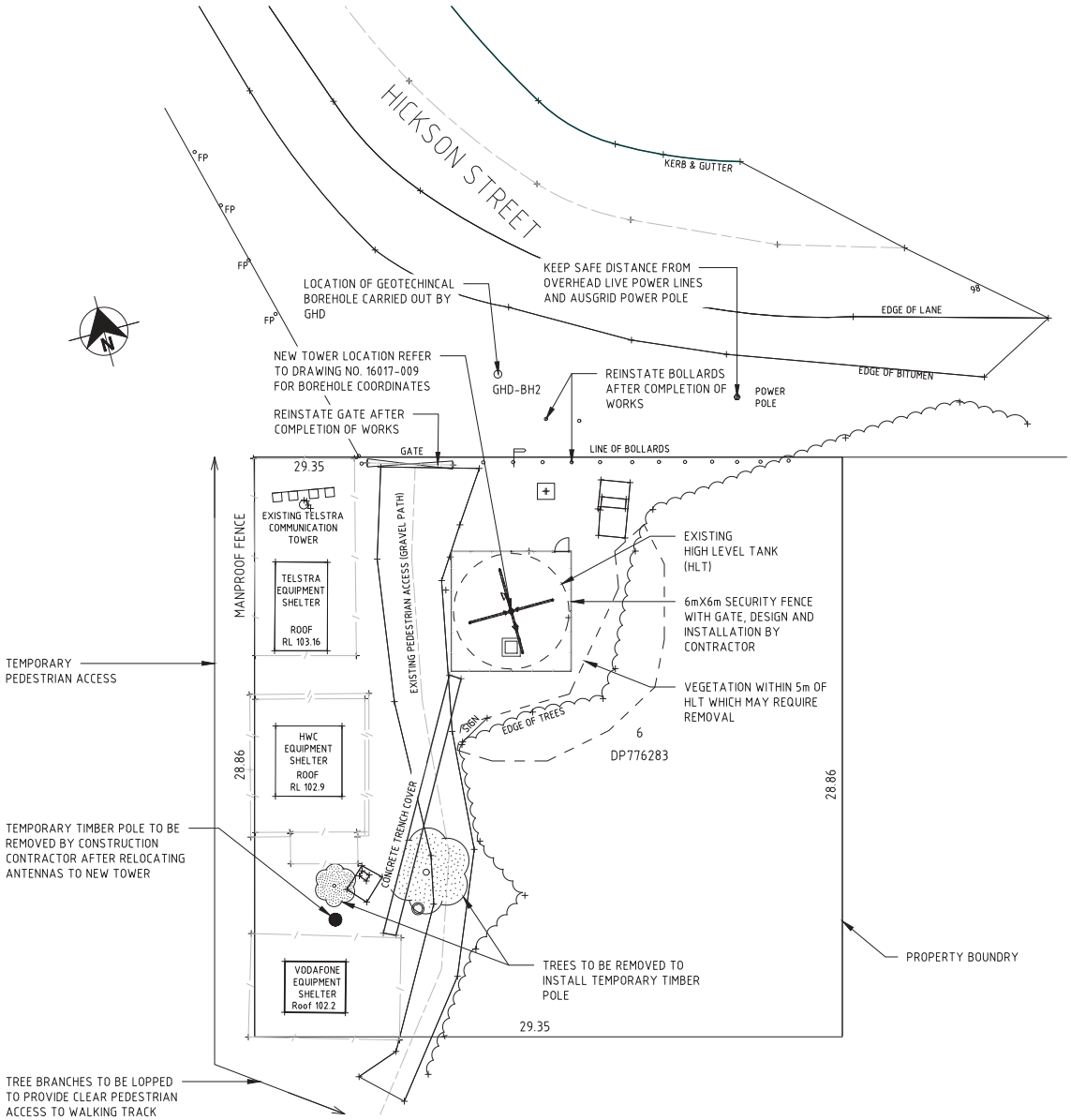
STRUCTURAL DESIGN
BEFORE AND AFTER PERSPECTIVES

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	-	16017	002	02

Plot Date: 08/06/21 - 10:20 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-002_02.dwg

NOTE:

1. ALL DRAWINGS SHALL BE READ IN CONJUCTION WITH TECHNICAL SPECIFICATIONS.
2. FOR EXISTING AND NEW UNDERGROUND SERVICES REFER TO DRAWING NO. 16017-008.



NEW SITE PLAN

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

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CONSULT. REFERENCE No. 12525175

HUNTER WATER

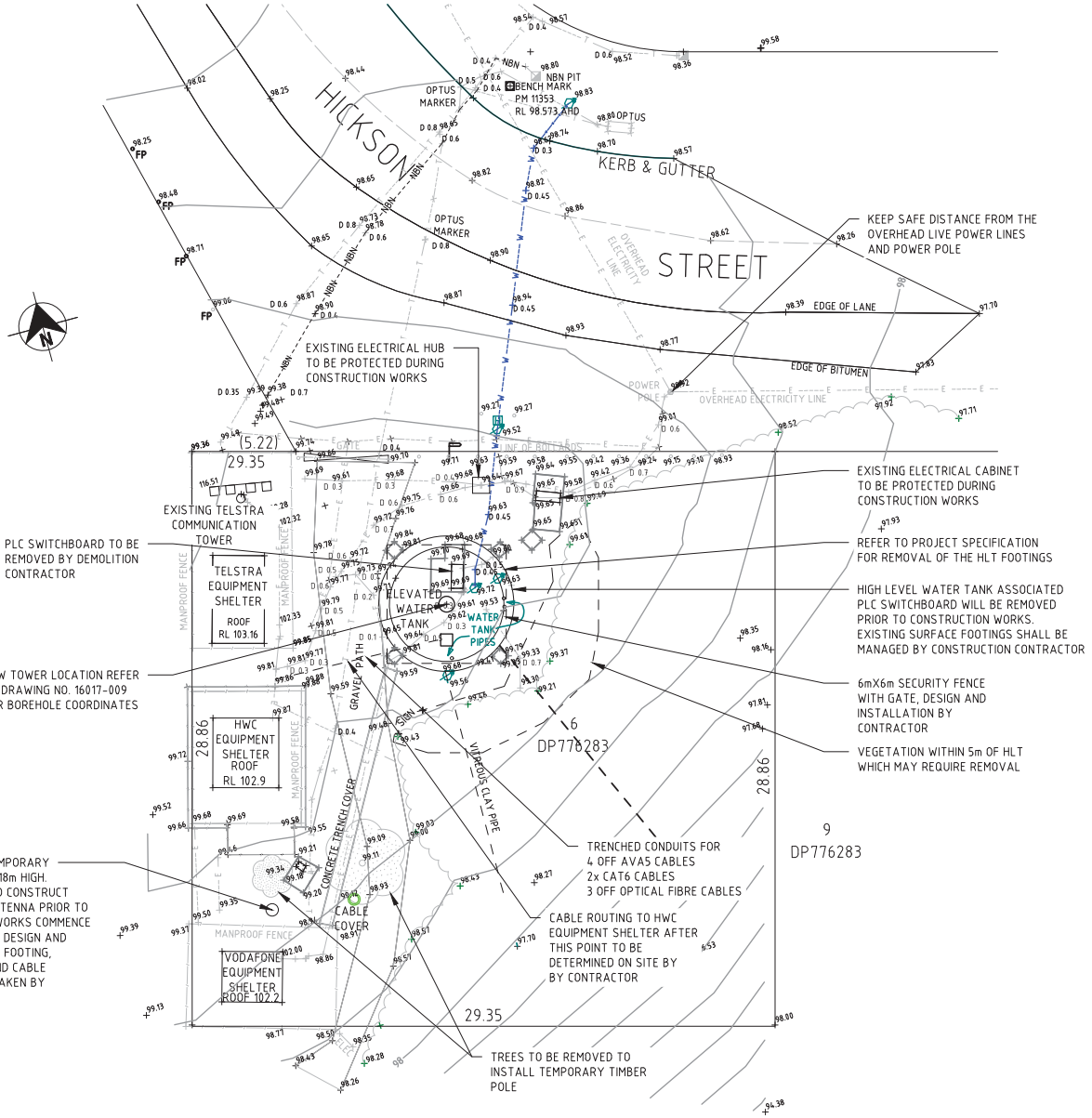
DESIGNED: HR	DATE: 30/06/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	007	03

Plot Date: 08/06/21 - 10:21 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-007_03.dwg



LEGEND:

- TREE
- COMMS PIT
- HYDRANT
- STOP VALVE
- ELECTRICAL BOX
- SIGN
- ELECTRICITY LINE & DEPTH
- WATER LINE & DEPTH
- TELEPHONE LINE & DEPTH
- NBN LINE & DEPTH

NOTE:

1. THE CONTRACTOR SHALL MARK EXACT LOCATION OF ALL EXISTING AND NEW UNDERGROUND SERVICES AT WORK AREA AND PROTECT AGAINST DAMAGE.

0 2.5 5.0 7.5 10
2.5 0
HORIZONTAL SCALE 1:250

SITE PLAN WITH UNDERGROUND SERVICES

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
4	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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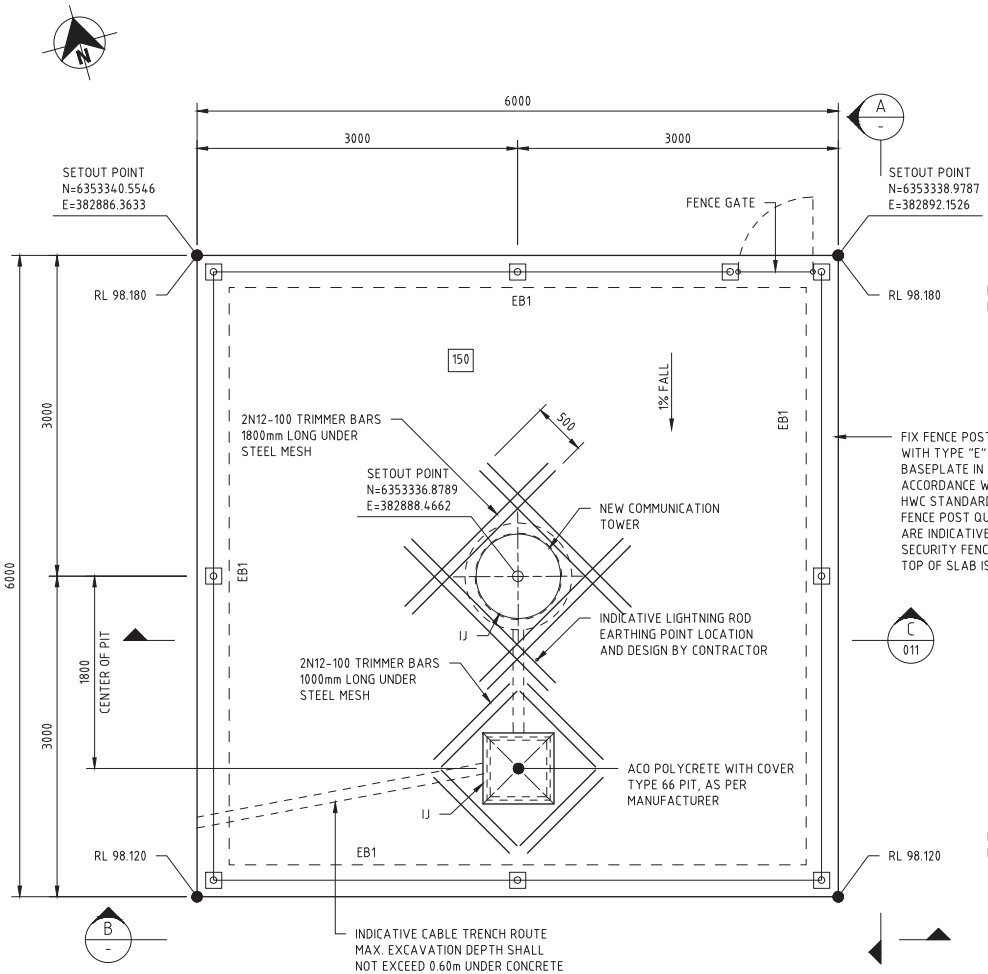
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

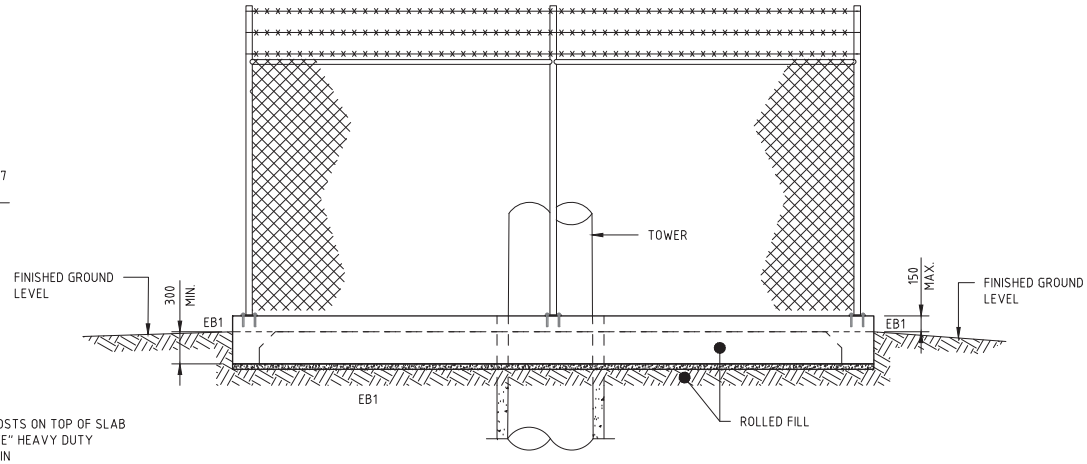
STRUCTURAL DESIGN
GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	008	04

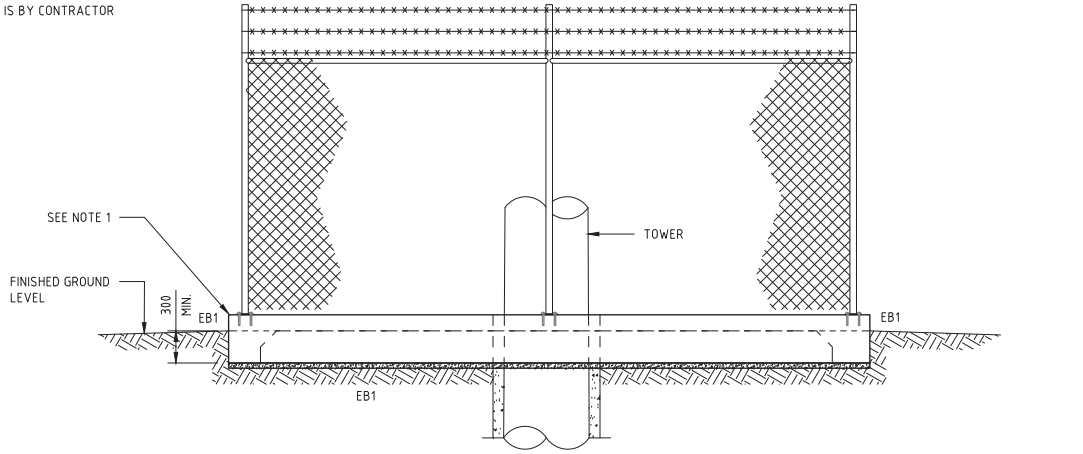
Plot Date: 11/06/21 - 10:40 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-008_04.dwg



PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

CONCRETE GROUND BEAMS SCHEDULE		
MARK	SIZE	REINFORCEMENT
EB1	EDGE BEAM 300 W x 450 D	3L11 - TM BOTT. WITH R10 - 600 LIGS

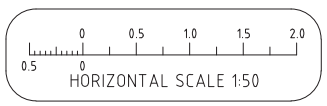
SLAB REINFORCEMENT	
THICKNESS	REINFORCEMENT
150	SL82 TOP

NOTE:

1. CHEMICAL ANCHORS FOR THE FENCE POSTS SHALL BE HILTI RE 500 V3 + HIT-V HOT DIP GALVANIZED FULL THREADED 4-M12 STUDS GRADE 5.8 OR APPROVED EQUIVALENT WITH EFFECTIVE EMBEDMENT OF 150 mm AND MINIMUM 80 mm EDGE DISTANCE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

LEGEND:

IJ - DENOTES ISOLATION JOINT



CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
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1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
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CONSULT. REFERENCE No. 12525175

HUNTER WATER

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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

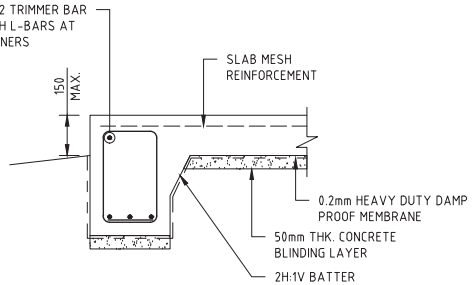
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS

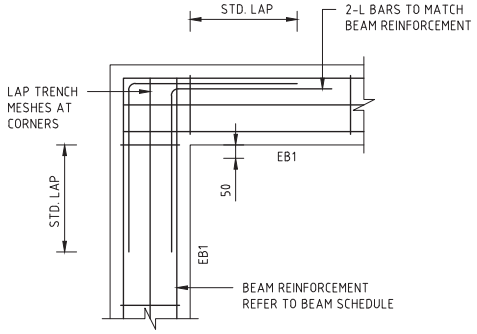
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	009	03

VERSION 4

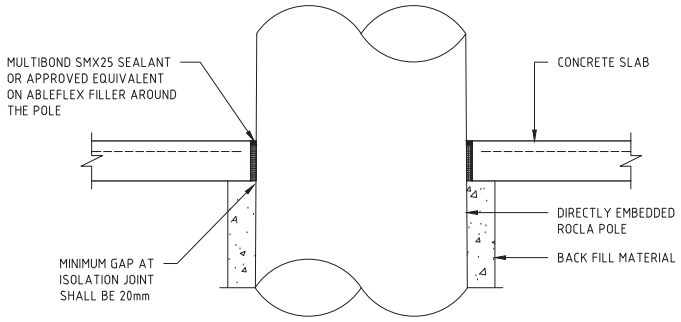
Plot Date: 11/06/21 - 10:41 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-009_03.dwg



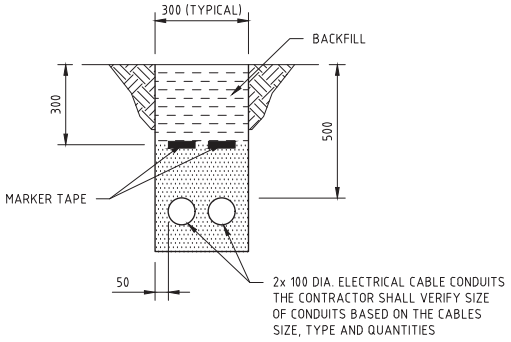
TYPICAL EDGE BEAM (EB1) DETAIL
SCALE 1:20



TYPICAL CORNER FOOTING REINFORCEMENT DETAIL
SCALE 1:20



ISOLATION JOINT (IJ) DETAIL
SCALE 1:20



TYPICAL TRENCHED CONDUITS DETAIL
SCALE 1:20

0 0.2 0.4 0.6 0.8
0.2 0
HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

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www.ghd.com.au

CONSULT. REFERENCE No.
12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
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CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
TYPICAL DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:20	-	16017	010	01

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-010_01.dwg

NOTES:

1- THE POLE SHALL BE INSTALLED TO AN ORIENTATION TO ALLOW INSTALLATION OF THE HEADFRAME IN THE INDICATED ORIENTATION WITH CABLE OPENING AT THE BOTTOM NEAREST TO THE PIT. THE ORIENTATION OF TOP FERRULES SHALL ALLOW FOR CORRECT BEARING OF THE DISH ANTENNAS.

2- CABLE TRAY ROUTING AND ARRANGEMENT IS BY CONTRACTOR.

3- ALL CABLES SHALL BE ROUTED AND FIXED INSIDE THE POLE. ATTACHMENT OF CABLE TRAY OVER THE POLE IS NOT ALLOWED.

4- ACCESS TO THE HEADFRAME AND THE POLE IS ONLY POSSIBLE BY ELEVATED WORKING PLATFORM. ADDITION OF CLIMBING MEANS SUCH AS STEP BOLTS OR LADDERS ARE NOT ALLOWED.

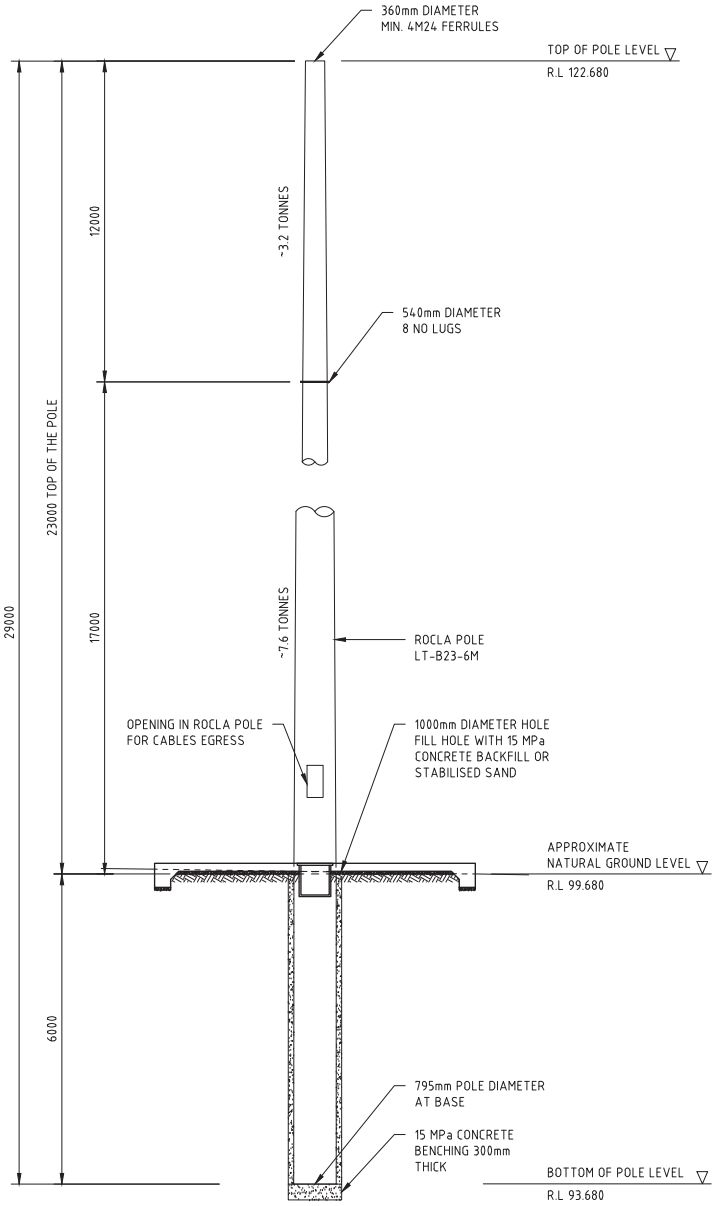
5- THE BACKFILL AROUND THE POLE SHALL BE FLOWABLE STABILISED SAND OR BLINDING CONCRETE OF STRENGTH GREATER THAN THE CLAYEY SAND THAT IS REPLACED.

6- THE BACKFILL SHALL NOT ARCH BETWEEN THE POLE AND SIDE OF THE HOLE TO PREVENT CREATION OF VOIDS.

7- REFER TO GEOTECHNICAL REPORT NUMBER 12525175 FOR GEOTECHNICAL PROPERTIES OF THE SOIL. CONTRACTOR SHALL ALLOW FOR AN ON-SITE COMPETENT GEOTECHNICAL ENGINEER TO INSPECT THE ENCOUNTERED SOIL STRATA AND MATERIAL AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

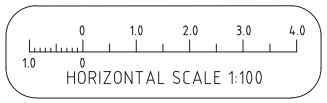
8- THE POLE SHALL BE TEMPORARILY SUPPORTED UNTIL THE BACKFILL GAINS REQUIRED STRENGTH. THE HEADFRAME SHALL ONLY BE INSTALLED AFTER THE TEMPORARY SUPPORTS ARE REMOVED. PLANNING AND DESIGN OF THE REQUIRED TEMPORARY WORKS ARE BY CONTRACTOR.

9-THE CONTRACTOR SHALL VERIFY THE NATURAL GROUND LEVEL SHOWN IN THIS DRAWING AT THE LOCATION OF THE POLE AND REPORT DISCREPANCIES.



SECTION C / 009
SCALE 1:100

NOTE:
FENCE NOT SHOWN FOR CLARITY



CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

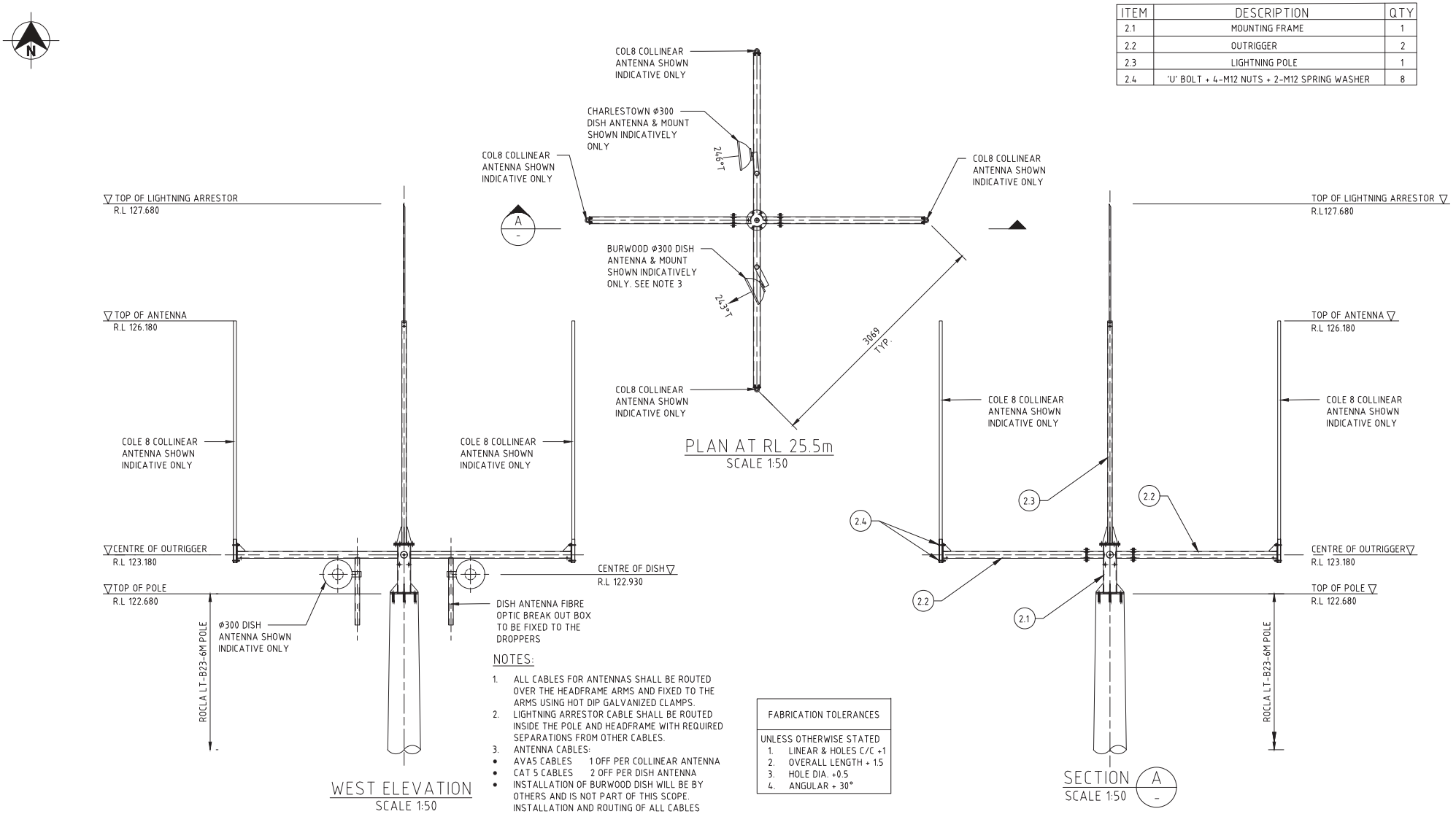
STRUCTURAL DESIGN
ROCLA POLE ELEVATION VIEW

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:100	-	16017	011	03

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-011_03.dwg

ITEM	DESCRIPTION	QTY
2.1	MOUNTING FRAME	1
2.2	OUTRIGGER	2
2.3	LIGHTNING POLE	1
2.4	'U' BOLT + 4-M12 NUTS + 2-M12 SPRING WASHER	8



NOTES:

1. ALL CABLES FOR ANTENNAS SHALL BE ROUTED OVER THE HEADFRAME ARMS AND FIXED TO THE ARMS USING HOT DIP GALVANIZED CLAMPS.
2. LIGHTNING ARRESTOR CABLE SHALL BE ROUTED INSIDE THE POLE AND HEADFRAME WITH REQUIRED SEPARATIONS FROM OTHER CABLES.
3. ANTENNA CABLES:
   - AVA5 CABLES 1 OFF PER COLLINEAR ANTENNA
   - CAT 5 CABLES 2 OFF PER DISH ANTENNA
   - INSTALLATION OF BURWOOD DISH WILL BE BY OTHERS AND IS NOT PART OF THIS SCOPE. INSTALLATION AND ROUTING OF ALL CABLES INCLUDING CABLES FOR THIS DISH IS PART OF THIS SCOPE.
4. DETAILED SHOP DRAWINGS SHALL BE PREPARED BY CONTRACTOR AND SUBMITTED TO THE PRINCIPAL FOR REVIEW AND COMMENT PRIOR TO FABRICATION OF THE HEADFRAME.
5. FOR PROTECTIVE COATING OF THE HEADFRAME STEEL STRUCTURE REFER TO PROJECT SPECIFICATIONS.

FABRICATION TOLERANCES
UNLESS OTHERWISE STATED
1. LINEAR & HOLES C/C +1
2. OVERALL LENGTH + 1.5
3. HOLE DIA. +0.5
4. ANGULAR + 30°

SITE BOLTS:

ARM CONNECTIONS: M16x60 LONG 8.8/TB HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS AND TWO NUTS-18 FASTENER ASSEMBLIES REQUIRED

HEADFRAME TO POLE CONNECTION: M24 8.8/S HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS TO SUIT FERRULES - 4 FASTENER ASSEMBLIES REQUIRED

HORIZONTAL SCALE 1:50

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
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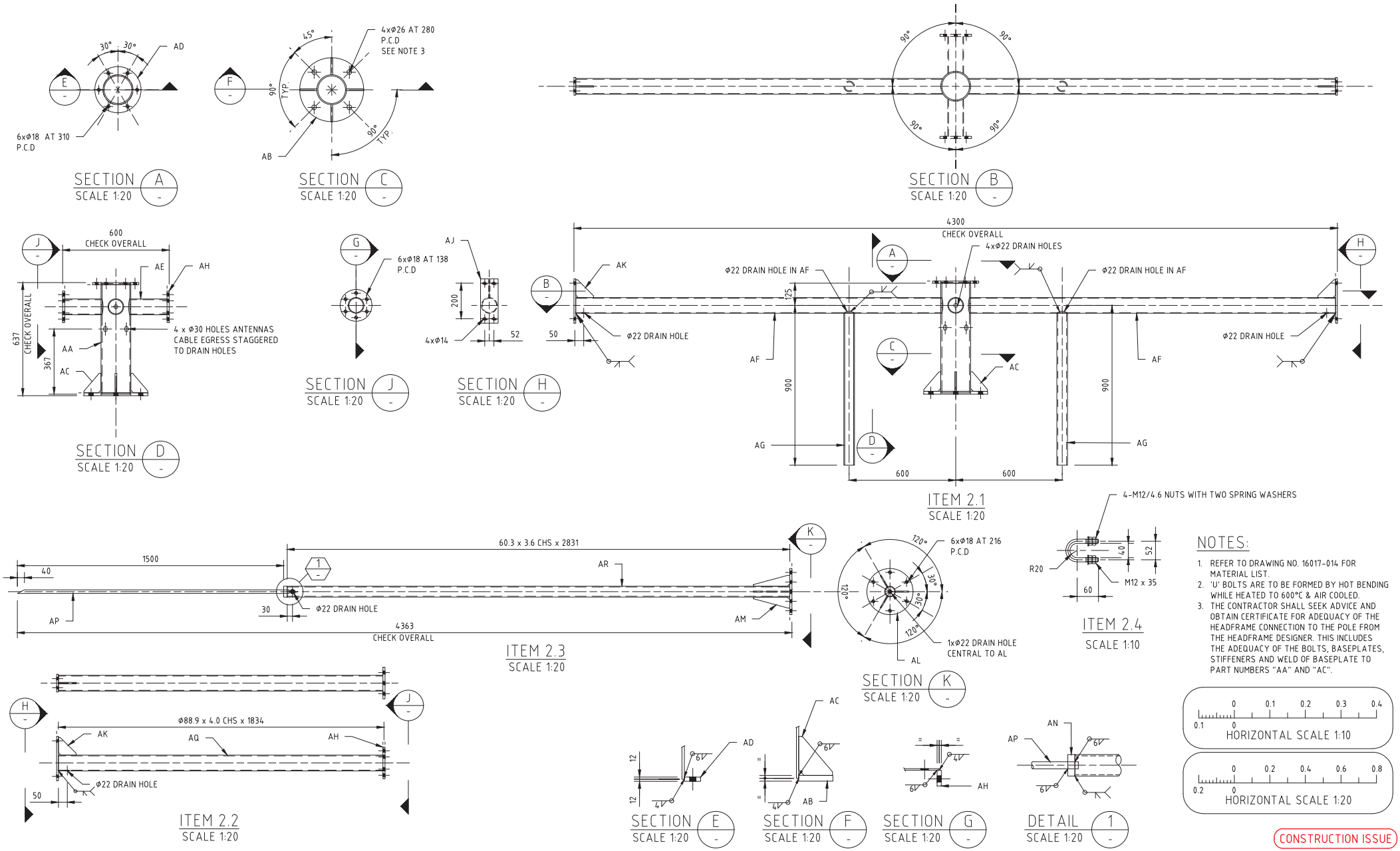
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME ARRANGEMENT

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	012	03

VERSION 4



NOTES:

1. REFER TO DRAWING NO. 16017-014 FOR MATERIAL LIST.
2. 'U' BOLTS ARE TO BE FORMED BY HOT BENDING WHILE HEATED TO 600°C & AIR COOLED.
3. THE CONTRACTOR SHALL SEEK ADVICE AND OBTAIN CERTIFICATE FOR ADEQUACY OF THE HEADFRAME CONNECTION TO THE POLE FROM THE HEADFRAME DESIGNER. THIS INCLUDES THE ADEQUACY OF THE BOLTS, BASEPLATES, STIFFENERS AND WELD OF BASEPLATE TO PART NUMBERS "AA" AND "AC".

HORIZONTAL SCALE 1:10

HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	AS SHOWN	-	16017	013	02

VERSION 4

Plot Date: 08/06/21 - 10:25 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-013_02.dwg

Hunter Water Corporation
ABN 46 228 513 446

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hunterwater.com.au

21 December 2020

Our Ref: HW2016-530/53/10

Subsidence Advisory NSW
Ground Floor, NSW Government Offices
117 Bull St
Newcastle West NSW 2302

To whom it may concern

Proposed Communications Tower at Hickson Street Merewether

Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land off Hickson Street, Merewether (Lot 6, DP 776283, refer Figure 1 and attachment). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower prior to the demolition.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

Under Clause 114 of the ISEPP, Hunter Water is required to provide Subsidence Advisory with written notice of the intention to undertake development of a tower or mast.

The proposed tower would be a 25-metre concrete pole. An additional 30cm diameter communication dish is to be installed to improve communications to Burwood Beach Wastewater Treatment Works. The tower will be a neutral colour to help it blend in with the surrounding environment and reduce the visual impact.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

See Figure 2 for a visual representation of how the site will look once the new tower has been constructed and the water tank demolished.

Hunter Water is preparing a Review of Environmental Factors (REF) for the proposal. The REF will consider potential environmental impacts of the proposal including impacts on biodiversity and the community. We propose to publicly exhibit the REF in early 2021.

The development of the tower design would consider the NSW Governments *Telecommunications Facilities Guideline Including Broadband* (July 2010). Construction of the new tower is expected to start in the first half of 2021, with the demolition of the old water tank to follow.

Please contact Andrew Moss with any comment by email to andrew.moss@hunterwater.com.au by Thursday 28 January 2021.

Yours faithfully,

Andrew Moss
Senior Project Manager

Figure 1
Proposal location

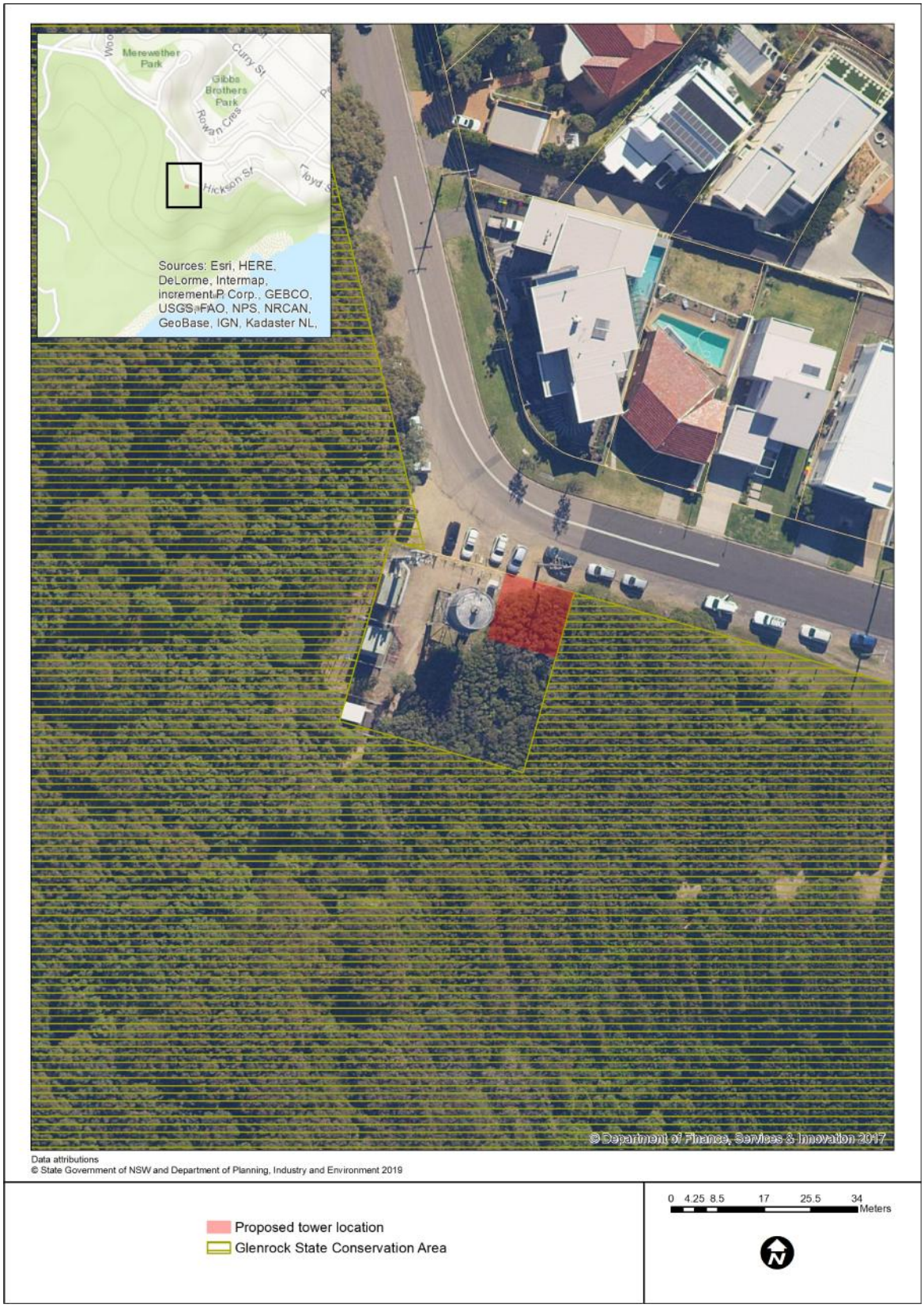

Figure 2
Visual representation of communications tower (before and after)

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

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hunterwater.com.au

17 June 2021

Our Ref: HW2016-530/53/10

Subsidence Advisory NSW
Ground Floor, NSW Government Offices
117 Bull St
Newcastle West NSW 2302

To whom it may concern

Proposed communications tower at Hickson Street Merewether - amended design

As advised in December 2020, Hunter Water Corporation is proposing to construct a communications tower on Hunter Water owned land located at 29 Scenic Drive Merewether (off Hickson Street, Lot 6, DP 776283, refer Attachment A). The water tank at this site is proposed to be demolished and the existing radio antennas and communication dish currently installed on the tank will be relocated to the new tower.

Hunter Water is undertaking the proposal as development permitted without consent under clause 114 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), and is the proponent and determining authority for the work under Division 5.1 of the *Environmental Planning and Assessment Act 1979*.

The original tower design consisted of a 25m tall concrete pole to be constructed adjacent to the tank. Following further investigations, including consideration of site constraints and constructability, and feedback from the consultation process, the design has been amended to reduce the pole height to 23m. The new pole will now be constructed on the same footprint as the tank, meaning less vegetation will need to be removed.

To maintain continuity of communications while the tank is being demolished and the permanent tower constructed, a temporary timber pole will be installed on the site. This pole will be removed at the completion of the work.

The proposed tower would be located wholly within Hunter Water land. Some vegetation removal would be required and would be managed in accordance with the requirements of the project approval.

Refer attached for the design drawings of the proposed tower.

Hunter Water is finalising a Review of Environmental Factors (REF) for the proposal, which will consider potential environmental and community impacts. The REF will be placed on public exhibition in the coming weeks.

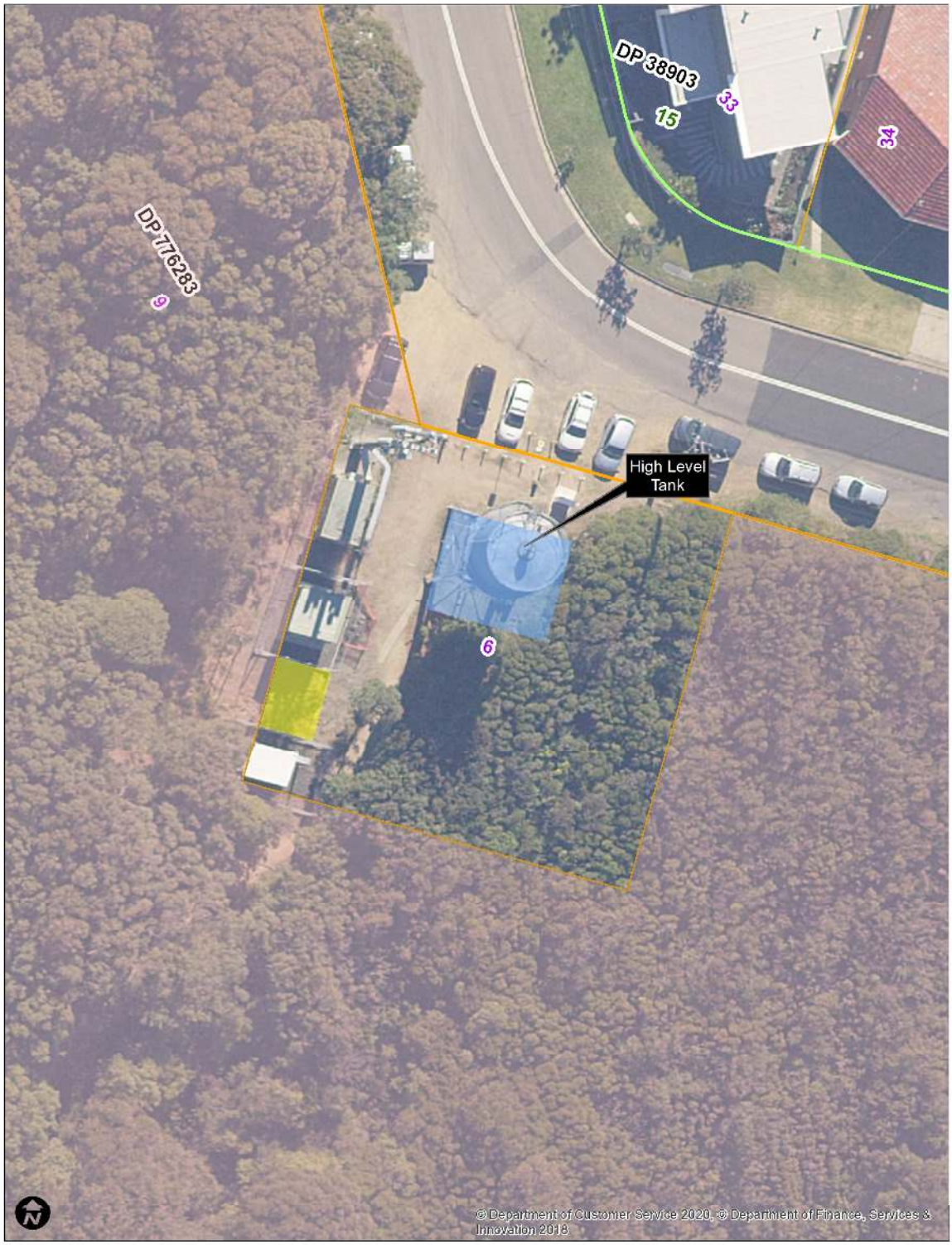
The development of the tower design has considered the NSW Government's *Telecommunications Facilities Guideline Including Broadband* (July 2010).

Please forward any comment by email to andrew.moss@hunterwater.com.au by Friday 9 July 2021.

Yours faithfully,

Andrew Moss
Senior Project Manager

Attachment A
Proposal location



Attachment B
Design drawings of proposed communications tower

HUNTER WATER CORPORATION

MEREWETHER – COMMUNICATION TOWER STRUCTURAL DESIGN

LOCALITY PLAN
NOT TO SCALE

DRAWING LIST:

16017-001	COVER SHEET, LOCALITY PLAN AND DRAWING LIST
16017-002	BEFORE AND AFTER PERSPECTIVES
16017-007	GENERAL ARRANGEMENT PLAN
16017-008	GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN
16017-009	CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS
16017-010	TYPICAL DETAILS
16017-011	ROCLA POLE ELEVATION VIEW
16017-012	HEADFRAME ARRANGEMENT
16017-013	HEADFRAME DETAILS
16017-014	HEADFRAME MATERIAL LIST

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
1	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
0	CONSTRUCTION ISSUE	AK	07/12/20

CONSULTANT DETAILS:
GHD
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E nltmail@ghd.com.au
www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
COVER SHEET, LOCALITY PLAN AND DRAWING LIST

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	–	16017	001	01

VERSION 4

Plot Date: 08/06/21 – 10:19 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-001_01.dwg

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
BEFORE

PERSPECTIVE: HICKSON ST., LOOKING SOUTH
AFTER

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
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TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

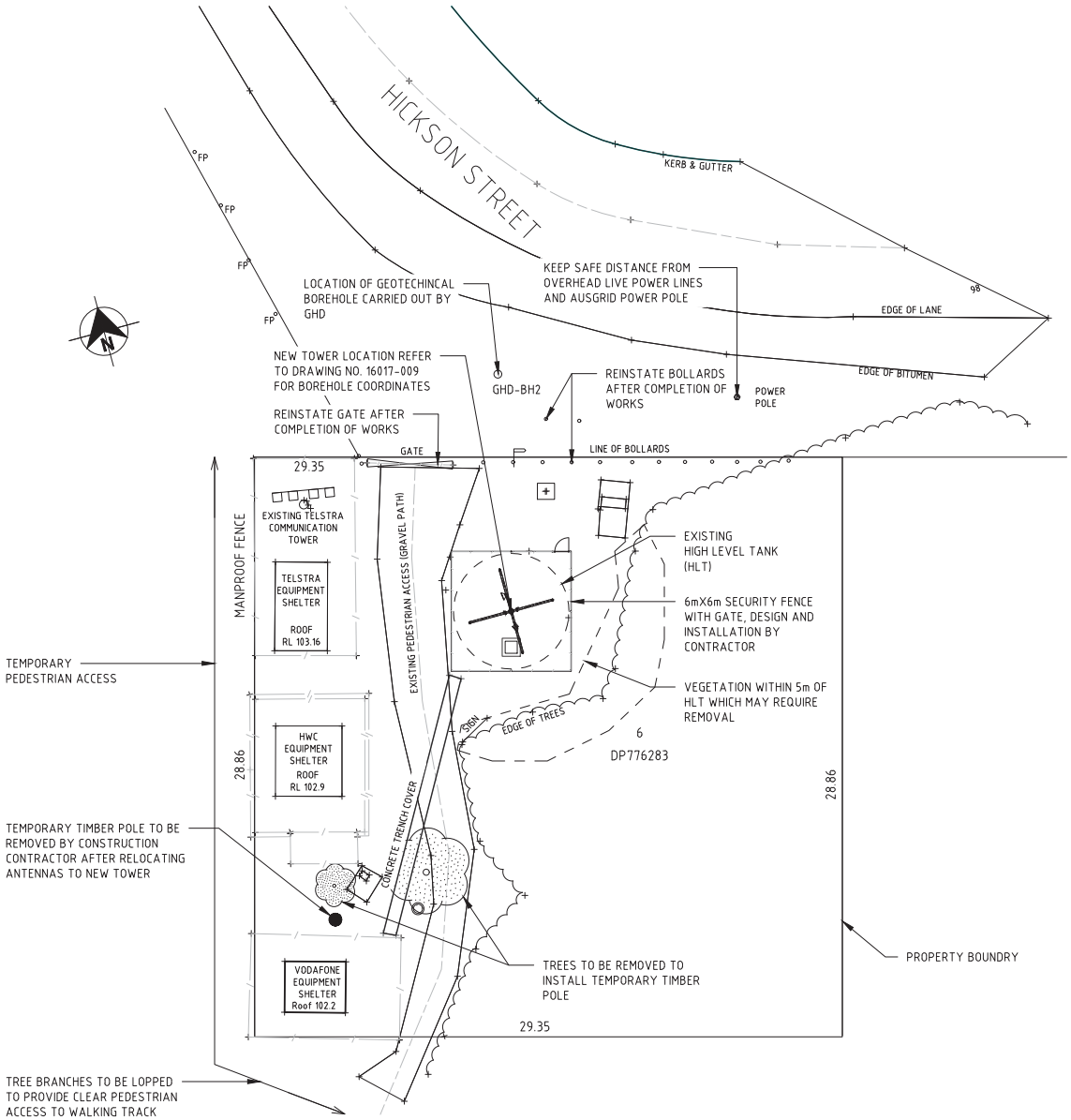
STRUCTURAL DESIGN
BEFORE AND AFTER PERSPECTIVES

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	NTS	-	16017	002	02

Plot Date: 08/06/21 - 10:20 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-002_02.dwg

NOTE:

1. ALL DRAWINGS SHALL BE READ IN CONJUCTION WITH TECHNICAL SPECIFICATIONS.
2. FOR EXISTING AND NEW UNDERGROUND SERVICES REFER TO DRAWING NO. 16017-008.



NEW SITE PLAN

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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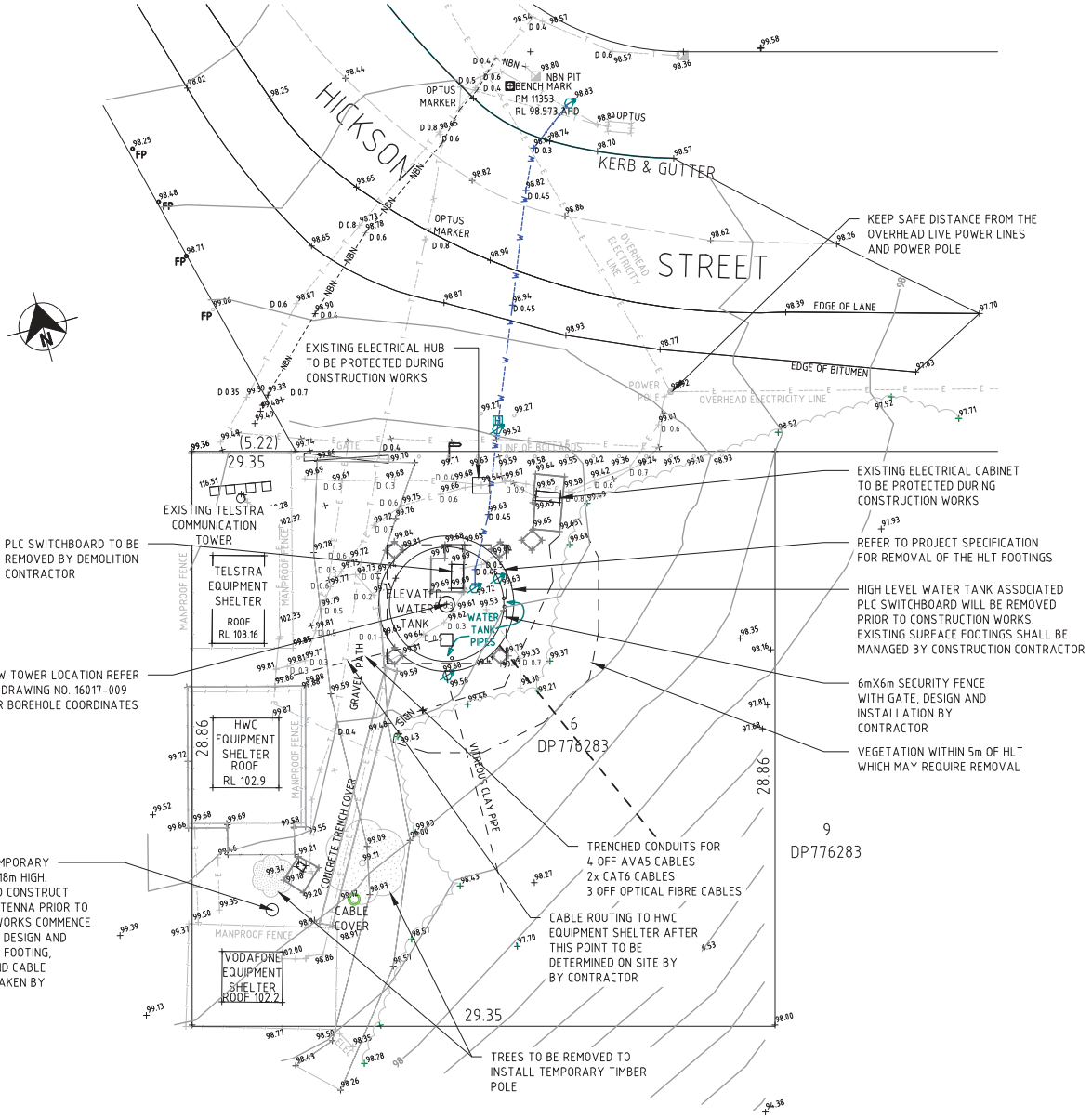
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	007	03

Plot Date: 08/06/21 - 10:21 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-007_03.dwg



LEGEND:

- TREE
- COMMS PIT
- HYDRANT
- STOP VALVE
- ELECTRICAL BOX
- SIGN
- ELECTRICITY LINE & DEPTH
- WATER LINE & DEPTH
- TELEPHONE LINE & DEPTH
- NBN LINE & DEPTH

NOTE:

1. THE CONTRACTOR SHALL MARK EXACT LOCATION OF ALL EXISTING AND NEW UNDERGROUND SERVICES AT WORK AREA AND PROTECT AGAINST DAMAGE.

0 2.5 5.0 7.5 10
2.5 0
HORIZONTAL SCALE 1:250

SITE PLAN WITH UNDERGROUND SERVICES

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
4	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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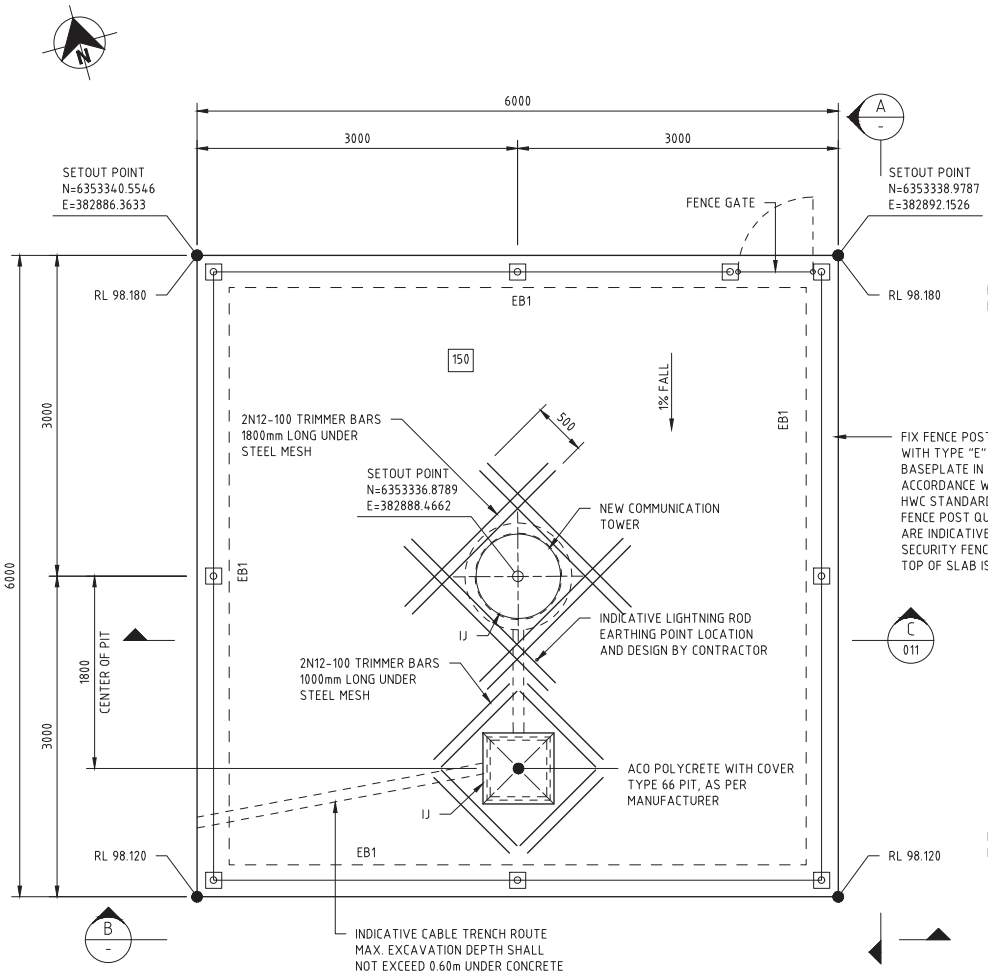
TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

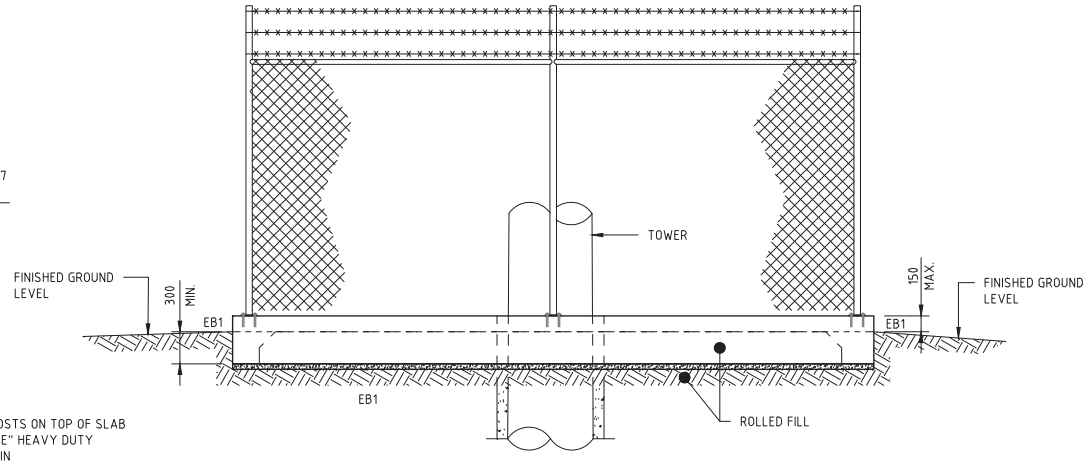
STRUCTURAL DESIGN
GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	008	04

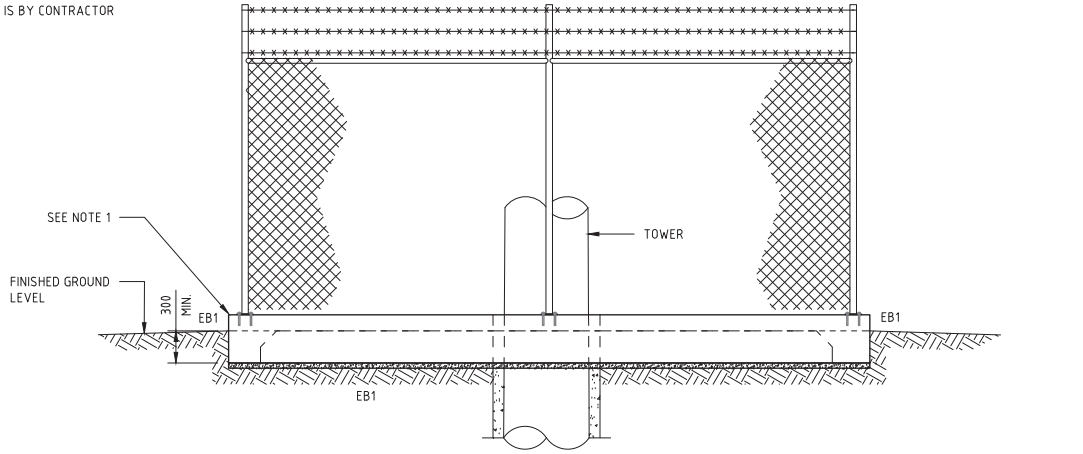
Plot Date: 11/06/21 - 10:40 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-008_04.dwg



PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

CONCRETE GROUND BEAMS SCHEDULE		
MARK	SIZE	REINFORCEMENT
EB1	EDGE BEAM 300 W x 450 D	3L11 - TM BOTT. WITH R10 - 600 LIGS

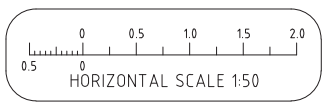
SLAB REINFORCEMENT	
THICKNESS	REINFORCEMENT
150	SL82 TOP

NOTE:

1. CHEMICAL ANCHORS FOR THE FENCE POSTS SHALL BE HILTI RE 500 V3 + HIT-V HOT DIP GALVANIZED FULL THREADED 4-M12 STUDS GRADE 5.8 OR APPROVED EQUIVALENT WITH EFFECTIVE EMBEDMENT OF 150 mm AND MINIMUM 80 mm EDGE DISTANCE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

LEGEND:

IJ - DENOTES ISOLATION JOINT



CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
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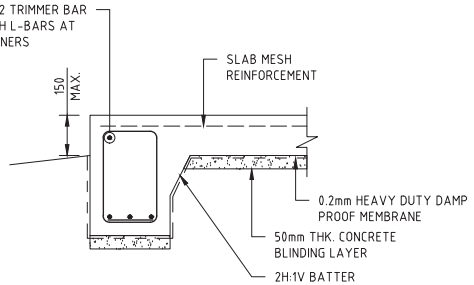
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS

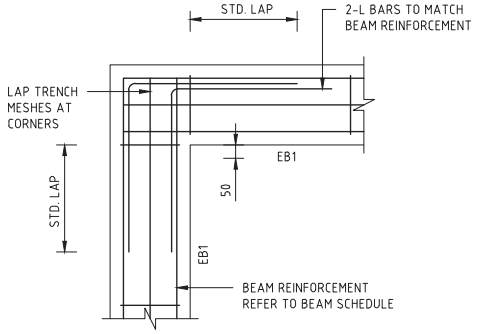
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	009	03

VERSION 4

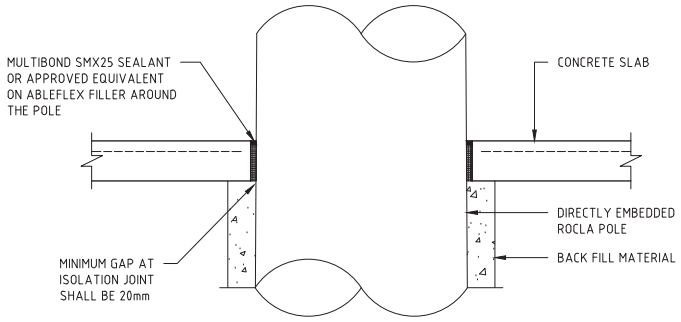
Plot Date: 11/06/21 - 10:41 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-009_03.dwg



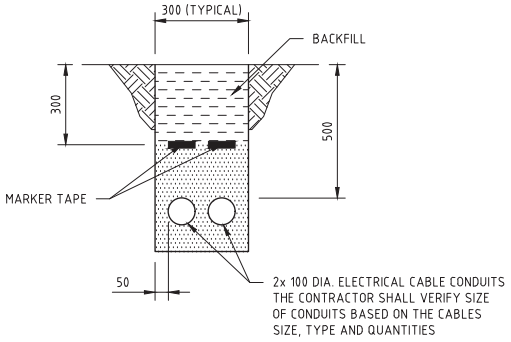
TYPICAL EDGE BEAM (EB1) DETAIL
SCALE 1:20



TYPICAL CORNER FOOTING REINFORCEMENT DETAIL
SCALE 1:20



ISOLATION JOINT (IJ) DETAIL
SCALE 1:20



TYPICAL TRENCHED CONDUITS DETAIL
SCALE 1:20

0 0.2 0.4 0.6 0.8
0.2 0
HORIZONTAL SCALE 1:20

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
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0	CONSTRUCTION ISSUE	AK	07/12/20

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APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
TYPICAL DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:20	-	16017	010	01

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-010_01.dwg

NOTES:

1- THE POLE SHALL BE INSTALLED TO AN ORIENTATION TO ALLOW INSTALLATION OF THE HEADFRAME IN THE INDICATED ORIENTATION WITH CABLE OPENING AT THE BOTTOM NEAREST TO THE PIT. THE ORIENTATION OF TOP FERRULES SHALL ALLOW FOR CORRECT BEARING OF THE DISH ANTENNAS.

2- CABLE TRAY ROUTING AND ARRANGEMENT IS BY CONTRACTOR.

3- ALL CABLES SHALL BE ROUTED AND FIXED INSIDE THE POLE. ATTACHMENT OF CABLE TRAY OVER THE POLE IS NOT ALLOWED.

4- ACCESS TO THE HEADFRAME AND THE POLE IS ONLY POSSIBLE BY ELEVATED WORKING PLATFORM. ADDITION OF CLIMBING MEANS SUCH AS STEP BOLTS OR LADDERS ARE NOT ALLOWED.

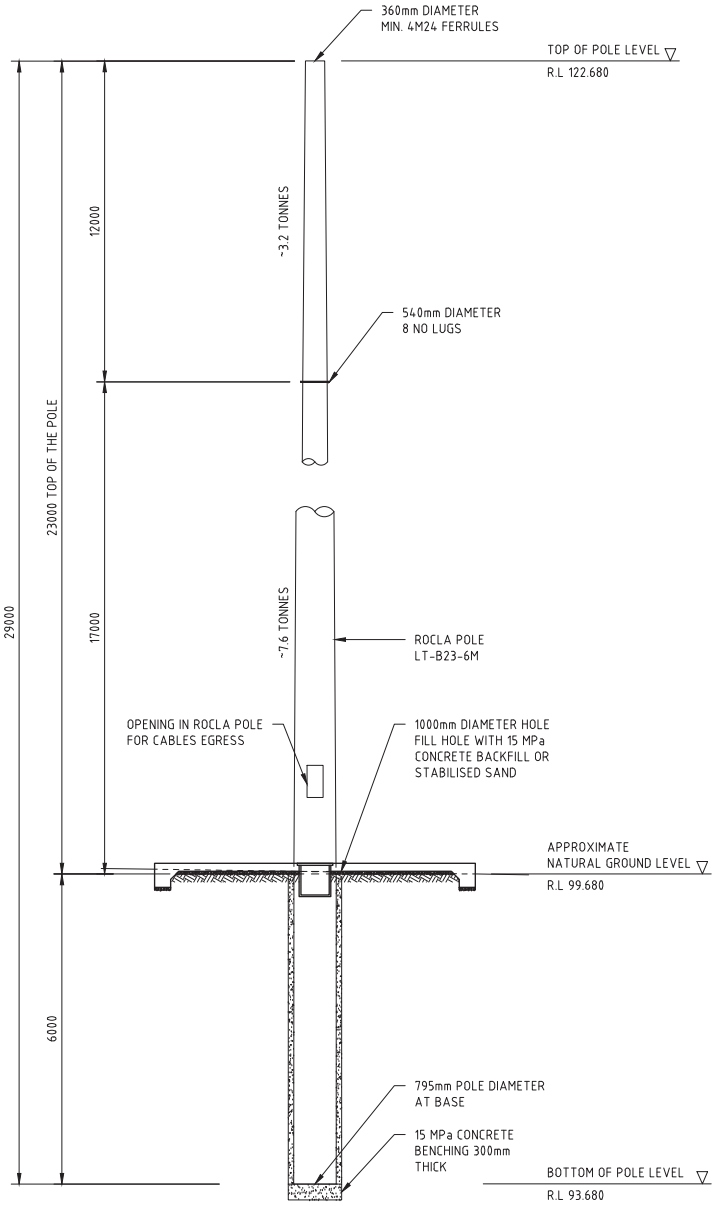
5- THE BACKFILL AROUND THE POLE SHALL BE FLOWABLE STABILISED SAND OR BLINDING CONCRETE OF STRENGTH GREATER THAN THE CLAYEY SAND THAT IS REPLACED.

6- THE BACKFILL SHALL NOT ARCH BETWEEN THE POLE AND SIDE OF THE HOLE TO PREVENT CREATION OF VOIDS.

7- REFER TO GEOTECHNICAL REPORT NUMBER 12525175 FOR GEOTECHNICAL PROPERTIES OF THE SOIL. CONTRACTOR SHALL ALLOW FOR AN ON-SITE COMPETENT GEOTECHNICAL ENGINEER TO INSPECT THE ENCOUNTERED SOIL STRATA AND MATERIAL AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

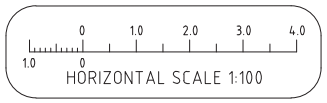
8- THE POLE SHALL BE TEMPORARILY SUPPORTED UNTIL THE BACKFILL GAINS REQUIRED STRENGTH. THE HEADFRAME SHALL ONLY BE INSTALLED AFTER THE TEMPORARY SUPPORTS ARE REMOVED. PLANNING AND DESIGN OF THE REQUIRED TEMPORARY WORKS ARE BY CONTRACTOR.

9-THE CONTRACTOR SHALL VERIFY THE NATURAL GROUND LEVEL SHOWN IN THIS DRAWING AT THE LOCATION OF THE POLE AND REPORT DISCREPANCIES.



SECTION C / 009
SCALE 1:100

NOTE:
FENCE NOT SHOWN FOR CLARITY



CONSTRUCTION ISSUE

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TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

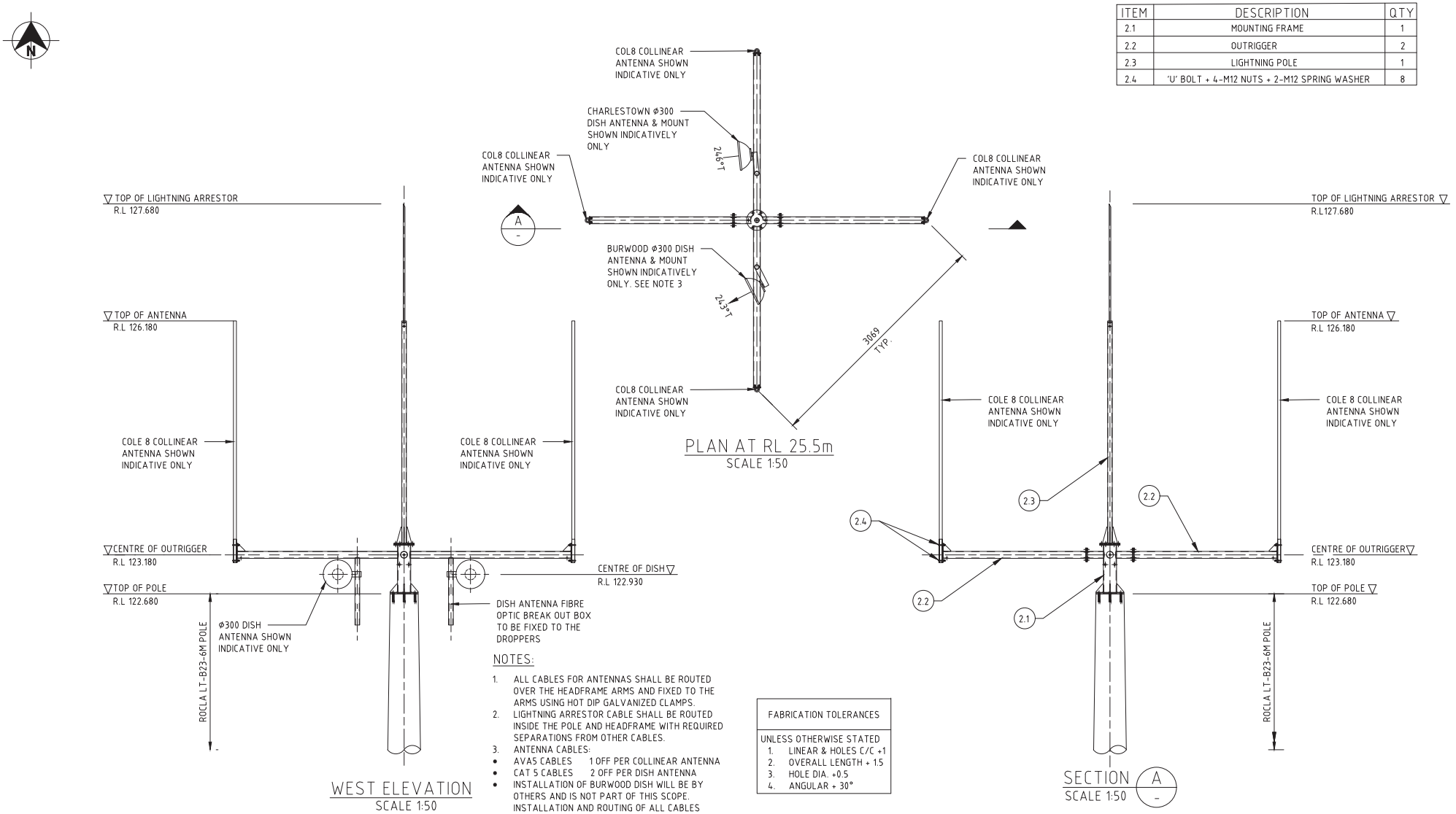
STRUCTURAL DESIGN
ROCLA POLE ELEVATION VIEW

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:100	-	16017	011	03

VERSION 4

Plot Date: 08/06/21 - 10:23 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-011_03.dwg

ITEM	DESCRIPTION	QTY
2.1	MOUNTING FRAME	1
2.2	OUTRIGGER	2
2.3	LIGHTNING POLE	1
2.4	'U' BOLT + 4-M12 NUTS + 2-M12 SPRING WASHER	8



NOTES:

1. ALL CABLES FOR ANTENNAS SHALL BE ROUTED OVER THE HEADFRAME ARMS AND FIXED TO THE ARMS USING HOT DIP GALVANIZED CLAMPS.
2. LIGHTNING ARRESTOR CABLE SHALL BE ROUTED INSIDE THE POLE AND HEADFRAME WITH REQUIRED SEPARATIONS FROM OTHER CABLES.
3. ANTENNA CABLES:
   - AVA5 CABLES 1 OFF PER COLLINEAR ANTENNA
   - CAT 5 CABLES 2 OFF PER DISH ANTENNA
   - INSTALLATION OF BURWOOD DISH WILL BE BY OTHERS AND IS NOT PART OF THIS SCOPE. INSTALLATION AND ROUTING OF ALL CABLES INCLUDING CABLES FOR THIS DISH IS PART OF THIS SCOPE.
4. DETAILED SHOP DRAWINGS SHALL BE PREPARED BY CONTRACTOR AND SUBMITTED TO THE PRINCIPAL FOR REVIEW AND COMMENT PRIOR TO FABRICATION OF THE HEADFRAME.
5. FOR PROTECTIVE COATING OF THE HEADFRAME STEEL STRUCTURE REFER TO PROJECT SPECIFICATIONS.

FABRICATION TOLERANCES
UNLESS OTHERWISE STATED
1. LINEAR & HOLES C/C +1
2. OVERALL LENGTH + 1.5
3. HOLE DIA. +0.5
4. ANGULAR + 30°

SITE BOLTS:

ARM CONNECTIONS: M16x60 LONG 8.8/TB HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS AND TWO NUTS-18 FASTENER ASSEMBLIES REQUIRED

HEADFRAME TO POLE CONNECTION: M24 8.8/S HOT DIP GALVANIZED BOLTS WITH FLAT WASHERS TO SUIT FERRULES - 4 FASTENER ASSEMBLIES REQUIRED

HORIZONTAL SCALE 1:50

CONSTRUCTION ISSUE

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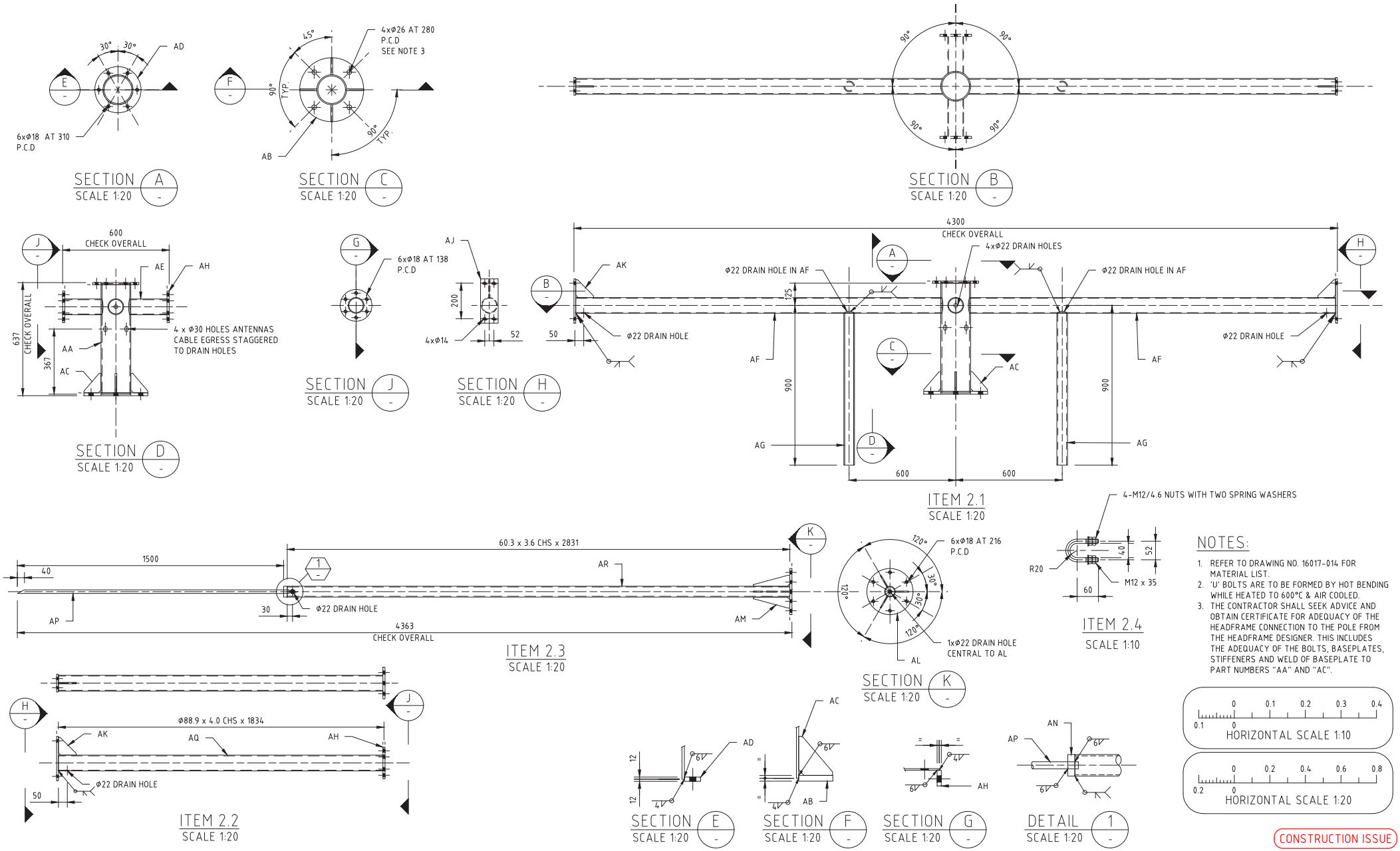
TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME ARRANGEMENT

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	012	03

VERSION 4



NOTES:

1. REFER TO DRAWING NO. 16017-014 FOR MATERIAL LIST.
2. 'U' BOLTS ARE TO BE FORMED BY HOT BENDING WHILE HEATED TO 600°C & AIR COOLED.
3. THE CONTRACTOR SHALL SEEK ADVICE AND OBTAIN CERTIFICATE FOR ADEQUACY OF THE HEADFRAME CONNECTION TO THE POLE FROM THE HEADFRAME DESIGNER. THIS INCLUDES THE ADEQUACY OF THE BOLTS, BASEPLATES, STIFFENERS AND WELD OF BASEPLATE TO PART NUMBERS "AA" AND "AC".

HORIZONTAL SCALE 1:10

HORIZONTAL SCALE 1:20

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MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
HEADFRAME DETAILS

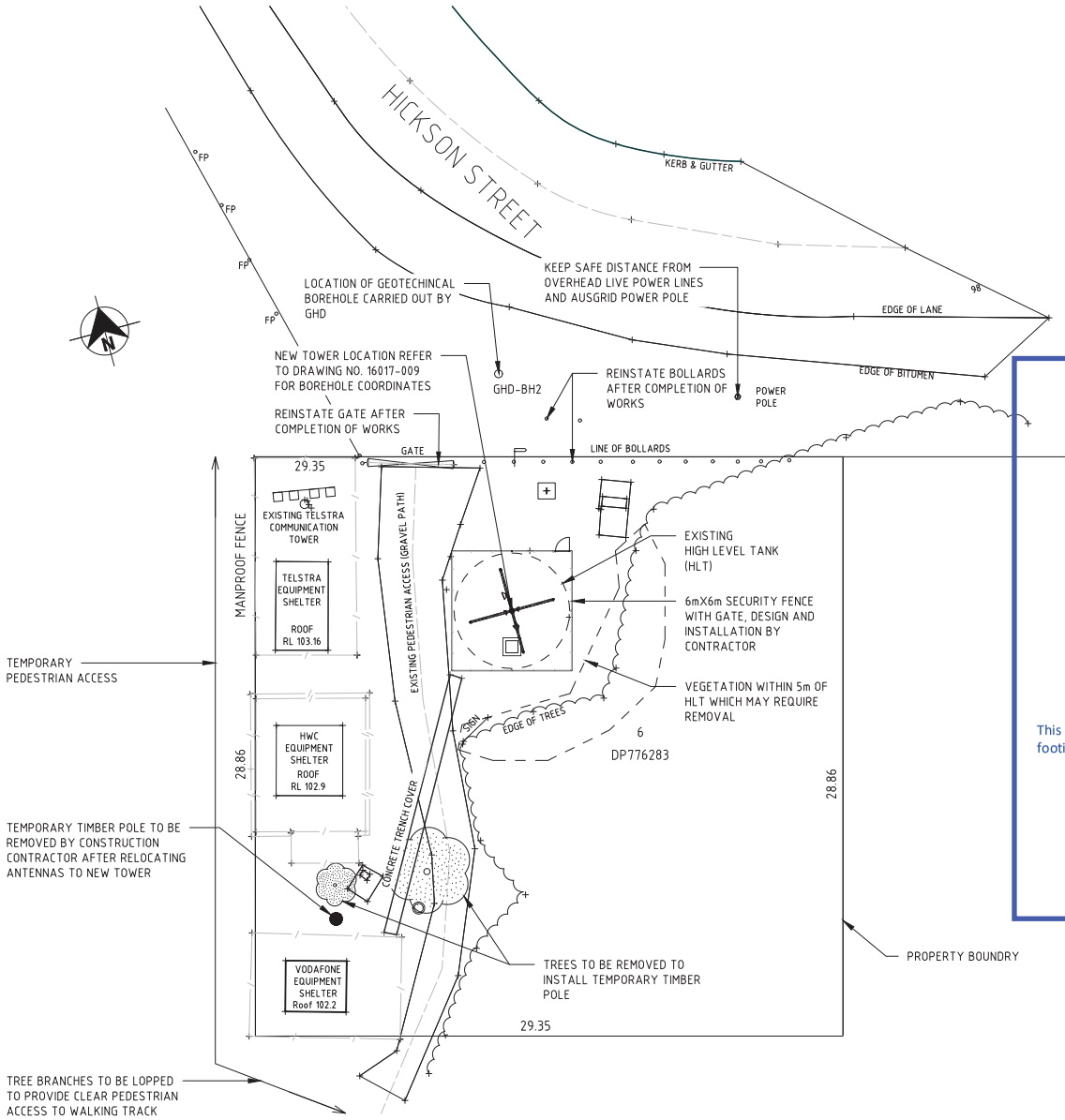
SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	AS SHOWN	-	16017	013	02

VERSION 4

Plot Date: 08/06/21 - 10:25 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-013_02.dwg

NOTE:

1. ALL DRAWINGS SHALL BE READ IN CONJUCTION WITH TECHNICAL SPECIFICATIONS.
2. FOR EXISTING AND NEW UNDERGROUND SERVICES REFER TO DRAWING NO. 16017-008.



NEW SITE PLAN

SCALE 1:250

SUBSIDENCE ADVISORY NSW
DEVELOPMENT APPROVED

Paul Gray

This plan is approved under section 22 of the Coal Mine Subsidence Compensation Act 2017, and is valid for five (5) years from today.

18-Jun-2021

This approval is subject to levels & heights shown on plan being accurate & footings designed to comply with AS2870 or relevant Australian Standards.

SUBSIDENCE ADVISORY NSW
DEVELOPMENT REVIEWED

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

VERSION 4

CONSULTANT DETAILS:
GHD
Level 3 GHD Tower 24 Honeysuckle Drive
Newcastle NSW 2300
T 61 2 4979 9999 F 61 2 9475 0725
E ntlmail@ghd.com.au
www.ghd.com.au

CONSULT. REFERENCE No. 12525175

HUNTER WATER

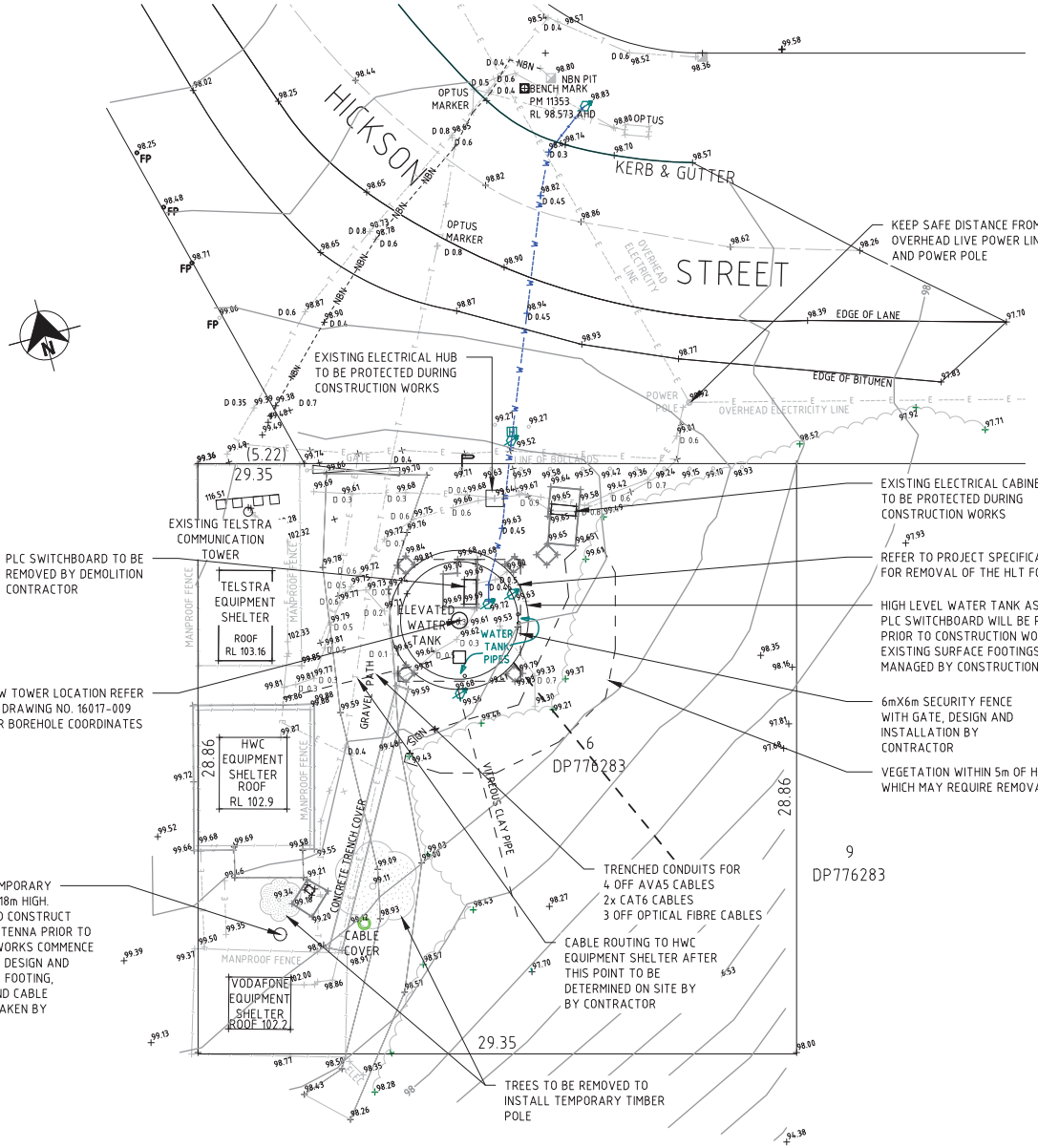
DESIGNED: HR	DATE: 30/06/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:250	-	16017	007	03

Plot Date: 08/06/21 - 10:21 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-007_03.dwg



LEGEND:

- TREE
- COMMS PIT
- HYDRANT
- STOP VALVE
- ELECTRICAL BOX
- SIGN
- ELECTRICITY LINE & DEPTH
- WATER LINE & DEPTH
- TELEPHONE LINE & DEPTH
- NBN LINE & DEPTH

NOTE:

1. THE CONTRACTOR SHALL MARK EXACT LOCATION OF ALL EXISTING AND NEW UNDERGROUND SERVICES AT WORK AREA AND PROTECT AGAINST DAMAGE.

SUBSIDENCE ADVISORY NSW
DEVELOPMENT APPROVED

Paul Gray

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18-Jun-2021

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SUBSIDENCE ADVISORY NSW
DEVELOPMENT REVIEWED

0 2.5 5.0 7.5 10
2.5 0
HORIZONTAL SCALE 1:250

SITE PLAN WITH UNDERGROUND SERVICES

SCALE 1:250

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
4	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
3	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	11/05/21
1	RE-ISSUED FOR CONSTRUCTION	SPB	16/12/20
0	CONSTRUCTION ISSUE	AK	07/12/20

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HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE: CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
GENERAL ARRANGEMENT WITH SURVEY AND UNDERGROUND SERVICES PLAN

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
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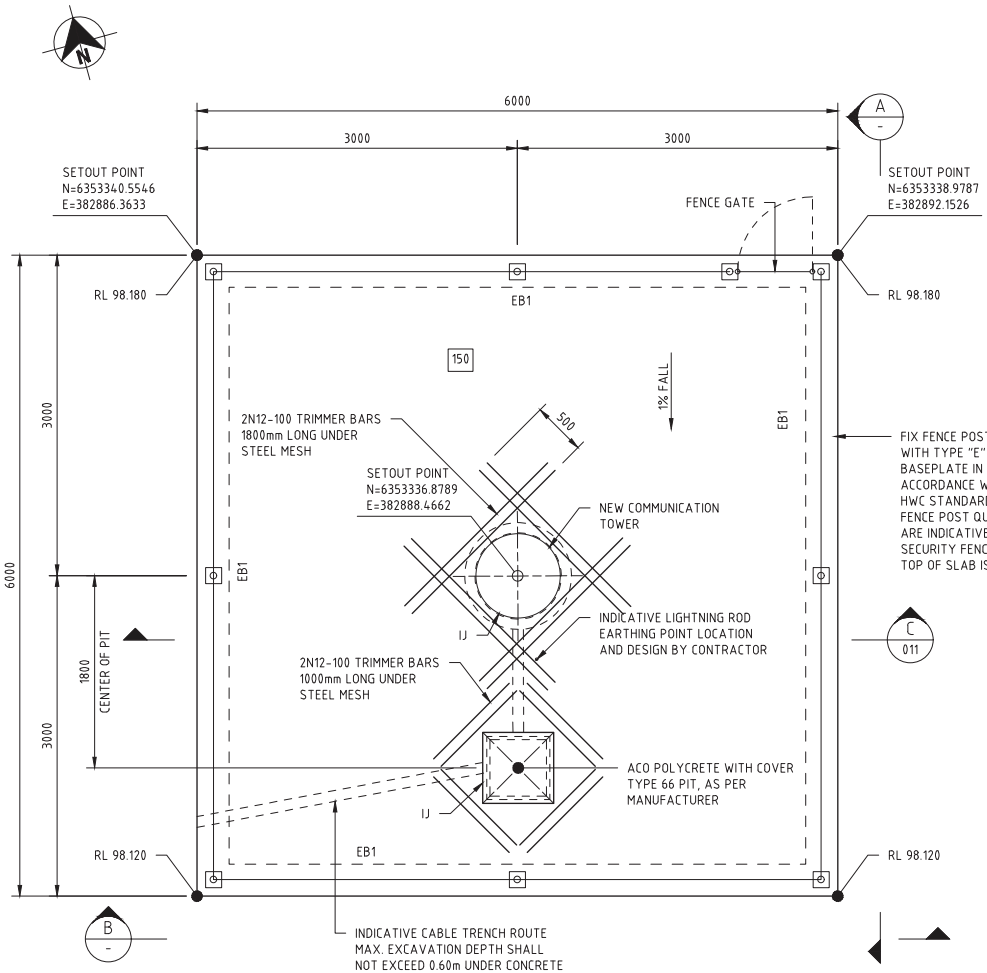
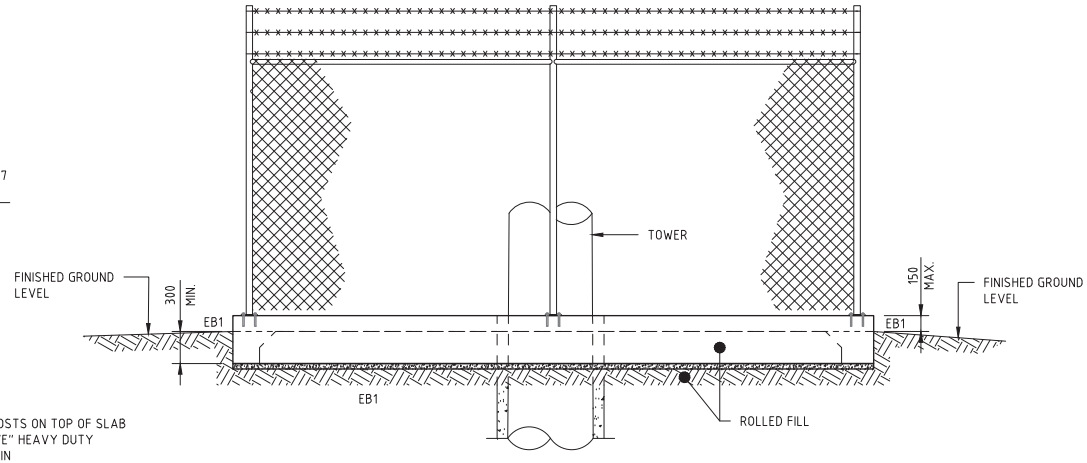
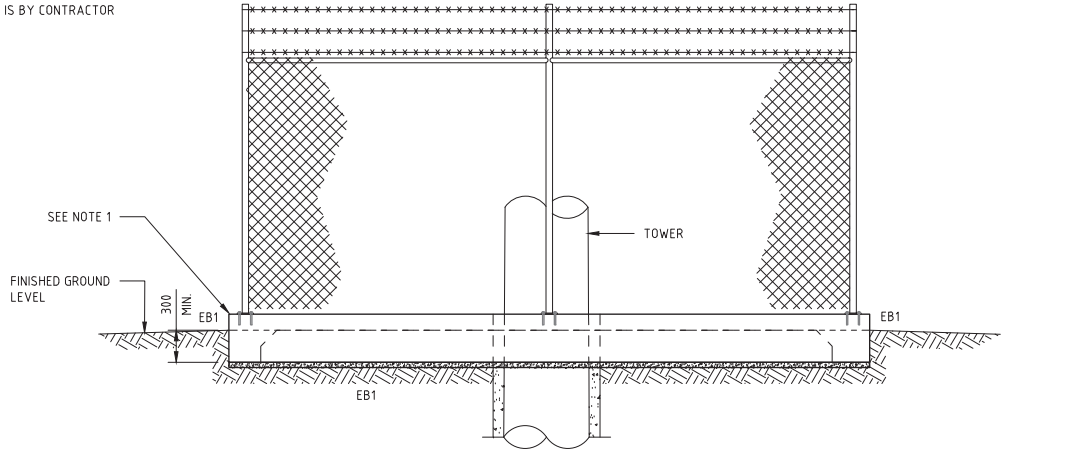
Plot Date: 11/06/21 - 10:40 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-008_04.dwg



PLAN
SCALE 1:50



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

CONCRETE GROUND BEAMS SCHEDULE		
MARK	SIZE	REINFORCEMENT
EB1	EDGE BEAM 300 W x 450 D	3L11 - TM BOTT. WITH R10 - 600 LIGS

SLAB REINFORCEMENT	
THICKNESS	REINFORCEMENT
150	SL82 TOP

NOTE:

1. CHEMICAL ANCHORS FOR THE FENCE POSTS SHALL BE HILTI RE 500 V3 + HIT-V HOT DIP GALVANIZED FULL THREADED 4-M12 STUDS GRADE 5.8 OR APPROVED EQUIVALENT WITH EFFECTIVE EMBEDMENT OF 150 mm AND MINIMUM 80 mm EDGE DISTANCE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

LEGEND:

IJ - DENOTES ISOLATION JOINT

0 0.5 1.0 1.5 2.0
0.5 0
HORIZONTAL SCALE 1:50

CONSTRUCTION ISSUE

No.	REVISION DETAILS	DWN	DATE
3	RE-ISSUED FOR CONSTRUCTION	SPB	11/06/21
2	RE-ISSUED FOR CONSTRUCTION	SPB	08/06/21
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HUNTER WATER

DESIGNED: HR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
DRAWN: AK	DATE: 07/12/20	COMPANY: GHD PTY LTD	
CHECKED: KR	DATE: 07/12/20	COMPANY: GHD PTY LTD	
APPROVED: NM	DATE: 07/12/20	COMPANY: GHD PTY LTD	

TITLE:
CS0499
MEREWETHER - COMMUNICATION TOWER STRUCTURAL DESIGN

STRUCTURAL DESIGN
CONCRETE GROUND SLAB, PIT AND SECURITY FENCE ARRANGEMENT AND DETAILS

SIZE	SCALE	INDEX No.	DRAWING No.	SHEET	REV No.
A3	1:50	-	16017	009	03

VERSION 4

Plot Date: 11/06/21 - 10:41 Cad File: N:\PH\Cebu\Projects\22\12525175\CADD\Drawings\Structural\16017-009_03.dwg

APPENDIX D

Ecological assessment file note

Merewether HLT and Communications Tower - Revised Ecological Assessment

Subject:	Revised Ecological Assessment – Merewether HLT and Communications Tower
Date:	7th June 2021
To:	Andrew Moss, Innovation & Investment
From:	Anne Finegan, Environment & Sustainability

1 PROPOSED WORKS

Hunter Water is proposing to demolish the Merewether High Level Tank (HLT), located on Hickson Street Merewether. Telemetry aerials are currently attached to the HLT. It is proposed that a tower to which the telemetry aerials can be attached be constructed on the site of the HLT.

Previously, it was proposed to construct the communications tower around 15 to 20 m east of the HLT, necessitating the clearing of dense shrubby vegetation dominated by Prickly-leaved Paperbark (*Melaleuca nodosa*) with scattered Broad-leaved Mahogany (*Eucalyptus umbra*) and Rough-barked Apple (*Angophora floribunda*) are also present in the canopy. Based on this, an ecological assessment was prepared by Tim Mouton in March 2021. The assessment identified no significant ecological constraints in terms of threatened species/communities or habitat, but acknowledged that the vegetation is high value and directly adjoins Glenrock SCA.

Revising the project design so that the communications tower would be located on the HLT site will avoid the vegetation clearing assessed in the previous assessment. It may, however, be necessary to clear a limited area of vegetation to allow machinery access. Although there appears to be sufficient room for heavy equipment to operate, allowance has been made in this current assessment for a 5m cleared radius around the tower to be established. This would involve removal of intact native vegetation in an arc extending from east to south of the tower (see Figure **1**).

During completion of the proposed works, public access to a walking track leading to the paragliding launch site will be restricted, with pedestrians directed behind existing infrastructure (see Figure 1). Minor lopping of tree branches would be required to provide clear access, but otherwise no vegetation clearing would be required to establish temporary pedestrian access.

An 18 m temporary pole would also need to be established during the proposed works, necessitating the removal of a few trees within the site (see Figure 1).

2 LOCAL CONTEXT

The proposed work site is situated at the top of a ridgeline along which Hickson Street runs (see Figure 2). Glenrock State Conservation Area (SCA) adjoins Hunter Water land to the east, south and west. The SCA is characterised by largely intact native bushland which provides habitat for a wide range of threatened flora and fauna and endangered ecological communities. The SCA is used for various recreational activities such as bushwalking, jogging and mountain bike-riding. The start of the walking track heading south off Hickson Street though the SCA is situated within the proposed work site and is frequented by walkers as well as hang-gliding enthusiasts accessing the handglider launch site located approximately 150 m to the south (see Figure 2). To the north lies Merewether Heights, situated on the southern edge of the Newcastle city environs.

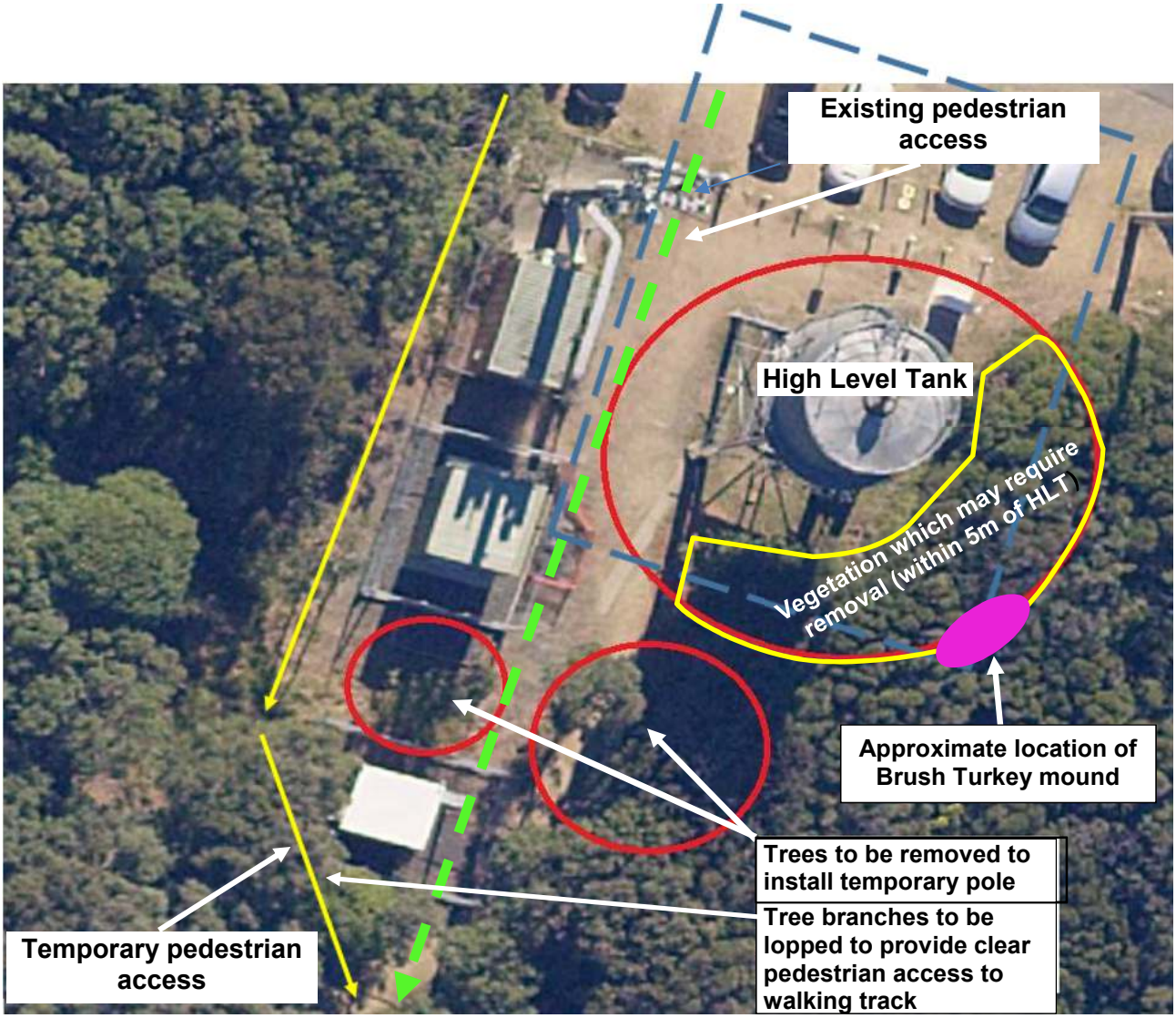

Figure 1: Location of proposed HLT demolition and Communications Tower installation

Figure 2: Locality Map

3 ASSESSMENT APPROACH

The terrestrial ecological assessment was undertaken using data sourced from the following:

- Database searches

Interrogation of BioNet's Atlas of NSW Wildlife database, based on a 10km x 10km search area centred on the Project site, and search results generated from the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protect Matters Search Tool, was undertaken to identify species of flora or fauna listed on the NSW *Biodiversity Conservation Act 2016* (BC Act) or the EPBC Act recorded in the local area and with potential to occur on the Project site.

- Field survey

A field survey was conducted on 27 April 2021 by Hunter Water's Senior Ecologist.

The objectives of the field survey were to:

- Identify the structural and floristic components of the vegetation communities occurring within the Project site.
- Compile a list of plant species recorded in the construction areas.
- Conduct targeted searches for threatened flora where potentially suitable habitat occurred.
- Identify fauna habitats within and adjacent to the construction areas, focusing on areas of potential shelter, basking, roosting, nesting and/or foraging sites, such as hollow-bearing trees, termitaria and permanent or ephemeral waterbodies.
- Record opportunistic observations of the presence of fauna, including scats, tracks, diggings, sightings and audible calls.
- Identify the extent of native vegetation and habitat attributes likely to be impacted, both directly and indirectly, by the construction and operation of the Proposal.
- Identify whether further field surveys, in the form of targeted methodologies such as spotlighting, Anabat detection, etc are required to assess the presence of threatened fauna.

4 EXISTING ENVIRONMENT

4.1 VEGETATION WITHIN THE PROJECT SITE

The site of the high level tank and associated infrastructure is adjoined by extensive native vegetation extending throughout Glenrock State Conservation Area. Immediately adjoining the HLT site to the east and south is a low closed forest dominated by a dense canopy of Prickly-leaved Paperbark (*Melaleuca nodosa*) with Broad-leaved White Mahogany (*Eucalyptus umbra*) occurring as a sub-dominant (see Photo 1 and Photo 2). The open understorey is dominated by mesic shrub species such as Lilly Pilly (*Acmena smithii*) Coffee Bush (*Breynia oblongifolia*), Mutton Wood (*Myrsine variabilis*), Sweet Pittosporum (*Pittosporum undulatum*) and Mock Olive (*Notelaea longifolia*). The sparse groundlayer is characterised by vines and scramblers such as Native Grape (*Cayratia clematidea*), Snake Vine (*Stephania japonica*), Wombat Berry (*Billardia scandens*), Native Raspberry (*Rubus parvifolius*), Kangaroo Vine (*Cissus antarctica*) and the occasional Spiny-headed Mat-rush (*Lomandra longifolia*), Basket Grass (*Oplismenus aemulus*) and Blue Flax-lily (*Dianella caerulea*).

Photo 1: View towards low closed forest adjoining HLT site

Photo 2: Low closed forest adjoining HLT site

The proposed temporary pedestrian access traverses shrubby forest vegetation with a canopy dominated by Broad-leaved White Mahogany (*Eucalyptus umbra*), understorey dominated by Sweet Pittosporum and Bracken Fern (*Pteridium esculentum*) and sparse groundcover dominated by Kidney Weed (*Dichondra repens*), Basket Grass, Snake Vine and Ground Asparagus (*Asparagus aethiopicus*) (see Photo 3). Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*) is also present.

Photo 3: View along temporary pedestrian access toward SCA walking track

The proposed work area for the temporary pole contains remnant native trees and shrubs, namely Broad-leaved Mahogany, Prickly-leaved Paperbark and Sweet Pittosporum as well as Lantana (*Lantana camara*) (Photo 4).

Photo 4: Trees / shrubs to be removed to install temporary pole

4.2 FAUNA HABITATS WITHIN THE PROJECT SITE

Fauna habitat provided by the intact vegetation adjoining the HLT site comprises:

- Foraging, nesting and shelter habitat for native bird species associated with low closed coastal forest including migratory species such as the Black-faced Monarch and Rufous Fantail.
- Shelter habitat for small to medium arboreal mammals such as Common Ringtail Possum.
- Foraging habitat for ground-dwelling species such as bandicoots.
- Confirmed nest site for Scrub Turkey – mound located approximately 5m from tower (see Photo 5).

The trees / shrubs to be removed to install the temporary pole provide marginal foraging and nesting habitat and are not considered to be important to local native fauna.

Photo 5: Brush Turkey nest mound in low closed forest adjoining HLT site

4.3 THREATENED SPECIES AND ECOLOGICAL COMMUNITIES

A search of the BioNet Atlas of NSW Wildlife database revealed no threatened flora species have been recorded in or adjacent to the Project site. No threatened flora species were recorded during the field surveys and none are expected to occur due to the absence of suitable habitat.

No threatened fauna species, or evidence therefore (such as scats or scratches on tree trunks), were recorded on the Project site.

The Project site does not provide roosting, nesting or denning habitat for any fauna species listed on the BC Act or EPBC Act. Whilst the Project site may provide foraging resources in the form of flowering trees and/or shrubs for threatened species, it is considered unlikely that such habitat would be important to threatened fauna recorded in the local area.

Due to the presence of rainforest elements in the understorey, the low closed canopy and its coastal location, consideration was given to whether the vegetation community on the eastern side of the HLT was consistent with Littoral Rainforest, an endangered ecological community listed on the *Biodiversity Conservation Act 2016* and *Environment Protection and Biodiversity Conservation Act 1999.* Littoral Rainforest is a closed forest ecological community recognised by its close proximity to the ocean (generally < 2km) and closed canopy (i.e. ~70% of the sky obscured by tree leaves and limbs). Vegetation structure can range from low thickets in wind exposed environments to tall forest in more protected sites. The plant species in this ecological community

are predominantly rainforest species with moist, evergreen, leathery leaves and vines may be a major component of the canopy. Whilst dominated by rainforest species, scattered individuals of sclerophyllous (hardleaved) plants, such as Smooth-barked Apple (*Angophora costata*), Coastal Banksia (*Banksia integrifolia*), Bangalay (*Eucalyptus botryoides*) and Forest Red Gum (*E. tereticornis*) may also be present. Based on the dominance of the canopy by sclerophyllous species such as Prickly-leaved Paperbark and Broad-leaved White Mahogany, vegetation adjoining the HLT site is not considered to qualify as Littoral Rainforest EEC.

As the Project site does not support habitat for any flora or fauna species or EEC listed on the BC Act and/or EPBC Act, an Assessment of Significance under the BC Act or EPBC Act is not required and no significant ecological constraints to the Project are considered to be present.

4.4 BIOSECURITY MATTER

Under the NSW *Biosecurity Act 2015,* all plants, pest animals, pathogens and diseases are regulated with a General Biosecurity Duty to prevent, eliminate or minimise any biosecurity risk they may pose.

Any person who deals with any plant, whether they have an infestation on their land, are selling a potentially invasive species, dumping garden rubbish, or supplying contaminated fodder or the like, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

The *Hunter Regional Strategic Weed Management Plan 2017 – 2022* identifies regional priority weeds, including management objectives and outcomes to demonstrate compliance with the General Biosecurity Duty, which, for those weeds, clearly define community expectations for land managers to meet their General Biosecurity Duty.

Priority weeds identified with the Plan have each been allocated to one of the following categories:

- **Prevention** – weed management aimed at preventing new species from arriving.
- **Eradication** – weed management aimed at removing newly arrived weeds including all plant material.
- **Containment** – weed management aimed at reducing the spread and/or severity of established weed infestations using defined geographical boundaries.
- **Asset protection** – weed management aimed at protecting assets from the impact of established weeds. Assets may be environmental, primary production or community.

The Plan also identifies state level and other priority weeds (categorised as 'Additional Species of Concern') to provide further focus to weed management in the region.

Table 1 lists the weed species recorded on the Project site. Three species listed as Priority Weeds in the *Hunter Regional Strategic Weed Management Plan 2017-2022*, being Bitou Bush, Lantana and Ground Asparagus, were recorded on-site. Measures to ensure Hunter Water, and its contractors, meet GBD obligations under the *Biosecurity Act 2016* are provided in Section 6.

Table 1: Weeds recorded on-site

Common Name	Scientific Name	State Priority[1]	Regional Priority[1]	Biosecurity requirements[1]	Project-specific requirements
Lantana	*Lantana camara*	Asset Protection	ASOC[2]	GBD[3]	Non-native vegetation which requires clearing from the site is to be disposed of at a waste management facility licensed to accept green waste
Bitou Bush	*Chrysanthemoides monilifera subsp. rotundata*	Containment	ASOC	GBD	
Mickey Mouse Plant	*Ochna serrulata*	GBD	not listed	GBD	
Ground Asparagus	*Asparagus aethiopicus*	GBD	ASOC	GBD	
Senna	*Senna pendula subsp. glabrata*	GBD	not listed	GBD	

Notes: [1] As stated in Hunter Regional Strategic Weed Management Plan
[2] ASOC = Additional Species of Concern
[3] GBD = General Biosecurity Duty

5 IMPACT ASSESSMENT

Construction of the temporary pole would require the removal of one (1) Broad-leaved Mahogany, one (1) Prickly-leaved Paperbark, one (1) Sweet Pittosporum and Lantana.

Demolition of the high level tank and construction of the communications tower may require removal of vegetation to provide machinery access. Allowance has been made in this assessment for vegetation up to 5 m from the base of the existing tower to be cleared. If a 5 m clearance zone is required, this would necessitate the removal of around 100 m^2 of low closed forest dominated by a canopy of Prickly-leaved Paperbark and Broad-leaved White Mahogany with rainforest elements in the understorey.

Establishing a clear path along the temporary pedestrian access will require removal of an overhanging and trimming of shrubby understorey vegetation, however the impacts of this level of vegetation removal are considered to be negligible. Erosion impacts are also expected to be minimal given the moderate cover provided by the layer of leaf litter on the ground.

The impact of the proposed works on native flora and fauna is expected to be minimal, based on the following:

- None of the trees to be removed are hollow-bearing therefore it is not expected that there would be any impact on nesting / breeding / roosting habitat for hollow-dependent fauna occurring in the local area, including threatened species such as Eastern Coastal Free-tailed Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat, Little Lorikeet, Masked Owl, Powerful Owl, Brush-tailed Phascogale and Squirrel Glider.
- There are no nests in any of the trees identified for removal, however a precautionary mitigation measure is included below in the event that a nest is established in one of the trees prior to felling.
- No hollows, cavities or fissures were observed in any of the trees to be removed, so it is unlikely that habitat important to hollow-dependent fauna would be impacted.

- None of the trees identified for removal are listed on the BC Act and/or EPBC Act.
- The vegetation to be removed is not consistent with any threatened ecological community listed on the BC Act or EPBC Act.
- The vegetation to be removed is unlikely to be important to any local threatened species population.
- No species of flora or fauna listed on the BC Act and/or EPBC Act is expected to be impacted by the proposed vegetation removal works.
- The Brush Turkey nest identified during the site visit is situated just outside the 5m vegetation clearing zone.

It is considered that the proposed works are unlikely to impact any threatened flora or fauna species or threatened ecological communities, hence no further assessment is required, including preparation of Assessments of Significance (5 Part Tests, EPBC Assessments). However, Hunter Water still has obligations under the BC Act to minimise harm to protected fauna, including non-threatened species such as Brush Turkey.

6 MITIGATION MEASURES

The following environmental safeguards will be implemented during construction:

- If clearing of vegetation on the eastern side of the HLT is required to facilitate access by heavy machinery, a barrier is to be installed between the Brush Turkey mound and the work site to prevent disturbance of the nest and as much of the tree canopy as possible is to be kept intact so that the mound remains shaded.
- Native vegetation cleared from the Project site is to be mulched and spread along the interface between the cleared areas and adjoining bush as a weed suppressant.
- Non-native vegetation (Ground Asparagus, Lantana, Bitou Bush) which requires clearing from the site is to be disposed of at a waste management facility licensed to accept green waste
- Prior to entering and leaving the construction corridor, all vehicles, equipment, footwear and clothing are to be checked and all mud / soil clods and weed propagules, such as seed-heads, removed and placed in a sealed bag for disposal at a licensed waste management facility
- If clearing of the low closed forest adjoining the HLT site is required, replanting using tubestock of Prickly-leaved Paperbark (*Melaleuca nodosa*), Sweet Pittosporum (*Pittosporum undulatum*), Spiny-headed Mat-rush (*Lomandra longifolia*) and Blue Flax-lily (*Dianella caerulea*) is to be undertaken to reinstate the current vegetation cover.
- Prior to commencement of works, ensure that gloves and a handling bag (e.g. pillow case) are available in the event that an injured animal or dependent young needs to be retrieved during the tree removal activities
- The contact details for the local wildlife rescue organisation is to be kept in a location easily accessible by all site staff. The licenced wildlife rescue group in the area is Hunter Wildlife Rescue (Ph: 0418 628 483)
- Check the canopy of all trees immediately prior to tree felling to ensure no roosting birds (e.g. owls, nightjars, tawny frogmouths) or nests are present

- If roosting birds are identified in a tree to be felled, gently nudge the tree to encourage the animal(s) to move on
- Should injured animals or dependent young be found on-site during tree felling, contact Hunter Wildlife Rescue (Ph: 0418 628 483) to arrange for the animal to be taken into care. If safe to do so, use gloves to pick up the animal and place in a cloth bag, pillow case or box and keep in a quiet, dark, warm (but not hot) location until the animal can be transferred to a wildlife carer
- If a nest with nestlings is found within any of the trees to be removed, carefully remove the nest and nestlings, place in a box and contact Hunter Wildlife Rescue (Ph: 0418 628 483) to organise for the nestlings to be taken into care
- If a snake requires relocation, contact a licenced reptile handler. Do not try to handle the snake. Note that it is offence under NSW legislation to harm or kill a snake

APPENDIX E

Database search results

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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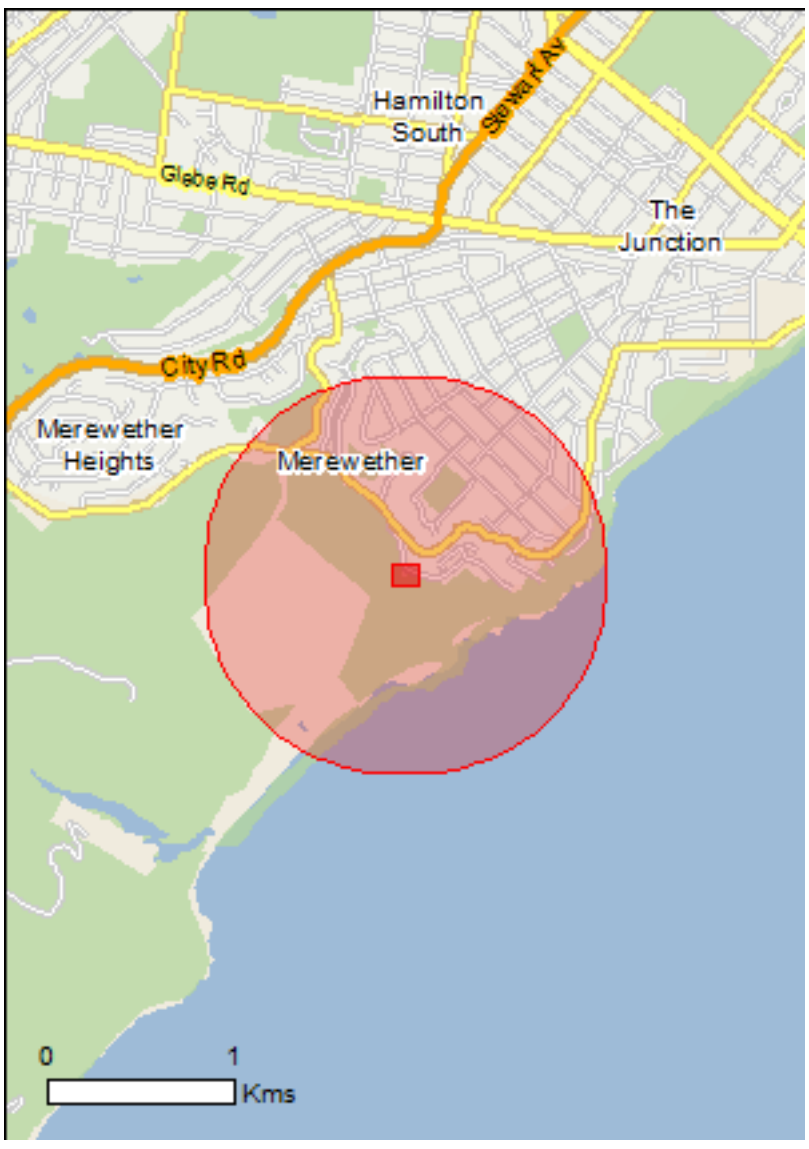

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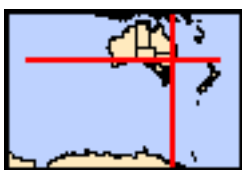

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	75
Listed Migratory Species:	58

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	78
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	41
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Hunter estuary wetlands	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus		
Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii		
Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Hippocampus whitei		
White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat may occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus		
Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Angophora inopina		
Charmhaven Apple [64832]	Vulnerable	Species or species habitat may occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Diuris praecox		
Newcastle Doubletail [55086]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus camfieldii		
Camfield's Stringybark [15460]	Vulnerable	Species or species habitat may occur within area
Euphrasia arguta		
[4325]	Critically Endangered	Species or species habitat may occur within area
Grevillea parviflora subsp. parviflora		
Small-flower Grevillea [64910]	Vulnerable	Species or species habitat may occur within area
Grevillea shiressii		
[19186]	Vulnerable	Species or species habitat known to occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior		
Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269)		
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Rhizanthella slateri		
Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens		
Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat known to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Tetratheca juncea Black-eyed Susan [21407]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		

Name	Threatened	Type of Presence
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Director of War Service Homes

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat likely to occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Glenrock	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red		Species or species habitat likely to occur

Name	Status	Type of Presence
Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-32.95168 151.74647,-32.95168 151.7477,-32.95252 151.7477,-32.95252 151.74647,-32.95168 151.74647

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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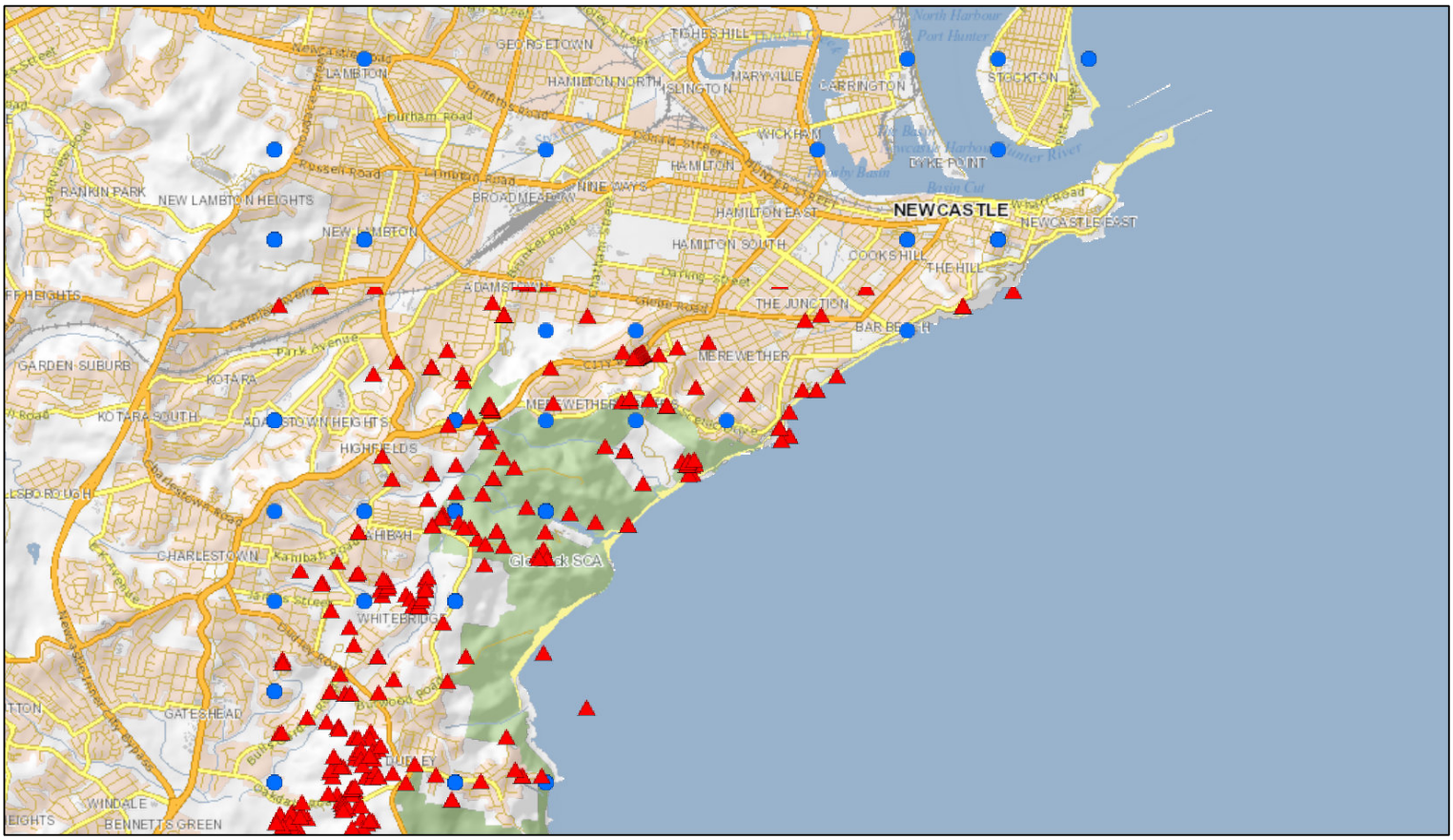
Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Entities in selected area [North: -32.90 West: 151.70 East: 151.80 South: -33.00] returned a total of 4,944 records of 66 species.
Report generated on 12/02/2021 1:55 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Amphibia	Myobatrachidae	3137	*Crinia tinnula*		Wallum Froglet	V,P		1	
Animalia	Reptilia	Cheloniidae	2004	*Caretta caretta*		Loggerhead Turtle	E1,P	E	2	
Animalia	Reptilia	Cheloniidae	2007	*Chelonia mydas*		Green Turtle	V,P	V	3	
Animalia	Reptilia	Cheloniidae	2008	*Eretmochelys imbricata*		Hawksbill Turtle	P	V	2	
Animalia	Aves	Anseranatidae	0199	*Anseranas semipalmata*		Magpie Goose	V,P		1	
Animalia	Aves	Columbidae	0025	*Ptilinopus magnificus*		Wompoo Fruit-Dove	V,P		2	
Animalia	Aves	Columbidae	0023	*Ptilinopus superbus*		Superb Fruit-Dove	V,P		3	
Animalia	Aves	Apodidae	0334	*Hirundapus caudacutus*		White-throated Needletail	P	V,C,J,K	1	
Animalia	Aves	Diomedeidae	0086	*Diomedea exulans*		Wandering Albatross	E1,P	E	2	
Animalia	Aves	Procellariidae	0072	*Ardenna carneipes*		Flesh-footed Shearwater	V,P	J,K	1	
Animalia	Aves	Procellariidae	0929	*Macronectes giganteus*		Southern Giant Petrel	E1,P	E	5	
Animalia	Aves	Procellariidae	0971	*Pterodroma solandri*		Providence Petrel	V,P		1	
Animalia	Aves	Sulidae	0105	*Sula dactylatra*		Masked Booby	V,P	J,K	1	
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*		Black-necked Stork	E1,P		1	
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*		White-bellied Sea-Eagle	V,P		7	
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		1	
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*		Square-tailed Kite	V,P,3		1	
Animalia	Aves	Accipitridae	8739	*^^Pandion cristatus*		Eastern Osprey	V,P,3		8	
Animalia	Aves	Burhinidae	0174	*Burhinus grallarius*		Bush Stone-curlew	E1,P		1	
Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*		Sooty Oystercatcher	V,P		19	
Animalia	Aves	Haematopodidae	0130	*Haematopus longirostris*		Pied Oystercatcher	E1,P		5	
Animalia	Aves	Charadriidae	0141	*Charadrius leschenaultii*		Greater Sand-plover	V,P	V,C,J,K	3	
Animalia	Aves	Charadriidae	0139	*Charadrius mongolus*		Lesser Sand-plover	V,P	E,C,J,K	145	
Animalia	Aves	Jacanidae	0171	*Irediparra gallinacea*		Comb-crested Jacana	V,P		1	
Animalia	Aves	Scolopacidae	0164	*Calidris canutus*		Red Knot	P	E,C,J,K	30	
Animalia	Aves	Scolopacidae	0161	*Calidris ferruginea*		Curlew Sandpiper	E1,P	CE,C,J,K	996	
Animalia	Aves	Scolopacidae	0165	*Calidris tenuirostris*		Great Knot	V,P	CE,C,J,K	6	
Animalia	Aves	Scolopacidae	0167	*Limicola falcinellus*		Broad-billed Sandpiper	V,P	C,J,K	33	
Animalia	Aves	Scolopacidae	0152	*Limosa limosa*		Black-tailed Godwit	V,P	C,J,K	12	
Animalia	Aves	Scolopacidae	0149	*Numenius madagascariensis*		Eastern Curlew	P	CE,C,J,K	28	
Animalia	Aves	Scolopacidae	0160	*Xenus cinereus*		Terek Sandpiper	V,P	C,J,K	237	
Animalia	Aves	Laridae	0120	*Onychoprion fuscata*		Sooty Tern	V,P		2	
Animalia	Aves	Laridae	0117	*Sternula albifrons*		Little Tern	E1,P	C,J,K	275	
Animalia	Aves	Cacatuidae	0265	*^Calyptorhynchus lathami*		Glossy Black-Cockatoo	V,P,2		1	
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*		Little Lorikeet	V,P		5	
Animalia	Aves	Psittacidae	0309	*^^Lathamus discolor*		Swift Parrot	E1,P,3	CE	3	
Animalia	Aves	Psittacidae	0302	*^^Neophema pulchella*		Turquoise Parrot	V,P,3		1	
Animalia	Aves	Strigidae	0246	*^^Ninox connivens*		Barking Owl	V,P,3		2	
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*		Powerful Owl	V,P,3		58	
Animalia	Aves	Tytonidae	0252	*^^Tyto longimembris*		Eastern Grass Owl	V,P,3		1	
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*		Masked Owl	V,P,3		2	
Animalia	Aves	Tytonidae	9924	*^^Tyto tenebricosa*		Sooty Owl	V,P,3		6	
Animalia	Aves	Meliphagidae	0603	*Anthochaera phrygia*		Regent Honeyeater	E4A,P	CE	2	
Animalia	Aves	Meliphagidae	0448	*Epthianura albifrons*		White-fronted Chat	V,P		8	
Animalia	Aves	Pomatostomidae	8388	*Pomatostomus temporalis temporalis*		Grey-crowned Babbler (eastern subspecies)	V,P		1	
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*		Varied Sittella	V,P		1	
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V,P	V	5	
Animalia	Mammalia	Burramyidae	1150	*Cercartetus nanus*		Eastern Pygmy-possum	V,P		2	
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider	V,P		21	
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	240	
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*		Greater Broad-nosed Bat	V,P		2	
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*		Little Bent-winged Bat	V,P		6	
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*		Large Bent-winged Bat	V,P		6	
Animalia	Mammalia	Dugongidae	1558	*Dugong dugon*		Dugong	E1,P		2	
Animalia	Mammalia	Otariidae	1543	*Arctocephalus forsteri*		New Zealand Fur-seal	V,P		1	
Animalia	Mammalia	Balaenopteridae	1575	*Megaptera novaeangliae*		Humpback Whale	V,P	V	1	
Plantae	Flora	Asteraceae	1643	*Rutidosis heterogama*		Heath Wrinklewort	V	V	12	
Plantae	Flora	Elaeocarpaceae	6206	*Tetratheca juncea*		Black-eyed Susan	V	V	331	
Plantae	Flora	Fabaceae (Faboideae)	11644	*Pultenaea maritima*		Coast Headland Pea	V		4	
Plantae	Flora	Myrtaceae	6809	*Melaleuca biconvexa*		Biconvex Paperbark	V	V	1	
Plantae	Flora	Myrtaceae	4283	*Rhodamnia rubescens*		Scrub Turpentine	E4A		8	
Plantae	Flora	Myrtaceae	4293	*Syzygium paniculatum*		Magenta Lilly Pilly	E1	V	2	
Plantae	Flora	Orchidaceae	9027	*^Diuris praecox*		Rough Doubletail	V,P,2	V	2330	
Plantae	Flora	Polygonaceae	9184	*Muehlenbeckia costata*		Scrambling Lignum	V		1	
Plantae	Flora	Proteaceae	5400	*Grevillea shiressii*			V	V	40	
Plantae	Flora	Zannichelliaceae	6339	*Zannichellia palustris*			E1		2	

Atlas Map



February 12, 2021

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APPENDIX F

Noise estimator outputs

Distanced Based Assessment (Noisiest Plant)

Please pick from drop-down list in orange cells

Noise area category		R1
RBL or LA90 Background level (dB(A))	Day	40
	Evening	35
	Night	30
LAeq(15minute) Noise Mangement Level (dB(A))	Day	50
	Day (OOHW)	45
	Evening	40
	Night	35
Noisiest plant		Bored Piling Rig
Is there line of sight to receiver?		Yes

Steps for Assessment:

1. Schedule noisy works to occur in standard hours where possible or before 1 1pm and implement Standard Measures.
2. Select the representative noise area category. The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
3. Select the noisiest plant. If not found in drop-down list, refer to 'Source List' and select a representative plant with equivalent sound power level.
4. Is there line of sight to receiver? Select the appropriate scenario from the drop down list.:
   Identify and implement standard mitigation measures where feasible and reasonable. Include any shielding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to/aw to receiver' drop-down list. Solid barriers can be in the form of road cutting, timber lapped and capped fence, shipping container, site office, etc. Substantial solid barriers are barriers greater than 5 metres in height or multiple rows of houses or a sound barrier specifically designed to mitigate construction noise. Please note that vegetation and trees are not considered to be a form of solid barrier and any gaps would compromise the acoustic integrity of the solid barrier.
5. Determine if there are any receivers (both residential and non-residential receivers) within the affected distance for each relevant time period . Consider background LA90 noise measurements to check assumption in Step #2 if:
   (a) there are many affected receivers and the impact duration at any one receiver is more than 3 weeks; or
   (b) there are a few affected receivers and the impact duration at any one receiver is more than 6 weeks.
   Note that consideration need to be given to the construction staging plan when determining impact duration.
7. Identify if there are any receivers within the additional mitigation measures distances and identify feasible and reasonable measures at each receiver.
8. Where night works are involved, identify sleep disturbance affected distance.
9. Document the outcomes of these steps.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Note that spot check verification of noise levels and individual briefings are not required for projects with less than 3 weeks impact duration

Residential receiver

			LAeq(15minute) noise level above background (LA90)											LAeq(15minute) 75 dB(A) or greater (Highly affected)			Sleep disturbance LAmax 65 dB(A)
			5 to 10 dB(A)			10 to 20 dB(A)			20 to 30 dB(A)			> 30 dB(A)					
			Noticeable			Clearly audible			Moderately intrusive			Highly intrusive					
		Affected distance (m)	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Affected distance (m)
Undeveloped green fields, rural areas with isolated dwellings	Day	250							N	120	60	N	45	70	N, PC, RO	25	75	
	Day (OOHW)	365				N, R1, DR	250	50	N, R1, DR	120	60	N, R1, DR, PC, SN	45	70	N, PC, RO	25	75	
	Evening	525				N, R1, DR	365	45	N, R1, DR	175	55	N, R1, DR, PC, SN	75	65	N, PC, RO	25	75	
	Night	760	N	760	35	N, R2, DR	525	40	N, PC, SN, R2, DR	250	50	AA, N, PC, SN, R2, DR	120	60	N, PC, RO	25	75	175
	Highly Affected	25													N, PC, RO	25	75	
Developed settlements (urban and suburban)	Day	305							N	135	60	N	50	70	N, PC, RO	30	75	
	Day (OOHW)	460				N, R1, DR	305	50	N, R1, DR	135	60	N, R1, DR, PC, SN	50	70	N, PC, RO	30	75	
	Evening	690				N, R1, DR	460	45	N, R1, DR	200	55	N, R1, DR, PC, SN	85	65	N, PC, RO	30	75	
	Night	1010	N	1010	35	N, R2, DR	690	40	N, PC, SN, R2, DR	305	50	AA, N, PC, SN, R2, DR	135	60	N, PC, RO	30	75	200
	Highly Affected	30													N, PC, RO	30	75	
Propagation across a valley / over water	Day	405							N	160	60	N	60	70	N, PC, RO	35	75	
	Day (OOHW)	630				N, R1, DR	405	50	N, R1, DR	160	60	N, R1, DR, PC, SN	60	70	N, PC, RO	35	75	
	Evening	960				N, R1, DR	630	45	N, R1, DR	255	55	N, R1, DR, PC, SN	95	65	N, PC, RO	35	75	
	Night	1420	N	1420	35	N, R2, DR	960	40	N, PC, SN, R2, DR	405	50	AA, N, PC, SN, R2, DR	160	60	N, PC, RO	35	75	255
	Highly Affected	35													N, PC, RO	35	75	

Non-residential receiver
Undeveloped green fields, rural areas with isolated dwellings

	Standard hours			LAeq(15minute) noise level above NML						LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)					
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	175				N	75	65	N, PC, RO	25	75
Hospital wards and operating theatres	Day	65	75							N, PC, RO	25	75
Place of worship	Day	55	175				N	75	65	N, PC, RO	25	75
Active recreation	Day	65	75							N, PC, RO	25	75
Passive recreation	Day	60	120				N	45	70	N, PC, RO	25	75
Industrial premise	Day	75	25							N, PC, RO	25	75
Offices, retail outlets	Day	70	45							N, PC, RO	25	75

	OOHW			LAeq(15minute) noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	
Hospital wards and operating theatres	Evening	65	75				N, R1, DR	45	70	N, R1, DR	14	80	N, R1, DR, PC, SN	4	90	
	Night	65	75	N	75	65	N, R2, NR	45	70	N, PC, SN, R2, DR	14	80	AA, N, PC, SN, R2, DR	4	90	
Place of worship	Evening	55	175				N, R1, DR	120	60	N, R1, DR	45	70	N, R1, DR, PC, SN	14	80	
	Night	55	175	N	175	55	N, R2, NR	120	60	N, PC, SN, R2, DR	45	70	AA, N, PC, SN, R2, DR	14	80	
Active recreation	Evening	65	75				N, R1, DR	45	70	N, R1, DR	14	80	N, R1, DR, PC, SN	4	90	
Passive recreation	Evening	60	120				N, R1, DR	75	65	N, R1, DR	25	75	N, R1, DR, PC, SN	8	85	
Industrial premise	Evening	75	25				N, R1, DR	14	80	N, R1, DR	4	90	N, R1, DR, PC, SN	1	100	
	Night	75	25	N	25	75	N, R2, NR	14	80	N, PC, SN, R2, DR	4	90	AA, N, PC, SN, R2, DR	1	100	
Offices, retail outlets	Evening	70	45				N, R1, DR	25	75	N, R1, DR	8	85	N, R1, DR, PC, SN	3	95	
	Night	70	45	N	45	70	N, R2, NR	25	75	N, PC, SN, R2, DR	8	85	AA, N, PC, SN, R2, DR	3	95	

Non-residential receiver
Developed settlements (urban and suburban)

	Standard hours			LAeq(15minute) noise level above NML						LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)					
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	200				N	85	65	N, PC, RO	30	75
Hospital wards and operating theatres	Day	65	85							N, PC, RO	30	75
Place of worship	Day	55	200				N	85	65	N, PC, RO	30	75
Active recreation	Day	65	85							N, PC, RO	30	75
Passive recreation	Day	60	135				N	50	70	N, PC, RO	30	75
Industrial premise	Day	75	30							N, PC, RO	30	75
Offices, retail outlets	Day	70	50							N, PC, RO	30	75

	OOHW			LAeq(15minute) noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	
Hospital wards and operating theatres	Evening	65	85				N, R1, DR	50	70	N, R1, DR	17	80	N, R1, DR, PC, SN	5	90	
	Night	65	85	N	85	65	N, R2, NR	50	70	N, PC, SN, R2, DR	17	80	AA, N, PC, SN, R2, DR	5	90	
Place of worship	Evening	55	200				N, R1, DR	135	60	N, R1, DR	50	70	N, R1, DR, PC, SN	17	80	
	Night	55	200	N	200	55	N, R2, NR	135	60	N, PC, SN, R2, DR	50	70	AA, N, PC, SN, R2, DR	17	80	
Active recreation	Evening	65	85				N, R1, DR	50	70	N, R1, DR	17	80	N, R1, DR, PC, SN	5	90	
Passive recreation	Evening	60	135				N, R1, DR	85	65	N, R1, DR	30	75	N, R1, DR, PC, SN	9	85	
Industrial premise	Evening	75	30				N, R1, DR	17	80	N, R1, DR	5	90	N, R1, DR, PC, SN	2	100	
	Night	75	30	N	30	75	N, R2, NR	17	80	N, PC, SN, R2, DR	5	90	AA, N, PC, SN, R2, DR	2	100	
Offices, retail outlets	Evening	70	50				N, R1, DR	30	75	N, R1, DR	9	85	N, R1, DR, PC, SN	3	95	
	Night	70	50	N	50	70	N, R2, NR	30	75	N, PC, SN, R2, DR	9	85	AA, N, PC, SN, R2, DR	3	95	

Non-residential receiver
Propagation across a valley / over water

	Standard hours			LAeq(15minute) noise level above NML						LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)					
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	255				N	95	65	N, PC, RO	35	75
Hospital wards and operating theatres	Day	65	95							N, PC, RO	35	75
Place of worship	Day	55	255				N	95	65	N, PC, RO	35	75
Active recreation	Day	65	95							N, PC, RO	35	75
Passive recreation	Day	60	160				N	60	70	N, PC, RO	35	75
Industrial premise	Day	75	35							N, PC, RO	35	75
Offices, retail outlets	Day	70	60							N, PC, RO	35	75

	OOHW			LAeq(15minute) noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	
Hospital wards and operating theatres	Evening	65	95				N, R1, DR	60	70	N, R1, DR	20	80	N, R1, DR, PC, SN	5	90	
	Night	65	95	N	95	65	N, R2, NR	60	70	N, PC, SN, R2, DR	20	80	AA, N, PC, SN, R2, DR	5	90	
Place of worship	Evening	55	255				N, R1, DR	160	60	N, R1, DR	60	70	N, R1, DR, PC, SN	20	80	
	Night	55	255	N	255	55	N, R2, NR	160	60	N, PC, SN, R2, DR	60	70	AA, N, PC, SN, R2, DR	20	80	
Active recreation	Evening	65	95				N, R1, DR	60	70	N, R1, DR	20	80	N, R1, DR, PC, SN	5	90	
Passive recreation	Evening	60	160				N, R1, DR	95	65	N, R1, DR	35	75	N, R1, DR, PC, SN	15	85	
Industrial premise	Evening	75	35				N, R1, DR	20	80	N, R1, DR	5	90	N, R1, DR, PC, SN	2	100	
	Night	75	35	N	35	75	N, R2, NR	20	80	N, PC, SN, R2, DR	5	90	AA, N, PC, SN, R2, DR	2	100	
Offices, retail outlets	Evening	70	60				N, R1, DR	35	75	N, R1, DR	15	85	N, R1, DR, PC, SN	3	95	
	Night	70	60	N	60	70	N, R2, NR	35	75	N, PC, SN, R2, DR	15	85	AA, N, PC, SN, R2, DR	3	95	

Distanced Based Assessment (Noisiest Plant)

Please pick from drop-down list in orange cells

Noise area category		R1
RBL or L_{A90} Background level (dB(A))	Day	40
	Evening	35
	Night	30
$L_{Aeq(15minute)}$ Noise Mangement Level (dB(A))	Day	50
	Day (OOHW)	45
	Evening	40
	Night	35
Noisiest plant		ST Excavator
Is there line of sight to receiver?		Yes

Steps for Assessment:

1. Schedule noisy works to occur in standard hours where possible or before 1 1pm and implement Standard Measures.
2. Select the representative noise area category. The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
3. Select the noisiest plant. If not found in drop-down list, refer to 'Source List' and select a representative plant with equivalent sound power level.
4. Is there line of sight to receiver? Select the appropriate scenario from the drop down list.:
   Identify and implement standard mitigation measures where feasible and reasonable. Include any shielding implemented as part of the standard mitigation measures by changing the selection in the 'Is there line of sight to/aw to receiver' drop-down list. Solid barriers can be in the form of road cutting, timber lapped and capped fence, shipping container, site office, etc. Substantial solid barriers are barriers greater than 5 metres in height or multiple rows of houses or a sound barrier specifically designed to mitigate construction noise. Please note that vegetation and trees are not considered to be a form of solid barrier and any gaps would compromise the acoustic integrity of the solid barrier.
5. Determine if there are any receivers (both residential and non-residential receivers) within the affected distance for each relevant time period . Consider background LA90 noise measurements to check assumption in Step #2 if:
   (a) there are many affected receivers and the impact duration at any one receiver is more than 3 weeks; or
   (b) there are a few affected receivers and the impact duration at any one receiver is more than 6 weeks.
   Note that consideration need to be given to the construction staging plan when determining impact duration.
7. Identify if there are any receivers within the additional mitigation measures distances and identify feasible and reasonable measures at each receiver.
8. Where night works are involved, identify sleep disturbance affected distance.
9. Document the outcomes of these steps.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be investigated on a project-by-project basis. Please contact a Roads

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Note that spot check verification of noise levels and individual briefings are not required for projects with less than 3 weeks impact duration

Residential receiver

			$L_{Aeq(15minute)}$ noise level above background (L_{A90})											$L_{Aeq(15minute)}$ 75 dB(A) or greater (Highly affected)			Sleep disturbance L_{Amax} 65 dB(A)
			5 to 10 dB(A)			10 to 20 dB(A)			20 to 30 dB(A)			> 30 dB(A)					
			Noticeable			Clearly audible			Moderately intrusive			Highly intrusive					
		Affected distance (m)	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Affected distance (m)
Undeveloped green fields, rural areas with isolated dwellings	Day	85							N	30	60	N	15	70	N, PC, RO	10	75	
	Day (OOHW)	130				N, R1, DR	85	50	N, R1, DR	30	60	N, R1, DR, PC, SN	15	70	N, PC, RO	10	75	
	Evening	185				N, R1, DR	130	45	N, R1, DR	50	55	N, R1, DR, PC, SN	25	65	N, PC, RO	10	75	
	Night	270	N	270	35	N, R2, DR	185	40	N, PC, SN, R2, DR	85	50	AA, N, PC, SN, R2, DR	30	60	N, PC, RO	10	75	50
	Highly Affected	10													N, PC, RO	10	75	
Developed settlements (urban and suburban)	Day	95							N	35	60	N	15	70	N, PC, RO	10	75	
	Day (OOHW)	145				N, R1, DR	95	50	N, R1, DR	35	60	N, R1, DR, PC, SN	15	70	N, PC, RO	10	75	
	Evening	220				N, R1, DR	145	45	N, R1, DR	55	55	N, R1, DR, PC, SN	25	65	N, PC, RO	10	75	
	Night	335	N	335	35	N, R2, DR	220	40	N, PC, SN, R2, DR	95	50	AA, N, PC, SN, R2, DR	35	60	N, PC, RO	10	75	55
	Highly Affected	10													N, PC, RO	10	75	
Propagation across a valley / over water	Day	105							N	40	60	N	15	70	N, PC, RO	10	75	
	Day (OOHW)	175				N, R1, DR	105	50	N, R1, DR	40	60	N, R1, DR, PC, SN	15	70	N, PC, RO	10	75	
	Evening	280				N, R1, DR	175	45	N, R1, DR	65	55	N, R1, DR, PC, SN	25	65	N, PC, RO	10	75	
	Night	445	N	445	35	N, R2, DR	280	40	N, PC, SN, R2, DR	105	50	AA, N, PC, SN, R2, DR	40	60	N, PC, RO	10	75	65
	Highly Affected	10													N, PC, RO	10	75	

Non-residential receiver
Undeveloped green fields, rural areas with isolated dwellings

	Standard hours			$L_{Aeq(15minute)}$ noise level above NML										LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)									
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	50				N	25	65	N, PC, RO	10	75			
Hospital wards and operating theatres	Day	65	25							N, PC, RO	10	75			
Place of worship	Day	55	50				N	25	65	N, PC, RO	10	75			
Active recreation	Day	65	25							N, PC, RO	10	75			
Passive recreation	Day	60	30				N	15	70	N, PC, RO	10	75			
Industrial premise	Day	75	10							N, PC, RO	10	75			
Offices, retail outlets	Day	70	15							N, PC, RO	10	75			

	OOHW			$L_{Aeq(15minute)}$ noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Hospital wards and operating theatres	Evening	65	25				N, R1, DR	15	70	N, R1, DR	6	80	N, R1, DR, PC, SN	2	90
	Night	65	25	N	25	65	N, R2, NR	15	70	N, PC, SN, R2, DR	6	80	AA, N, PC, SN, R2, DR	2	90
Place of worship	Evening	55	50				N, R1, DR	30	60	N, R1, DR	15	70	N, R1, DR, PC, SN	6	80
	Night	55	50	N	50	55	N, R2, NR	30	60	N, PC, SN, R2, DR	15	70	AA, N, PC, SN, R2, DR	6	80
Active recreation	Evening	65	25				N, R1, DR	15	70	N, R1, DR	6	80	N, R1, DR, PC, SN	2	90
Passive recreation	Evening	60	30				N, R1, DR	25	65	N, R1, DR	10	75	N, R1, DR, PC, SN	3	85
Industrial premise	Evening	75	10				N, R1, DR	6	80	N, R1, DR	2	90	N, R1, DR, PC, SN	1	100
	Night	75	10	N	10	75	N, R2, NR	6	80	N, PC, SN, R2, DR	2	90	AA, N, PC, SN, R2, DR	1	100
Offices, retail outlets	Evening	70	15				N, R1, DR	10	75	N, R1, DR	3	85	N, R1, DR, PC, SN	1	95
	Night	70	15	N	15	70	N, R2, NR	10	75	N, PC, SN, R2, DR	3	85	AA, N, PC, SN, R2, DR	1	95

Non-residential receiver
Developed settlements (urban and suburban)

	Standard hours			$L_{Aeq(15minute)}$ noise level above NML						LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)					
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	55				N	25	65	N, PC, RO	10	75
Hospital wards and operating theatres	Day	65	25							N, PC, RO	10	75
Place of worship	Day	55	55				N	25	65	N, PC, RO	10	75
Active recreation	Day	65	25							N, PC, RO	10	75
Passive recreation	Day	60	35				N	15	70	N, PC, RO	10	75
Industrial premise	Day	75	10							N, PC, RO	10	75
Offices, retail outlets	Day	70	15							N, PC, RO	10	75

	OOHW			$L_{Aeq(15minute)}$ noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Hospital wards and operating theatres	Evening	65	25				N, R1, DR	15	70	N, R1, DR	6	80	N, R1, DR, PC, SN	2	90
	Night	65	25	N	25	65	N, R2, NR	15	70	N, PC, SN, R2, DR	6	80	AA, N, PC, SN, R2, DR	2	90
Place of worship	Evening	55	55				N, R1, DR	35	60	N, R1, DR	15	70	N, R1, DR, PC, SN	6	80
	Night	55	55	N	55	55	N, R2, NR	35	60	N, PC, SN, R2, DR	15	70	AA, N, PC, SN, R2, DR	6	80
Active recreation	Evening	65	25				N, R1, DR	15	70	N, R1, DR	6	80	N, R1, DR, PC, SN	2	90
Passive recreation	Evening	60	35				N, R1, DR	25	65	N, R1, DR	10	75	N, R1, DR, PC, SN	3	85
Industrial premise	Evening	75	10				N, R1, DR	6	80	N, R1, DR	2	90	N, R1, DR, PC, SN	1	100
	Night	75	10	N	10	75	N, R2, NR	6	80	N, PC, SN, R2, DR	2	90	AA, N, PC, SN, R2, DR	1	100
Offices, retail outlets	Evening	70	15				N, R1, DR	10	75	N, R1, DR	3	85	N, R1, DR, PC, SN	1	95
	Night	70	15	N	15	70	N, R2, NR	10	75	N, PC, SN, R2, DR	3	85	AA, N, PC, SN, R2, DR	1	95

Non-residential receiver
Propagation across a valley / over water

	Standard hours			$L_{Aeq(15minute)}$ noise level above NML						LAeq(15minute) 75 dB(A) or greater (Highly affected)		
				<10 dB(A)			10 to 20 dB(A)					
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Classroom at schools and other educational institutions	Day	55	65				N	25	65	N, PC, RO	10	75
Hospital wards and operating theatres	Day	65	25							N, PC, RO	10	75
Place of worship	Day	55	65				N	25	65	N, PC, RO	10	75
Active recreation	Day	65	25							N, PC, RO	10	75
Passive recreation	Day	60	40				N	15	70	N, PC, RO	10	75
Industrial premise	Day	75	10							N, PC, RO	10	75
Offices, retail outlets	Day	70	15							N, PC, RO	10	75

	OOHW			$L_{Aeq(15minute)}$ noise level above NML												
				< 5 dB(A)			5 to 15 dB(A)			15 to 25 dB(A)			> 25 dB(A)			
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))
Hospital wards and operating theatres	Evening	65	25				N, R1, DR	15	70	N, R1, DR	5	80	N, R1, DR, PC, SN	2	90
	Night	65	25	N	25	65	N, R2, NR	15	70	N, PC, SN, R2, DR	5	80	AA, N, PC, SN, R2, DR	2	90
Place of worship	Evening	55	65				N, R1, DR	40	60	N, R1, DR	15	70	N, R1, DR, PC, SN	5	80
	Night	55	65	N	65	55	N, R2, NR	40	60	N, PC, SN, R2, DR	15	70	AA, N, PC, SN, R2, DR	5	80
Active recreation	Evening	65	25				N, R1, DR	15	70	N, R1, DR	5	80	N, R1, DR, PC, SN	2	90
Passive recreation	Evening	60	40				N, R1, DR	25	65	N, R1, DR	10	75	N, R1, DR, PC, SN	5	85
Industrial premise	Evening	75	10				N, R1, DR	5	80	N, R1, DR	2	90	N, R1, DR, PC, SN	1	100
	Night	75	10	N	10	75	N, R2, NR	5	80	N, PC, SN, R2, DR	2	90	AA, N, PC, SN, R2, DR	1	100
Offices, retail outlets	Evening	70	15				N, R1, DR	10	75	N, R1, DR	5	85	N, R1, DR, PC, SN	1	95
	Night	70	15	N	15	70	N, R2, NR	10	75	N, PC, SN, R2, DR	5	85	AA, N, PC, SN, R2, DR	1	95