Hornsby Park Drainage Upgrade Project

Review of Environmental Factors

Hornsby Council

25 October 2021

Final

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Approved by:	Katrina Wolf
Position:	Principal
Signed:	
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Glossary

Term / Abbreviation	Definition
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
Approved project	Hornsby Quarry Rehabilitation Works Development (DA/101/2019)
BC Act	NSW *Biodiversity Conservation Act 2016*
BCT	Biodiversity Conservation Trust
Biosecurity Act	NSW *Biosecurity Act 2015*
BOS	Biodiversity Offsets Strategy
Bushland SEPP	*State Environmental Planning Policy No 19 - Bushland in Urban Areas*
CEEC	Critically Endangered Ecological Community
Coastal Management SEPP	*State Environmental Planning Policy (Coastal Management) 2018*
Council	Hornsby Shire Council
Development footprint	The location of the proposed works for the proposal (see **Figure 2**)
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW *Environmental Planning and Assessment Regulation 2000*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1995*
HCEP	Habitat Creation and Enhancement Plan
Heritage Act	NSW *Heritage Act 1977*
HLEP 2013	*Hornsby Local Environmental Plan 2013*
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
Koala SEPP	*State Environmental Planning Policy (Koala Habitat Protection) 2021*
LLS Act	NSW *Local Land Services Act 2013*
NP&W Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
PAD	Potential Archaeological Deposit
PCT	Plant Community Type
POEO Act	NSW *Protection of the Environment Operations Act 1997*
Proposal	Hornsby Park Drainage Upgrade Project
REF	Review of Environmental Factors
RNE	Register of the National Estate
Site	Hornsby Quarry Site (see **Figure 1**)

Term / Abbreviation	Definition
SREP 20	*Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River*
TEC	Threatened ecological community
Vegetation SEPP	*State Environmental Planning Policy Vegetation in Non-Rural Areas 2017*
VMP	Vegetation Management Plan
WM Act	NSW *Water Management Act 2000*

Executive Summary

Hornsby Shire Council is seeking to undertake the Hornsby Park Drainage Upgrade Project (the 'proposal') under Part 5 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposal seeks to upgrade the existing drainage infrastructure to the east and north of the existing quarry void to a suitable standard for safety. Some of the earth embankments conveying the stormwater are not considered structurally sound. To ensure stormwater is safely conveyed through the Site, the drainage system is to be upgraded to current standards to cater for a 1 in 100 year event. The proposal also includes changes to the road to the north of the void adjacent to the existing drainage line. The proposal is separate from the previously approved Hornsby Quarry Rehabilitation Works Development (DA/101/2019) (the 'approved project').

A Review of Environmental Factors (REF) has been prepared to identify the significance of any adverse environmental impacts that could arise from the proposal and to determine whether there is a need for further assessment through an Environmental Impact Statement (EIS). The proposal will result in a number of impacts to environmental values including short-term impacts, such as construction-related impacts (noise, air quality etc.) and long-term impacts, such as impacts to biodiversity and non-Aboriginal heritage areas.

Due to the presence of the threatened ecological community (TEC) Blue Gum High Forest within the Site, Council considered a number of location and design iterations to minimise the extent of works within this community, as well as minimising impacts to other areas of native vegetation. The proposed design was chosen for these reasons.

Given the increased frequency of large rainfall events occurring and the recurring significant impact on the existing infrastructure and natural systems, the do-nothing approach will lead to costly on-going maintenance issues and negative environmental impacts. Future embellishments and infrastructure planned within the void including a lift (subject to approval) would be jeopardised by future sediment and water inundation, if a do-nothing approach is adopted.

A total of 0.94 ha of land will be disturbed for the proposal, including 0.62 ha of vegetation. A total of 0.34 ha of highly modified Blue Gum High Forest Critically Endangered Ecological Community will be removed by the proposal, and a total of 0.62 ha of habitat for threatened fauna species will be removed. Indirect impacts to retained vegetation and habitat may occur, such as runoff, erosion and sedimentation, pollution and edge effects. A number of these impacts are already present with the development footprint due to previous clearing and existing land uses, and indirect impacts are expected to be localised and are not considered to cause a substantial change in habitat. The proposal is not considered to result in a significant impact to Blue Gum High Forest and potentially occurring threatened fauna species in accordance with a test of significance.

One locally significant heritage item, Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area, will be directly impacted by the proposal. This heritage item will be impacted through vegetation clearing, earthworks, installation of drainage structures and revegetation. These changes will result in a physical and visual change to 0.76 ha of the heritage item, of which 0.08 ha overlaps with the approved project's footprint. There will be no impact on the Diatreme face as part of the proposal. In the broader context, the proposal in conjunction with the approved project, will enable retention of the characteristics of the heritage

item. Artefact (2021b) has assessed the proposal as having only a minor physical and visual impact on the heritage item, and a minor cumulative impact.

There is some potential for minor short-term impacts to the physical environment to occur during construction, including alterations to the hydrological regime, an increase in noise and vibration and a decrease in air quality due to increased dust. Such impacts will be subject to mitigation measures to ensure impacts are reduced to an acceptable level. The proposal will also contribute to cumulative impacts in conjunction with the approved project within the Site, such as an increase in the loss of vegetation (0.62 ha), an increase in impacts to the locally significant heritage item - Diatreme Hornsby Quarry and surrounding vegetation (0.68 ha).

A number of measures have been implemented to avoid or minimise any potential environmental impacts that are associated with the proposal, which includes location and design changes to reduce the area of native vegetation and habitat directly impacted. A comprehensive set of mitigation measures are proposed to manage impacts to environmental values that could not be avoided. Compensatory measures will be implemented for the loss of native vegetation through the application of the *Green Offsets Code 2015* (Hornsby Shire Council 2015a). A total of 3.72 ha of land is proposed to be used to offset the impacts to 0.62 ha of vegetation. It is proposed that the offsets will have in-perpetuity protection through a Voluntary Conservation Agreement in partnership between Council and the Biodiversity Conservation Trust. Due to an overlap between the development footprint and the approved project's footprint, the finalisation of the offsets package for the approved project will need to account for the development footprint.

This assessment considers that impacts to environmental values are manageable through the implementation of mitigation and compensatory measures, and not significant. As a result, the proposal is unlikely to significantly affect the environment and an EIS is not required.

1. Introduction

Cumberland Ecology was commissioned by Hornsby Shire Council (Council) to prepare a Review of Environmental Factors (REF) for the Hornsby Park Drainage Upgrade Project (the 'proposal'). The proposal is being undertaken at the Hornsby Quarry Site (the 'Site') (see **Figure 1**). Council is seeking to upgrade the existing drainage infrastructure to the east and north of the existing quarry void to a suitable standard to ensure safety under Part 5 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1. Purpose

The purpose of this REF is to identify the significance of any adverse environmental impacts that could arise from the proposal and to determine whether there is a need for further assessment through an Environmental Impact Statement (EIS). In particular, this REF provides an assessment of the impacts on biodiversity values, particularly threatened species, populations and communities that are listed under the schedules of the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The REF also identifies the measures that will be implemented to avoid or minimise any potential environmental impacts that are associated with the proposal.

This REF has been prepared in accordance with Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) (see **Appendix A**). The environmental assessment and determination of the proposal has been undertaken in accordance with Part 5 of the EP&A Act.

The preparation of this REF was guided by the REF template developed by EMAP Consulting (2019).

1.2. Project Background

1.2.1. Hornsby Quarry Overview

Hornsby Quarry was operated by a private business throughout the 1900s, with operations ceasing in the late 1990s. Council acquired the site in 2002 and it was closed to the public for safety reasons. Since acquiring the site, Council has undertaken research and planning of the future use of the site. In 2016, the site was approved to be used by the NorthConnex project to partially fill the site with excavated rock as soil. Council subsequently investigated options to rehabilitate the site and convert it into a community use recreational area.

In 2019, Council submitted an EIS to support an application (DA/101/2019) for designated and integrated development for the Site under Part 4 of the EP&A Act. The Hornsby Quarry Rehabilitation Works Development sought approval to rehabilitate the existing Hornsby Quarry, involving bulk earthworks and associated civil works, including construction of access tracks, retaining walls, site remediation, tree removal, revegetation work and site rehabilitation. The development was approved by the Sydney North Regional Planning panel on 4 November 2020. Supporting documents for the approved project include a Biodiversity Offsets Strategy (BOS), Vegetation Management Plan (VMP) and Habitat Creation and Enhancement Plan (HCEP).

1.2.2. Hornsby Park Drainage Upgrade Project

Council is currently seeking to upgrade the existing drainage infrastructure to the east and north of the existing quarry void to a suitable standard to ensure safety. Some of the extensive earth embankments for conveying stormwater were constructed by the previous quarry operators by placing unwanted material and are not

considered structurally sound. Further, a corrugated steel pipe on the main trunk drainage line was placed under a roadway and has corroded and collapsed. To ensure stormwater is safely conveyed through the Site the drainage system is to be upgraded to current standards to cater for a 1 in 100 year event.

The proposal is located between the two large areas of the site – Old Mans Valley and the quarry void. The proposal also includes changes to the access road to the north of the void adjacent to the existing drainage line. The area where the proposal will be undertaken is hereafter referred to as the 'development footprint'. The location of the development footprint is shown in **Figure 2**.

The proposed drainage upgrade works are separate from the approved project and therefore a separate approval is required.

1.3. Proposal Description

1.3.1. Proponent Details

Table 1 outlines the proponent contact details. For this proposal, Council is both a public authority proponent (EP&A Act s5.3) and the determining authority (EP&A Act s5.1).

Table 1 Proponent details

Item	Detail
Project Name:	Hornsby Park Drainage Upgrade Project
Proponent (Council) Name:	Hornsby Shire Council
Project Manager:	Craig Clendinning
Position:	Project Manager Major Projects
Contact Details:	cclendinning@hornsby.nsw.gov.au (02) 9847 6701

1.3.2. Detailed Scope of Works

The proposal involves improvements to existing drainage lines, and installation of new sections of drainage infrastructure to meet stormwater drainage requirements around the north and east of the existing quarry void. The proposal would extend over approximately 430 m with an area of works of approximately 0.94 ha, of which 0.12 ha overlaps with the approved project's footprint.

Works will include vegetation clearing and protection, demolition of obsolete sections of concrete channel and removal of existing stormwater pipes, installation of precast box culverts and slabs, construction of stormwater inlet pits and outlet structure headwalls, retaining walls and drainage bunds. As well as construction of rock lined channels and boulder installation as energy dissipators and drainage channel widening and maintenance access tracks. This will be followed by revegetation works. Council's civil drawings relating to the proposal are provided in **Appendix B**.

The proposal works will be carried out concurrently with bulk earthworks associated with the approved project and may require staging to maintain access to the two main areas of the site – Old Mans Valley and the quarry void. Following completion of both the proposal works and approved project, and subject to approval, the embellishment stage will commence and following this stage, portions of the Site will be open to the public and used for recreation purposes. The Site will be managed in accordance with the VMP and HCEP developed for the approved project.

1.3.3. Machinery and Equipment

The proposal requires the use of heavy machinery, such as:

- 30 t Excavator;
- Drott;
- Backhoe;
- Skid steer loader;
- Mobile cranes; and
- Spoil trucks.

Other ancillary tools and machinery may be required to undertake the work including pumps, generators, utility vehicles, jack hammers/rock hammering equipment, hand tools etc.

1.3.4. Access and Ancillary Works

No additional access and ancillary works are required for the proposal. Existing access roads into the development footprint will be utilised.

1.3.5. Duration and Working Hours

Table 2 provides details on the duration and work hours of the proposal.

Table 2 Proposal duration and working hours

Item	Details
Commencement Date:	Early 2022
Completion Date:	Mid 2023
Work Duration:	Approximately 12 months. The proposal works will be carried out concurrently with bulk earthworks associated with the approved project (DA/101/2019) and may require staging to maintain access to the two main areas of the site – Old Mans Valley and the quarry.
Work Hours:	Standard work hours: • 7:00am to 6:00pm Monday to Friday; • 8:00am to 1:00pm Saturday; and • No work on Sundays or Public Holidays.

1.4. Proposal Location and Context

1.4.1. Location of the Proposal

The proposal is located at 1X Quarry Road and 14B Dural Street, Hornsby within the Hornsby Local Government Area (LGA). The proposal is wholly located within the following lots:

- Lot 1 DP 114323;
- Lot 2 DP 169188; and
- Lot A and E DP 318676.

The proposal is located approximately 700 m north west of the Hornsby town centre. The proposal is contained the former Hornsby Quarry site and Old Mans Valley, which are located adjacent to Hornsby Park and Hornsby Aquatic and Leisure Centre. The Site adjoins Berowra Valley National Park to the west.

The location of the proposal is shown in **Figure 1**.

1.4.2. Site Context

The proposal is located within the former Hornsby Quarry, which is characterised by dramatic topography and significant bushland vegetation . The quarry occupies approximately 10 ha, and the pit is approximately 300 m wide. The topography of the Site generally falls east to west (around 180 Australian Height Datum (AHD) to 60 m AHD), and the steeper portions of the Site have slopes that exceed a gradient of 25%. The areas surrounding the quarry are densely vegetated, with some areas containing significant weed infestations.

The Site is located within the Old Mans Creek Catchment. Old Mans Creek traverses the Site, with three minor tributaries converging upstream of the quarry, and downstream of the Site the creek flows into the Berowra Creek system, which eventually drains into the Hawkesbury-Nepean River.

Although subject to modification through previous quarry operations, the natural soil landscapes identified within the Site include the Hornsby diatreme, basaltic breccia and metamorphosed Hawkesbury Sandstone.

The Site adjoins Berowra Valley National Park to the west. This national park is connected to Council bushland reserves, including the Rosemead Road Reserve, as well as both the Dog Pound Creek and Galston Park BioBank sites to the south and west respectively.

1.4.3. Land Use and Ownership

The wider Site was used as a quarry up until the early 1990s. In 2016, the Site was approved to be used by the NorthConnex project to partially fill the site with excavated rock as soil, with the final delivery of fill material completed in January 2019. Limited maintenance and investigative works have been undertaken within the Site. The development footprint currently comprises access roads, drainage infrastructure and vegetated areas.

The development footprint is located on land zoned RE1 Public Recreation under the *Hornsby Local Environmental Plan 2013* (HLEP 2013). The objectives of this zone are to:

- To enable land to be used for public open space or recreational purposes;

- To provide a range of recreational settings and activities and compatible land uses;
- To protect and enhance the natural environment for recreational purposes; and
- To protect and maintain areas of bushland that have ecological value.

The development footprint is wholly located on land owned by Council.

1.4.4. Proposal Justification and Consideration of Alternatives

1.4.4.1. Requirement for the Proposal

The proposal is required to rectify previous modifications and damage to the existing drainage infrastructure between Old Mans Valley and the quarry void, and upgrade it to a suitable standard to ensure safety. Some of the extensive earth embankments for conveying stormwater were constructed by the previous quarry operators by placing unwanted material and are not considered structurally sound. Further, a corrugated steel pipe on the main trunk drainage line was placed under a roadway and has corroded and collapsed. A significant rainfall event in early 2020 also caused damage to the existing drainage infrastructure and heavy scouring of the access track down to the quarry void. **Photographs 1-3** show evidence of damage from the February 2020 storm.

Photograph 1 Scouring and debris following the February 2020 storm

Photograph 2 Scouring following the February 2020 storm

Photograph 3 Debris on the existing trash rack following the February 2020 storm

To ensure stormwater is safely conveyed through the Site, the drainage system is to be upgraded to current standards to cater for a 1 in 100 year event. The proposal includes two detention basins and coarse trash racks. This has several benefits including the collection and removal of rubbish, reduction in peak flows downstream and some sediment removal.

In the past three years, there have been significant rainfall events in September 2019, February 2020 and March 2021, which have affected the Site. The peak flows experienced during these events have put continual pressure on the existing infrastructure and natural systems. These peak flows have caused significant erosion and scouring to the existing drainage line within the development footprint (see **Photographs 4-6**). This sourcing and erosion has undermined the root structures of the surrounding vegetation and further threatens the stability of the surrounding earth embankments. High sediment and nutrient loads are also being transported into the natural systems and into the quarry void. The presence of high sediment loads in the quarry void water could result in chemical flocculants needing to be used to treat the water before it was a suitable quality to be pumped into the local creek.

Landscape embellishments and new infrastructure planned within the void, during the next phase of transformation, would be at risk of damage through future sediment and water inundation. This risk needs to be addressed before the embellishment phase can proceed. **Appendix C** provides examples of storm event damage that could continue to occur in the 'do nothing' scenario.

Photograph 4 Scouring and debris following the March 2021 storm

Photograph 5 Typical build up of debris and sediment following significant rainfall events

Photograph 6 Stormwater and debris upstream following the March 2021 storm

1.4.4.2. Alternative to the Proposal

Due to the environmental constraints identified within the Site during previous investigations for the approved project, Council investigated a number of alternative options for the proposal. **Figure 3** shows the location of the development footprint in relation to the concept footprint that was initially developed. Some of the alternative designs considered are provided in **Appendix D**. **Plates 1-3** below show the detail of some of these alternative designs.

Both location and design options were considered in an effort to avoid and minimise the direct and indirect impacts of the proposal on environmental values. The majority of alternatives considered focussed on the eastern half of the development footprint where new infrastructure is required. The western half of the development footprint largely comprises improvement to existing infrastructure.

Due to the presence of the threatened ecological community (TEC) Blue Gum High Forest within the Site, Council considered a number of location and design iterations to minimise the extent of works within this community, as well as minimising impacts to other areas of native vegetation. A straight line connection between the inlet and outlet, which comprises a typical engineering design, would result in a greater impact to the TEC and native vegetation, and the impact area would extend further into this vegetation. Alternatively, a connection that follows the existing drainage line was also considered, however this also resulted in a greater impact to native vegetation. This is due to a wider area of impact to enable slope stabilisation works to occur. The final location selected adjoins the existing road alignment as far as practicable, which has assisted to minimise the extent of impacts to native vegetation as it utilises existing cleared areas a far as practical and reduces the need for additional slope stabilisation works. The inclusion of numerous bends within the culvert infrastructure has also assisted in minimising the extent of native tree removal, as the bends allowed for retention of additional trees. As shown in **Figure 3**, the development footprint has reduced in size from the footprint developed for the concept plan.

Plate 1 Iterations of box culvert designs

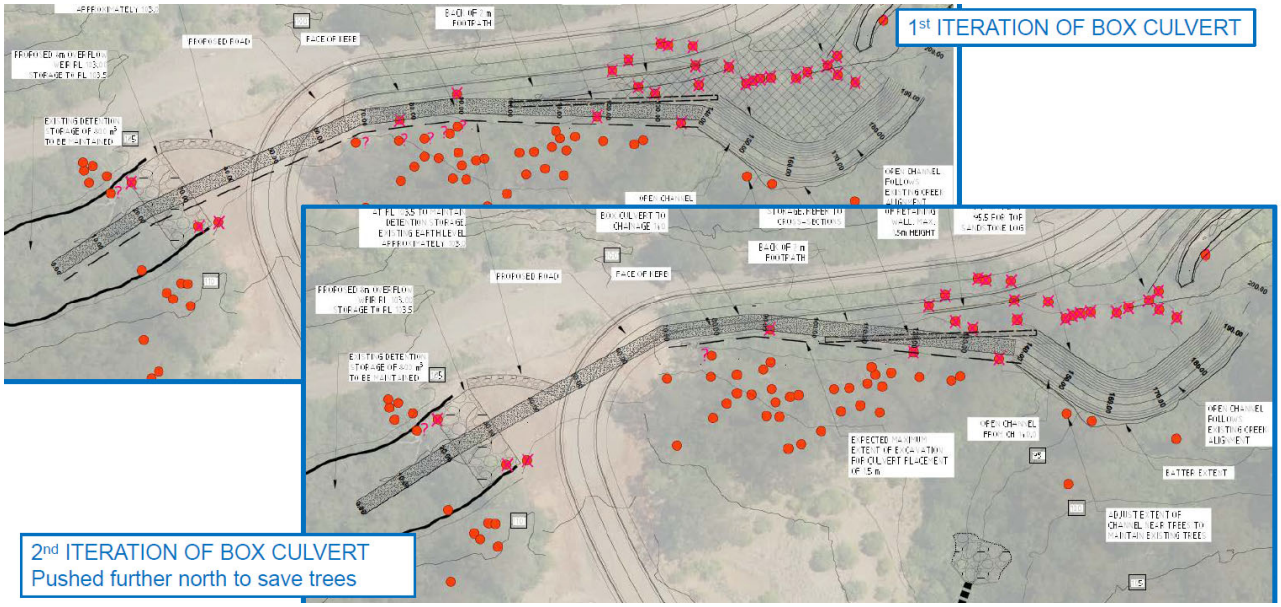


Plate 2 Open channel design

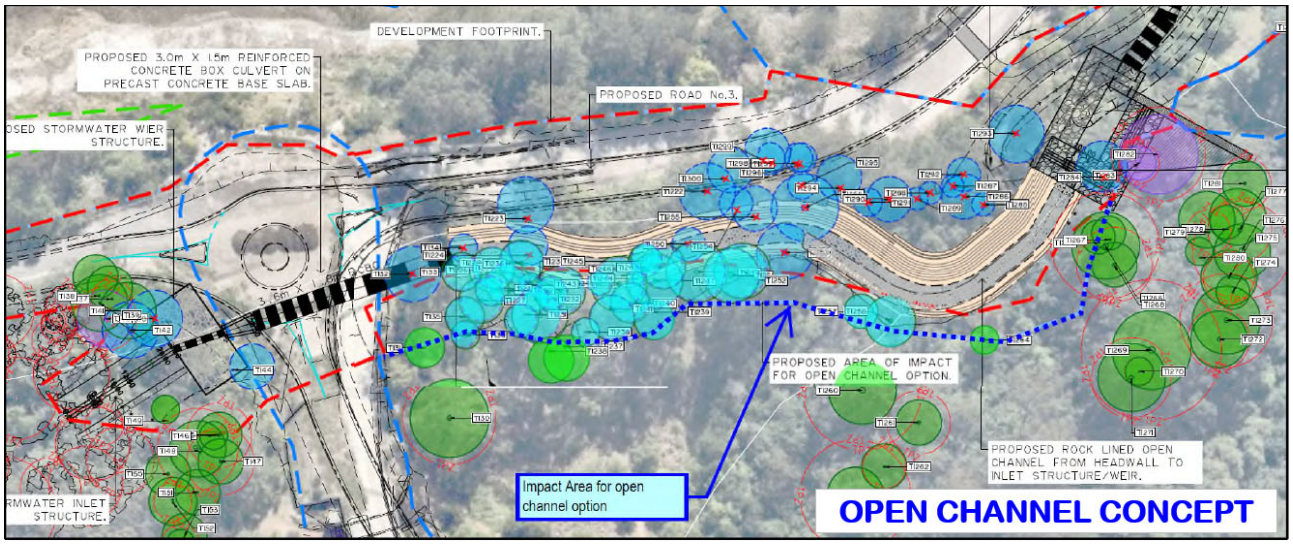
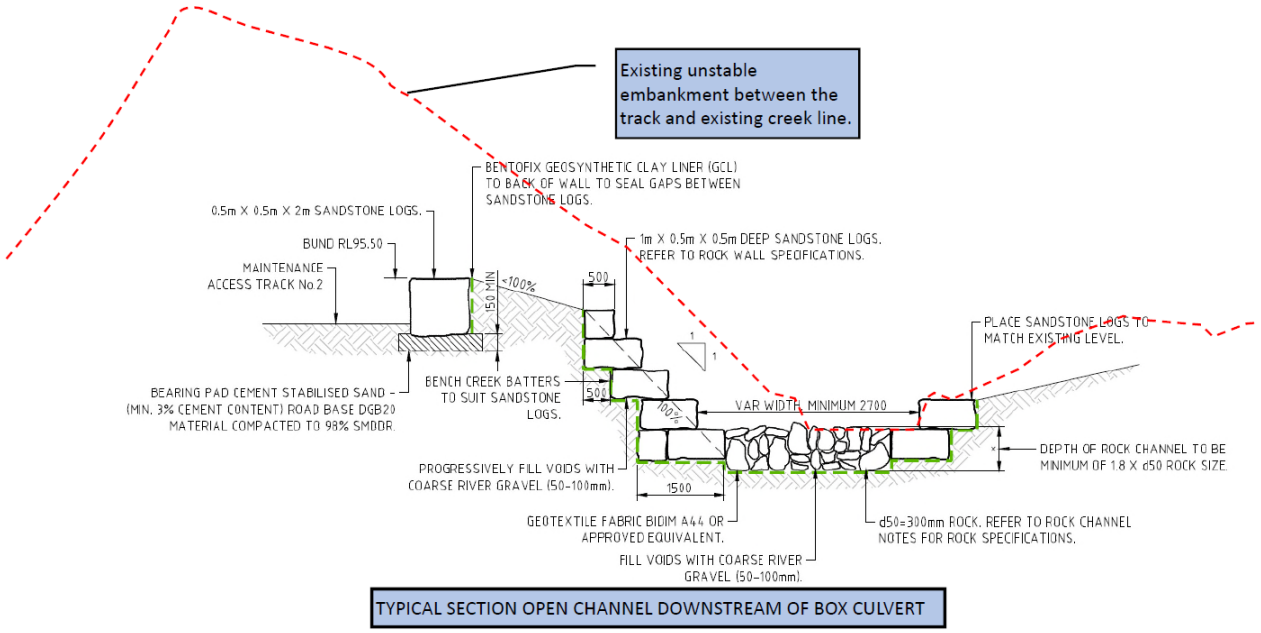


Plate 3 Open channel cross section



The drainage infrastructure selected for the eastern portion of the development footprint comprises a pre-cast box culvert system, which caters for a 1 in 100 year event. This type of infrastructure allows for the associated culverts to be covered, revegetated and managed under the VMP and HCEP.

An alternative option to have an overland flow path would have required additional clearing of native vegetation for both the channel and bank stabilisation works. An evaluation of the impact to trees shows that 30 trees are saved by the proposed culvert design rather than adopting the open channel concept (see **Plate 4** and **Table 3**).

Plate 4 Trees retained through use of culvert option

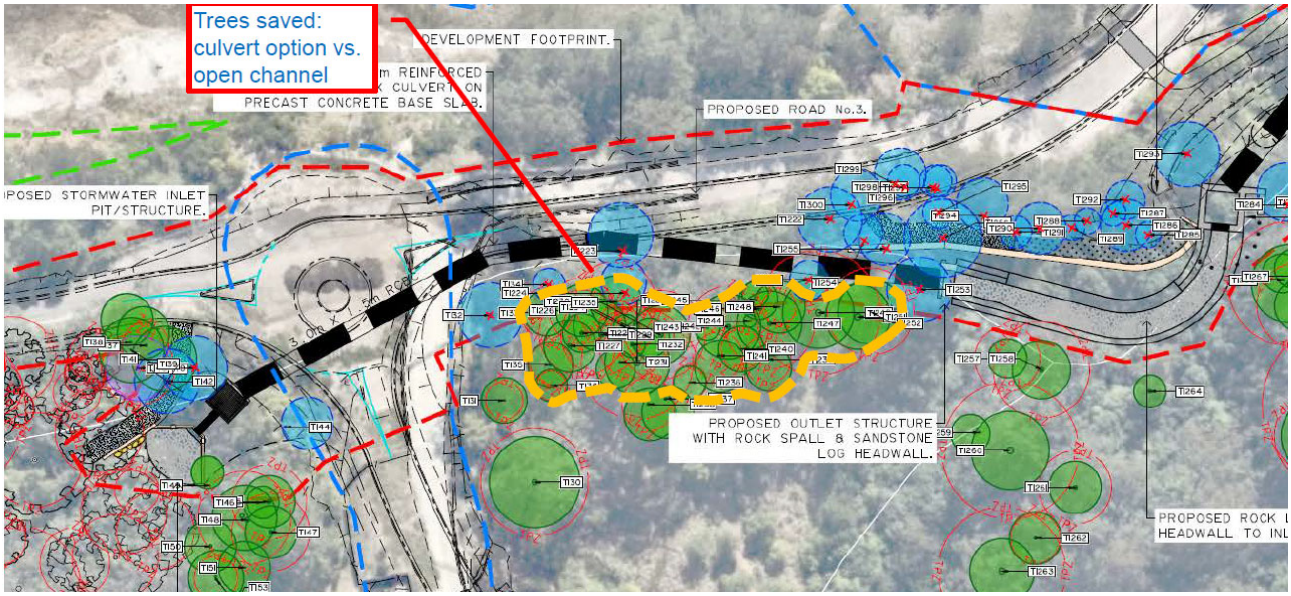


Table 3 Comparison of native tree removals between open channel and culvert design options

Scientific Name	Common Name	Open Channel Option	Culvert (Proposed) Option	Native Trees Saved by Use of Culvert Option
Eucalyptus saligna	Sydney Blue Gum	44	17	27
Casuarina cunninghamiana	River She-Oak	14	14	0
Angophora floribunda	Rough-barked Apple	3	1	2
Eucalyptus pilularis	Blackbutt	1	1	0
Pittosporum undulatum	Sweet Pittosporum	1	0	1
Acacia parramattensis	Parramatta Wattle	1	1	0
Casuarina glauca	Swamp She-Oak	1	1	0
Total		**65**	**35**	**30**

Although not part of the original design, approximately 130 m of additional box culvert above the RL90 track was recommended during the planning phase of the proposal. Although inclusion of this resulted in additional environmental impacts, it was included in the final design due to the potential impacts of subsidence of the adjoining hillside. The risk of the potential subsidence is that it could block the main drainage channel sending all stormwater into the quarry void and resulting significant scouring. Furthermore, due to the risk of sediment

and water inundation, significant impacts could also occur to future landscape embellishments and infrastructure in the void (e.g. the lift) which is being considered for the quarry void as part of the following embellishment stage of works. This risk needs to be addressed before future works within the void could proceed.

1.4.4.3. Do-nothing Approach

If Council does nothing, then there is a high likelihood that the existing uncompacted spoil mounds put in place by the former quarry operators to control stormwater will fail resulting in land slippage and inundation of the quarry void and possible risk to safety when the site is opened to the public. Additionally, there is a risk of potential subsidence of the slopes surrounding the existing drainage infrastructure, which could result in the redirection of flows causing significant scouring. The lack of a functioning culvert under the track between Old Mans Valley and the quarry void results in significant scouring of the track down to the quarry void during storm events.

In the February 2020 storm, scouring was up to 1.5 metres deep and evident over several hundred metres. Hundreds of tonnes of material scoured out, resulting in significant work to repair the tracks. The sediment laden stormwater entered the quarry void which resulted in approximately 60,000 cubic metres of water which had to be pumped out once water clarity was achieved and pumping permitted (see **Plate 5**).

The cost of pumping this volume of water is significant, particularly given the only current power source is a diesel generator. The associated greenhouse gases generated by this exercise are significant and avoidable with the proposal which is a gravity-based system requiring no power.

Given the increased frequency of large rainfall events occurring and the recurring significant impact on the existing infrastructure and natural systems, the do-nothing approach will lead to costly on-going maintenance issues and negative environmental impacts. Future embellishments and infrastructure planned within the void including a lift (subject to approval) would be jeopardised by future sediment and water inundation if a do-nothing approach is adopted.

Given the hydrology and slope of the Site and future plans for its use as public open space providing community opportunities for passive and active recreation, the do-nothing approach is not considered to be a feasible option.

Plate 5 NearMap aerial comparison

2. Statutory and Planning Context

2.1. Environmental Planning and Assessment Act 1979

The EP&A Act and EP&A Regulation provide the framework for development and environmental assessment in NSW. As council is the proponent, the works have been assessed as 'development permissible without consent' under Part 5 of the EP&A Act. Accordingly, Council must satisfy Sections 5.5, 5.6 and 5.7 of the EP&A Act by examining, and taking into account to the fullest extent possible, all matters which are likely to affect the environment. This REF is intended to address council's compliance with the EP&A Act including Sections 5.5, 5.6 and 5.7 and the requirements of Clause 228 of the EP&A Regulation. An assessment of factors considered under Clause 228 of the EP&A Regulation is provided in **Appendix A**.

Environmental Planning Instruments made under the EP&A Act may also be relevant and are addressed below.

2.2. State Environmental Planning Policy (Infrastructure) 2007

The *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) aims to facilitate the delivery of infrastructure across NSW by identifying whether certain types of infrastructure require consent, can be carried out without consent or are exempt development.

Division 20 of the Infrastructure SEPP applies to stormwater management systems. Under Clause 110, a 'stormwater management system' is defined as:

> *(a) works for the collection, detention, distribution or discharge of stormwater (such as channels, aqueducts, pipes, drainage works, embankments, detention basins and pumping stations), and*
>
> *(b) stormwater quality control devices (such as waste entrapment facilities, artificial wetlands, sediment ponds and riparian management), and*
>
> *(c) stormwater reuse schemes.*

The proposal is considered to meet the definition of a stormwater management system under Clause 110 of the Infrastructure SEPP. Clause 111(1) of the Infrastructure SEPP provides that development for the purpose of a stormwater management system may be carried out by or on behalf of a public authority, without consent on any land. Clause 111(2) provides that development for the purpose of stormwater management systems includes:

> *(a) construction works,*
>
> *(b) routine maintenance works, including maintenance dredging to remove sediment build-up in a stormwater canal or at exit points into natural waterways that affects the efficiency of the stormwater management system*
>
> *(c) environmental management works.*

As the proposal is being carried out by Council, and is not exempt development as defined in Clause 112, the proposal is permissible without consent under Clause 111 of the Infrastructure SEPP. The proposal is therefore assessed under Part 5 of the EP&A Act.

The provisions of the Infrastructure SEPP prevail over any other environmental planning instrument (e.g. HELP 2013, *Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River* (SREP 20)) to the extent of any inconsistency, in accordance with Clause 8(1).

2.3. Other Environmental Legislation

Table 4 outlines how the project has been considered under other relevant Commonwealth and State environmental legislation.

Table 4 Other environmental legislation

Legislation	Relevance to the Proposed Activity
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act is the Australian Government's key piece of environmental legislation and is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE). It is designed to protect national environmental assets, known as Matters of National Environmental Significance (MNES), which include threatened species of flora and fauna, TECs, migratory species as well as other protected matters. Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES must be referred to DAWE. This assessment has indicated that no Matters of National Environmental Significance, as listed under the EPBC Act are likely to be significantly affected by the proposed works.
State Legislation	
Biodiversity Conservation Act 2016 (BC Act)	The BC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Part 7 of the BC Act provides the environmental assessment requirements for activities being assessed under Part 5 of the EP&A Act. If a significant impact is likely, a Species Impact Statement is required. A biodiversity development assessment report may also be required if the proponent elects for this. Section 7.2(1)(a) and 7.3 describe the assessment requirements and thresholds for what is considered a significant impact. Threatened species and communities listed under the BC Act were identified as potentially being impacted by the proposal. Assessments of Significance were undertaken for these matters and concluded that a significant impact is not likely to result and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.
Local Land Services Act 2013 (LLS Act)	The objects of the LLS Act include 'to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development. The LLS Act regulates the clearing of native vegetation.

Legislation	Relevance to the Proposed Activity
	Section 60(O)(b)(ii) excludes the need for consent under the LLS Act where the clearing is an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act. Furthermore, the proposal is not located on rural land to which the LLS Act applies.
Fisheries Management Act 1995 (FM Act)	The FM Act provides for the protection, conservation, and recovery of threatened species, populations and ecological communities of fish and marine vegetation and fish habitats, as well as promoting the development and sharing of fishery resources in NSW. The proposal does not involve harm to mangroves or other protected marine vegetation, dredging or reclamation, blocking of fish passage and does not involve impact to a Key Fish Habitat waterway. Therefore the works will not require a permit issued by the Minister in accordance with Part 7 of the FM Act.
National Parks and Wildlife Act 1974 (NP&W Act)	The NP&W Act regulates the control and management of all national parks, historic sites, nature reserves, and Aboriginal areas. The main aim of the NP&W Act is to conserve the natural and cultural heritage of NSW. Where works will disturb Aboriginal objects, an Aboriginal Heritage Impact Permit is required. The development footprint is located approximately 550 m east of Berowra Valley National Park. The Heritage NSW AHIMS Web Services holds no records of Aboriginal sites or places within the development footprint. The proposed activity is unlikely to harm Aboriginal objects and therefore a permit under the NP&W Act is not required.
Heritage Act 1977 (Heritage Act)	The objects of the Heritage Act include 'to encourage the conservation of the State's heritage'. The Site contains one heritage site held in the NSW State Heritage Register (SHR), Old Man's Valley Cemetery, however this is located outside of the development footprint. The proposal does not involve an item or place listed on the NSW State Heritage Register or the subject of an interim heritage order or listing. Approval of works on the site is therefore not required under Part 4 of the Heritage Act.
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act is the key environmental protection and pollution statute. The POEO Act is administered by the Environment Protection Authority and establishes a licensing regime for waste, air, water and pollution. Relevant sections of the Act are listed below: • Part 5.3 Water Pollution • Part 5.4 Air Pollution • Part 5.5 Noise Pollution • Part 5.6 Land Pollution and Waste Any work potentially resulting in pollution must comply with the POEO Act. Relevant licences must be obtained if required. The proposal does not comprise a scheduled activity as identified in Schedule 1 of the POEO Act. Therefore no licences have been identified as being required for the proposal including an Environmental Protection Licence (EPL).

Legislation	Relevance to the Proposed Activity
Water Management Act 2000 (WM Act)	The main objective of the WM Act is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. Section 91E of the WM Act establishes an approval regime for controlled activities within waterfront land. However Clause 41 of the *Water Management (General) Regulation 2018* provides an exemption for public authorities in relation to all controlled activities on waterfront land.
Biosecurity Act 2015 (Biosecurity Act)	The Biosecurity Act and regulations provide requirements for state level priority weeds. The Biosecurity Act regulates all plants, with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. This REF considers the likelihood of encountering weeds and details appropriate mitigation measures to reduce the risk of spreading.
State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP)	The Coastal Management SEPP provides controls for undertaking development and activities in coastal management areas. Under Clause 10 of the SEPP, clearing native vegetation in the mapped 'Coastal wetland and littoral rainforest area' is permissible without consent when undertaken by or on behalf of a public authority and in accordance with a certified coastal management program, a plan of management under Division 2 of Part 2 of Chapter 6 of the Local Government Act, or a plan of management under Division 6 of the Crown Land Management Act 2016. In other cases, the clearing requires consent. The proposed activity is not located on land subject to the Coastal Management SEPP.
State Environmental Planning Policy Vegetation in Non-Rural Areas 2017 (Vegetation SEPP)	The aims of the Vegetation SEPP are to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation. Section 60(O) provides an exemption for clearing under Part 5 of the EP&A Act and therefore consent is not required under the Vegetation SEPP.
State Environmental Planning Policy (Koala Habitat Protection) 2021 (Koala SEPP)	The Koala SEPP aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. The Koala SEPP applies to development under Part 4 of the EP&A Act. As the proposal is not 'development', and is being undertaken under Part 5 of the EP&A Act, the Koala SEPP does not apply.
State Environmental Planning Policy –No 19 - Bushland in Urban Areas (Bushland SEPP)	The aim of the Bushland SEPP is to protect and preserve bushland within identified urban areas. The Bushland SEPP applies as the proposal is located on bushland zone or reserved for publish open space. In accordance with Clause 4 of the Bushland SEPP, a consent authority shall not consent to the carrying out of development referred to in subclause (1) unless: • It has made an assessment of the need to protect and preserve the bushland having regard to the aims of this Policy,

Legislation	Relevance to the Proposed Activity
	• It is satisfied that the disturbance of the bushland is essential for a purpose in the public interest and no reasonable alternative is available to the disturbance of that bushland, and • It is satisfied that the amount of bushland proposed to be disturbed is as little as possible and, where bushland is disturbed to allow construction work to be carried out, the bushland will be reinstated upon completion of that work as far as is possible. The proposal is considered to be compliant with the Bushland SEPP as it is essential for public interest, no reasonable alternative is available, the amount of bushland proposed to be disturbed is as little as possible and, where bushland is disturbed, it will be reinstated upon completion of that work as far as is possible. Furthermore, the proposal is consistent with the *Hornsby Park Plan of Management* (Hornsby Shire Council 2015b), which was prepared with consideration of Clause 8 of the Bushland SEPP.
Sydney Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (SREP 20)	The aim of SREP 20 is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. SREP 20 applies to specific areas of land, including the Hornsby LGA and the land on which the proposal occurs. Clause 5 of SREP 20 provides that the general planning considerations, and Clause 6 provides specific planning policies and related recommended strategies. An assessment of Clause 5 and 6 of SREP 20 is provided in **Appendix E**.
Hornsby Local Environmental Plan 2013	The HLEP 2013 aims to make local environmental planning provisions for land in Hornsby in accordance with the relevant standard environmental planning instrument under section 3.20 of the EP&A Act. The development footprint is located on land zoned RE1 Public Recreation under the *Hornsby Local Environmental Plan 2013* (HLEP 2013). Of relevance to this REF are the objectives of this zone: • To enable land to be used for public open space or recreational purposes; • To provide a range of recreational settings and activities and compatible land uses; • To protect and enhance the natural environment for recreational purposes; and • To protect and maintain areas of bushland that have ecological value. Clause 5.10 regarding heritage conservation is also of relevance, and is addressed by the Non-Aboriginal (Historic) Heritage Impact Assessment (Artefact 2021b). The proposal is considered to be compliant with the aims of the HLEP 2013.

3. Existing Environment

3.1. Landform, Geology and Soils

The topography of the Site generally falls east to west (around 180 AHD to 60 m AHD), and the steeper portions of the Site have slopes that exceed a gradient of 25%. Within the development footprint a high point occurs at approximately 108 AHD at the southern end, and a low point occurs at approximately 87 AHD at the western boundary of the development footprint. Generally the land slopes towards the existing access track and the RL90 track.

The Site is located on a matrix of the Hornsby Diatreme and Hawkesbury Sandstone geological formations. The natural soil landscapes of the Site include the Hornsby diatreme (an outcrop of volcanic sedimentary breccia), basaltic breccia and metamorphosed Hawkesbury Sandstone (SESL 2018). The soils present within the Site are complex, and have been subject to disturbance from previous quarry activities. The intact soils present are largely sandstone based, however at the lower slope position these soils can be found with breccia-derived clays in the subsoil (SESL 2018). The soil profile of the development footprint has been modified as part of previous land use activities, and is within areas of the diatreme. The development footprint is wholly within the area of volcanic breccia (PSM 2007).

3.2. Contaminated Land and Acid Sulfate Soils

AECOM (2015b) identified a number of potential sources of contamination within the Site resulting from the previous quarry activities. Detailed investigations undertaken by GHD (2019a) found that all analytical results were reported below the nominated human and ecological criteria, with the exception of nickel and zinc results in some soil samples. GHD (2019a) considered these results to be related to the natural rock and soil properties of the sampled material, and are not considered to be indicative of contamination. Based on the findings of the investigation by GHD (2019a), the risk of exposure to contaminants of potential concern for on-site and off-site receptors was confirmed to be low. These findings are also applicable to the development footprint.

GHD (2019b) identified that there is a low probability of acid sulfate soils occurs within the Site, which also applies to the development footprint.

3.3. Hydrology and Water Quality

The Site is located within the Old Mans Creek Catchment. A total catchment area of 84.1 ha flows into the drainage system. Old Mans Creek traverses the Site, with three minor tributaries converging upstream of the quarry. The majority of upstream flows through the valley have been diverted around the quarry via constructed channels and culverts (GHD 2018c). Downstream of the Site, Old Mans Creek flows in a westerly direction, flowing into Waitara Creek, and eventually flows into the Hawkesbury River via Berowra Creek. Within the development footprint, water collects at the southern end, and flows north, and eventually west. From the southern end of the development footprint, water flows under a roadway (see **Photograph 7**), into an existing man-made drainage channel within bushland (see **Photograph 8**), into a pit and twin pipes see **Photograph 9**) and into a concrete channel (see **Photograph 10**).

AECOM (2015b) identified two groundwater systems at the Site within the Quarry void, including a shallow perched water system and a deeper system located within the fresh breccia and surrounding Hawkesbury

Sandstone. The existing drainage system within the development footprint appears to be fed by surface water flows, rather than groundwater flows.

The existing water quality within Old Mans Creek is generally similar to an unimpacted or slightly disturbed catchment (GHD 2018c). Elevated faecal contamination has been observed in the creek, potentially due to point sources such as sewage overflows. Water quality within the development footprint is likely comparable to the remainder of the Site.

Photograph 7 Existing drainage pathway – under road

Photograph 8 Existing drainage pathway – man-made drainage channel

Photograph 9 Existing drainage pathway – pit/culvert

Photograph 10 Existing drainage pathway – concrete channel

3.4. Biodiversity

3.4.1. Vegetation Communities

The majority of the vegetation within the Site has been highly modified as a result of historical quarrying and rehabilitation works, and the landform and soil profile has been significantly altered (GHD 2018a). Vegetation within the Site comprises a mixture of remnant, regrowth, revegetation and rehabilitation (GHD 2018a). Vegetation within the Site has been mapped by Kleinfelder (2017) (see **Figure 4**) and GHD (2018a) (see **Figure 5**). The following two Plant Community Types (PCTs) have been identified within the Site:

- 1841. Smooth-barked Apple – Turpentine – Blackbutt tall open forest on enriched sandstone slopes and gullies of Sydney region.
- 1237. Sydney Blue Gum – Blackbutt – Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion

PCT 1841 is equivalent to the Blackbutt Gully Forest identified by Kleinfelder (2017) and GHD (2018a) and PCT 1237 is equivalent to Blue Gum Diatreme Forest. PCT 1237 is associated with the BC Act listed critically endangered ecological community (CEEC) Blue Gum High Forest. Although this TEC is also listed under the EPBC Act, the vegetation within the Site does not meet the condition criteria for inclusion in the CEEC listing under the EPBC Act (GHD 2018a).

The vegetation mapping by GHD (2018a) within the development footprint has been refined to align with current conditions, exclude areas that overlap with the approved project's footprint and exclude hard stand areas. The amended vegetation mapping is shown in **Figure 6**. **Table 5** details the extent of the vegetation communities within the development footprint.

Table 5 Vegetation communities within the development footprint

Vegetation Community (Kleinfelder)	Vegetation Community (GHD)	PCT	BC Act Status	EPBC Act Status	Development Footprint (ha)
Blue Gum Diatreme Forest (moderate-good_poor)	Blue Gum Diatreme Forest (moderate/good-poor)	1237	CEEC	-	0.34
Native Rehabilitation / Regeneration	Blackbutt Gully Forest (moderate/good-poor)	1841			0.02
Exotic Vegetation	Blackbutt Gully Forest (low)	1841	-	-	0.26
Quarry Void / Excluded	Quarry Void / Hardstand		-	-	0.31*
Total^					**0.94**

**Includes 0.12 ha which overlaps with the approved project's footprint.*

^In some cases totals may not equal the equivalent sum of numbers due to rounding.

All vegetation occurring within the development site has been subject to historical disturbance.

The Blue Gum Diatreme Forest occurs as remnant trees of *Eucalyptus saligna* (Sydney Blue Gum), *Angophora floribunda* (Rough-barked Apple), and *Eucalyptus pilularis* (Blackbutt) above an exotic dominated understorey. A dense small tree layer of the exotic *Ligustrum lucidum* (Large-leaved Privet) occurs within this community. An example of the Blue Gum Diatreme Forest within the development footprint is shown in **Photograph 11**.

The Blackbutt Gully Forest (moderate/good-poor) within the development footprint comprises small areas of regeneration at the edge of the existing access track. Weeds dominate these areas, including *Ligustrum lucidum* (Large-leaved Privet), *Genista monspessulana* (Montpellier Broom) and *Lantana camara* (Lantana). An example of the Blackbutt Gully Forest (moderate/good-poor) within the development footprint is shown in **Photograph 12**.

Blackbutt Gully Forest (low) within the development footprint comprises exotic vegetation, with the occasional emergent native tree. Exotic species occurring in this community include *Genista monspessulana* (Montpellier Broom), *Ligustrum lucidum* (Large-leaved Privet), *Ageratina adenophora* (Crofton Weed), *Solanum nigrum* (Black-berry Nightshade), *Verbena officinalis* (Common Verbena), *Cenchrus clandestinus* (Kikuyu Grass), and *Plantago lanceolata'*(Lamb's Tongues). Emergent trees include *Eucalyptus saligna* (Sydney Blue Gum) and the planted *Casuarina glauca* (Swamp Oak). An example of the Blackbutt Gully Forest (low) within the development footprint is shown in **Photograph 13**.

Photograph 11 Blue Gum Diatreme Forest within the development footprint

Photograph 12 Blackbutt Gully Forest (moderate/good-poor) within the development footprint

Photograph 13 Blackbutt Gully Forest (low) within the development footprint

3.4.2. Flora

GHD (2018a) recorded a total of 82 flora species from 39 families within the Site, including 39 exotic species and 43 native species. The Poaceae, Asteraceae and Myrtaceae were the most diverse families recorded. No threatened flora species have been recorded within the Site (GHD 2018a). No threatened flora species were recorded within the development footprint during a site inspection undertaken for the purpose of this assessment on 9 September 2021.

The BioNet Atlas holds records for a total of 21 threatened flora species within 5 km of the development footprint. None of these species are considered likely to occur within the development footprint, due to absence of previous records, lack of suitable habitat or highly modified/disturbed habitat.

3.4.3. Fauna

The Site generally has patches of good fauna habitat values, due to moderate habitat complexity, allowing for a moderate diversity of fauna species (GHD 2018a). Fauna habitats recorded by GHD (2018a) include eucalypt forest, exotic grassland and cleared areas, and aquatic habitat. Within the development footprint, fauna habitats include eucalypt forest, cleared areas and aquatic habitat.

A total of 86 fauna species have been recorded within the Site during recent surveys (Future Ecology 2021). This includes six amphibians, 50 birds, 25 mammals and five reptiles. Five introduced species were recorded

during surveys by Future Ecology (2021), including the European Red Fox (*Vulpes vulpes*) and feral cat (*Felis catus*).

The following threatened fauna species have been recorded within the Site (GHD 2018a, Future Ecology 2021):

- Red-crowned Toadlet (*Pseudophryne australis*);
- Powerful Owl (*Ninox strenua*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

The BioNet Atlas holds records for a total of 39 threatened fauna species, and an addition 5 migratory species, within 5 km of the development footprint. With the exception of the Red-crowned Toadlet (*Pseudophryne australis*), all the fauna species recorded within the Site are considered to have a high potential to occur within the development footprint (see **Appendix F**). One additional species, the Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is considered to have a moderate potential to occur.

3.5. Aboriginal Heritage

Artefact (2018b) previously identified 17 recorded sites held in the Heritage NSW Aboriginal Heritage Information Management System (AHIMS) within proximity of the Site. The majority of these recorded sites are art sites in the form of rock engravings (Artefact 2018b). Based on previous studies and historical records, and given the Site has been subject to major subsurface disturbance, the Site was assessed as having low potential to contain intact archaeological resources (Artefact 2018b). Surveys undertaken by Artefact (2018b) did not result in the identification of any Aboriginal sites or areas of Potential Archaeological Deposit (PAD).

The Heritage NSW AHIMS holds no records of Aboriginal sites or places within the development footprint. Based on the findings of Artefact (2018b), and previous disturbance, the development footprint is unlikely to contain any Aboriginal sites or areas of PAD.

3.6. Non-Aboriginal Heritage

Artefact (2018a) identified no National Heritage items or Commonwealth Heritage items within the Site or immediate surrounds. The Site contains one heritage site held in the SHR, Old Man's Valley Cemetery (Artefact 2018a). There is one item listed on the Register of the National Estate (RNE) within the Site, Hornsby Diatreme Area (Artefact 2021a). The Site also contains five listings on Schedule 4 of the HLEP 2013.

Table 6 lists the non-aboriginal heritage items occurring within the Site. Of these items, the Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area occurs within the development footprint. This heritage item is associated with the period of use of the Hornsby Quarry and is a physical example of the works undertaken for the quarry (AECOM 2015a). The location of the Diatreme Hornsby Quarry and surrounding vegetation within the Site and development footprint is shown in **Figure 7**.

Artefact (2021b) undertook an assessment of non-aboriginal heritage for the proposal (see **Appendix G**) and found no areas archaeological potential within the development footprint.

Table 6 Non-aboriginal heritage items within the Site

Item	Address	Significance	Listing Number
SHR			
Old Mans Cemetery	Old Mans Valley, off Quarry Road	State	01764
RNE			
Hornsby Diatreme Area	1X Quarry Road		
HLEP 2013			
Diatreme Hornsby Quarry and surrounding vegetation	1X Quarry Road	Local	A54
Old Mans Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located	1X Quarry Road	State	A55
Hornsby Park – Lone Pine and sandstone steps	203X Pacific Highway	Local	513
Sandstone steps	Quarry Road	Local	537
Diatreme Hornsby Quarry and surrounding vegetation	1X Quarry Road	Local	538

3.7. Noise

The noise environment surrounding the Site is dominated by the local road network, including Peats Ferry Road and other transport infrastructure such as Hornsby railway station and the Northern Railway Line (GHD 2018b). Noise sensitive receivers in proximity to the Site are predominantly residential dwellings, with other receivers including commercial, industrial, educational, and medical facilities, places of worship and active recreation areas (GHD 2018b). As the Site is not currently operational, the noise environment surrounding the development footprint is that of the local road and transport networks.

3.8. Air Quality

No detailed information is available on the existing air quality within the Site, with the closest air quality monitoring station located in Linfield, approximately 11km south east of the Site. Nearby sensitive receptors include residential dwellings, a church and an aquatic centre. As the Site is not currently operational, the air quality is not considered to be impacted by land use activities.

4. Impact Assessment

This chapter details the impact of the proposal on environment values, including biological and physical environment, to heritage items and other factors for consideration. The proposal includes the implementation of a suite of mitigation measures to address these impacts, and are provided in **Chapter 5**. An assessment of factors considered under Clause 228 of the EP&A Regulation is provided in **Appendix A**.

4.1. Landform, Geology and Soils

The proposal will involve excavation and landform alteration via the use of a range of machinery. The extent of landform alteration is overall expected to be minor however, will contributed to the wider alterations being undertaken as part of the approved project. During the construction phase of the proposal, there will be in increased risk of erosion and sedimentation. The proposal includes landform stabilisation works to minimise the risk of sedimentation and erosion of adjoining steep land. The landform will be most impacted along the sections of box culvert, however soils will be re-established following installation of this infrastructure, and where possible revegetated.

4.2. Contaminated Land and Acid Sulfate Soils

Due to the low risk of exposure to contaminants of potential concern within the Site, as reported in GHD (2019a), the proposal is not considered to impact contaminated land. Additionally, the proposal is unlikely to impact acid sulfate soils due to the low probability of these soils occurring within the Site (GHD 2019a).

4.3. Hydrology and Water Quality

Due to the proposal comprising drainage upgrade works, the hydrology of the development footprint will be significantly altered. The development footprint currently comprises a modified hydrological landscape. The proposal includes vegetation clearing and protection, demolition of obsolete sections of concrete channel and removal of existing stormwater pipes, installation of precast box culverts and slabs, construction of stormwater inlet pits and outlet structure headwalls, retaining walls and drainage bunds. As well as construction of rock lined channels and boulder installation as energy dissipators and drainage channel widening and maintenance access tracks. This will be followed by revegetation works.

During construction, there is the potential for water quality to be impacted through uncontrolled run-off entering adjoining waterbodies, including the quarry void. For this reason, it is imperative that appropriate stormwater and sediment controls are implemented for the proposal. With the implementation of suitable best practise stormwater detention and sediment control measures, the proposal is unlikely to impact water quality in the short-term or long-term.

4.4. Biodiversity

4.4.1. Vegetation Communities

4.4.1.1. Overview

The direct impact resulting from the proposed development is the loss of vegetation. **Table 7** identifies the extent of impacts to vegetation within the development footprint. A total of 0.62 ha of native vegetation will

be removed by the proposal (see **Figure 6**). The remaining 0.31 ha of land within the development footprint comprises cleared land, of which 0.12 ha overlaps with the approved project's footprint.

In addition to these direct impacts, the proposal has the potential have a number of indirect impacts, including:

- Fragmentation;
- Edge effects;
- Alteration to hydrological regimes;
- Construction impacts, such as noise and erosion.

Table 7 Extent of native vegetation impacts within the development footprint

Vegetation Community (GHD)	PCT	BC Act Status	EPBC Act Status	Development Footprint (ha)
Blue Gum Diatreme Forest (moderate/good-poor)	1237	CEEC	-	0.34
Blackbutt Gully Forest (moderate/good-poor)	1841	-	-	0.02
Blackbutt Gully Forest (low)	1841	-	-	0.26
Total				**0.62**

Table 8 list the endemic and native trees within the development footprint. A total of 47 native trees have been recorded within the development footprint, including 31 endemic trees and 16 planted native trees. The proposal will result in the removal of 35 trees (19 endemic and 16 planted native), conditional removal of one endemic tree, and retention of 11 endemic trees. One of the 19 endemic trees to be removed has recently been assessed as dead. The location of trees within the development footprint is shown in **Figure 8**.

Table 8 Endemic and native trees within the development footprint

Tree #	Scientific Name	Common Name	DBH (cm)	Tree Origin	Condition Rating Value	Outcome
132	*Eucalyptus saligna*	Sydney Blue Gum	0.55	Endemic	4: Moderate	Remove
133	*Eucalyptus saligna*	Sydney Blue Gum	0.33	Endemic	4: Moderate	Retain
134	*Eucalyptus saligna*	Sydney Blue Gum	0.24	Endemic	4: Moderate	Remove
137	*Angophora floribunda*	Rough-barked Apple	0.3	Endemic	4: Moderate	Retain
138	*Angophora floribunda*	Rough-barked Apple	0.28	Endemic	3: Low	Retain
139	*Angophora floribunda*	Rough-barked Apple	0.27	Endemic	3: Low	Retain
140	*Angophora floribunda*	Rough-barked Apple	0.47	Endemic	5: High	Conditional Remove
141	*Angophora floribunda*	Rough-barked Apple	0.23	Endemic	3: Low	Retain

Tree #	Scientific Name	Common Name	DBH (cm)	Tree Origin	Condition Rating Value	Outcome
142	*Eucalyptus pilularis*	Blackbutt	1.00	Endemic	1: Dead	Remove
143	*Eucalyptus saligna*	Sydney Blue Gum	0.63	Endemic	5: High	Remove
144	*Angophora floribunda*	Rough-barked Apple	0.24	Endemic	3: Low	Remove
149	*Angophora floribunda*	Rough-barked Apple	0.16	Endemic	3: Low	Retain
263	*Casuarina cunninghamiana*	River She-Oak	0.37	Native	4: Moderate	Remove
271	*Casuarina glauca*	Swamp She-Oak	0.31	Native	4: Moderate	Remove
275	*Eucalyptus saligna*	Sydney Blue Gum	0.23	Endemic	3: Low	Remove
276	*Eucalyptus saligna*	Sydney Blue Gum	0.55	Endemic	5: High	Remove
277	*Eucalyptus saligna*	Sydney Blue Gum	0.42	Endemic	4: Moderate	Remove
1222	*Eucalyptus saligna*	Sydney Blue Gum	0.55	Endemic	4: Moderate	Remove
1223	*Eucalyptus saligna*	Sydney Blue Gum	0.44	Endemic	4: Moderate	Remove
1224	*Eucalyptus saligna*	Sydney Blue Gum	0.45	Endemic	3: Low	Remove
1225	*Eucalyptus saligna*	Sydney Blue Gum	0.52	Endemic	4: Moderate	Retain
1245	*Eucalyptus saligna*	Sydney Blue Gum	0.17	Endemic	2: Very Poor	Retain
1250	*Eucalyptus saligna*	Sydney Blue Gum	0.42	Endemic	3: Low	Remove
1253	*Eucalyptus saligna*	Sydney Blue Gum	0.7	Endemic	4: Moderate	Remove
1254	*Eucalyptus saligna*	Sydney Blue Gum	0.26	Endemic	3: Low	Remove
1255	*Eucalyptus saligna*	Sydney Blue Gum	0.3	Endemic	4: Moderate	Remove
1256	*Eucalyptus saligna*	Sydney Blue Gum	0.92	Endemic	5: High	Remove
1284	*Eucalyptus saligna*	Sydney Blue Gum	0.39	Endemic	3: Low	Remove
1285	*Casuarina cunninghamiana*	River She-Oak	0.18	Native	3: Low	Remove
1286	*Casuarina cunninghamiana*	River She-Oak	0.3	Native	3: Low	Remove
1287	*Casuarina cunninghamiana*	River She-Oak	0.17	Native	3: Low	Remove
1288	*Casuarina cunninghamiana*	River She-Oak	0.16	Native	3: Low	Remove
1289	*Casuarina cunninghamiana*	River She-Oak	0.21	Native	3: Low	Remove
1290	*Casuarina cunninghamiana*	River She-Oak	0.38	Native	3: Low	Remove
1291	*Casuarina cunninghamiana*	River She-Oak	0.23	Native	3: Low	Remove

Tree #	Scientific Name	Common Name	DBH (cm)	Tree Origin	Condition Rating Value	Outcome
1292	*Eucalyptus saligna*	Sydney Blue Gum	0.24	Endemic	3: Low	Remove
1293	*Eucalyptus saligna*	Sydney Blue Gum	0.52	Endemic	4: Moderate	Remove
1294	*Casuarina cunninghamiana*	River She-Oak	0.31	Native	2: Very Poor	Remove
1295	*Casuarina cunninghamiana*	River She-Oak	0.25	Native	3: Low	Remove
1296	*Casuarina cunninghamiana*	River She-Oak	0.18	Native	3: Low	Remove
1297	*Casuarina cunninghamiana*	River She-Oak	0.18	Native	3: Low	Remove
1298	*Casuarina cunninghamiana*	River She-Oak	0.18	Native	3: Low	Remove
1299	*Casuarina cunninghamiana*	River She-Oak	0.16	Native	3: Low	Remove
1300	*Acacia parramattensis*	Parramatta Wattle	0.22	Native	2: Very Poor	Remove
5005	*Angophora floribunda*	Rough-barked Apple	0.56	Endemic	Not assessed	Retain
5010	*Angophora floribunda*	Rough-barked Apple	0.33	Endemic	Not assessed	Retain
5016	*Angophora floribunda*	Rough-barked Apple	0.57	Endemic	Not assessed	Retain

4.4.1.2. Threatened Ecological Communities

The proposal will remove 0.34 ha of Blue Gum High Forest, which is considered to conform to CEEC listing of the community under the BC Act. Potential indirect impacts to this community include:

- Weed invasion;
- Run-off, erosion and sedimentation; and
- Modification of microhabitat features resulting from long and short-term edge effects (e.g. changes in light filtration).

Such impacts are already present with the development footprint due to previous clearing and surrounding land uses. Previous land uses have resulted in the significant modification of the composition of the community within the development footprint. Approximately 14.73 ha of Blue Gum High Forest will remain from a total of 15.75 ha within the Site following vegetation clearing associated with the proposal and approved project.

A Test of Significance required under Section 7.3 of the BC Act has been prepared for this community in accordance with the *Threatened Species Test of Significance Guidelines* (NSW Government 2018). This assessment is provided in **Appendix H** and concludes that the proposal is unlikely to significantly affect Blue

Gum High Forest. A number of mitigation measures are proposed to further minimise the impacts to this community and are provided in **Chapter 5**.

4.4.2. Flora

No threatened flora species are considered to have the potential to occur within the development footprint due to the highly disturbed and modified nature of the subject land and absence of records during previous surveys. Therefore, the proposed development is unlikely to significant impact any threatened flora species.

4.4.3. Fauna

The following threatened fauna species have been assessed as having a high or moderate likelihood of occurrence within the development footprint:

- Powerful Owl (*Ninox strenua*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed);
- Varied Sittella (*Daphoenositta chrysoptera*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed);
- Grey-headed Flying-fox (*Pteropus poliocephalus*) (BC Act Status: Vulnerable; EPBC Act Status: Vulnerable);
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed);
- Little Bent-winged Bat (*Miniopterus australis*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) (BC Act Status: Vulnerable; EPBC Act Status: Not listed).

The proposal has the potential to result in a number of direct and indirect impacts to the habitat of these species. In addition to the direct removal and modification of vegetation within the development footprint, potential indirect impacts to fauna habitat include:

- Habitat disturbance during the construction phase of the proposal (e.g. changes in noise);
- Runoff, erosion and sedimentation;
- Increased pollution; and
- Modification of microhabitat features resulting from long and short-term edge effects (e.g. changes in light filtration).

A number of these impacts are already present with the development footprint due to previous clearing and existing land uses. The potential changes to the retained individuals resulting from indirect impacts are

expected to be localised and overall are not considered to cause a substantial change in the habitat of the potentially occurring threatened fauna species.

A Test of Significance required under Section 7.3 of the BC Act has been prepared for these species in accordance with the *Threatened Species Test of Significance Guidelines* (NSW Government 2018). This assessment is provided in **Appendix H** and concludes that the proposal is unlikely to significantly affect threatened fauna species. A number of mitigation measures are proposed to minimise the impacts to threatened fauna species and are provided in **Chapter 5**.

4.5. Aboriginal Heritage

Due to the absence of any Aboriginal sites or areas of PAD recorded during surveys of the Site by Artefact (2018b), the proposal is unlikely to impact any Aboriginal objects or items. Notwithstanding this, the proposal includes mitigation measures in the event of an unexpected find.

4.6. Non-Aboriginal Heritage

One locally significant heritage item, Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area, will be directly impacted by the proposal. This area comprises of an eroded valley of volcanic rock surrounded by parkland (Artefact 2021a). This heritage item will be impacted through vegetation clearing, earthworks, installation of drainage structures and revegetation. These changes will result in a physical and visual change to a small area (0.76 ha) of the heritage item. Of this area, 0.08 ha overlaps with the approved project's footprint. Therefore the proposal will result in an additional 0.68 ha of impact to the heritage item. The total area of the heritage item is 16 ha. There will be no impact on the Diatreme face as part of the proposal. Artefact (2021b) has assessed the proposal as having only a minor physical and visual impact on the heritage item, and a minor cumulative impact (see **Appendix G**).

In the broader context, the proposal in conjunction with the approved project, will enable retention of the characteristics of the quarry, where cliffs, zig-zagging entry roads and rocky landscapes are broadly preserved (Artefact 2021a).

Mitigation measures proposed to minimise impacts of the proposal on the heritage item.

4.7. Noise and Vibration

The proposal will generate increased noise and vibration during the construction phase. Noise and vibration is likely to result from vegetation clearing, earthworks and installation of drainage infrastructure, and generally via vehicle and machinery movement. A number of noise sensitive receivers, such as residential dwellings, occur in proximity to the proposal, and may be impacted.

Noise levels have the potential to exceed the construction noise management levels during work hours. The works which will increase noise will be short-term (approximately 12 months), and will be limited to standard work hours as detailed in **Table 2**. Furthermore, the exceedance of the construction noise management levels is anticipated to only occur during limited periods of the construction phase of the proposal. A Construction Noise and Vibration Management Plan has been prepared for the approved project and will also be used during the REF construction activities.

The traffic noise levels generated by the proposal during the construction phase are anticipated to meet the *NSW Road Noise Policy* (DECCW 2011), when assessed at residential dwellings adjacent to Bridge Road, Peats Ferry Road, Dural Street and Quarry Road.

Noise and vibration may impact on fauna species, including threatened species. Noise can affect animal physiology and behaviour, and if it becomes an ongoing stress, it can be injurious to an animal's energy budget, reproductive success and long-term survival. There are other potential impacts that include habitat loss through avoidance, reduced reproductive success and a retreat away from favourable habitats (AMEC Americas Limited 2005). It is expected that some species may relocate in response to noise, and this has the potential effect of increasing the amount of habitat for native species that will be displaced as a result of the proposal. It is likely that most animal species will habituate to the periodic noise disturbance (AMEC Americas Limited 2005), and the proposed works will likely cause only temporary disturbance to fauna.

Mitigation measures proposed to minimise the noise and vibration impacts of the proposal.

4.8. Air Quality

The primary source of air pollution from the proposal will be dust created during the construction phase, from excavation and landform alteration, and ingress and egress of the development footprint. However, the works will be short-term (approximately 12 months), and it is not anticipated that the proposal will create any long-term air quality problems. The impact of dust on air quality can be minimised if appropriate management actions for dust suppression are undertaken. Therefore, mitigation measures are proposed to minimise the impact of the proposal on air quality, including during the construction phases.

4.9. Waste and Chemical Management

The proposal will result in the generation of waste, including:

- Green waste resulting from vegetation removal;
- Top soil and subsurface soil from earthworks;
- Concrete and boulders from existing drainage infrastructure; and
- General waste from site personnel (such as food scraps, aluminium cans, glass bottles, plastic and paper containers, paper and cardboard).

Vegetation to be removed within the development footprint will be retained for mulch, compost, habitat or site stabilisation as appropriate. Habitat features, such as hollow logs or hollow branch sections will be retained within the Site, and used as part of habitat enhancement activities.

Soil disturbed within the development footprint will be reused within the development footprint, or where appropriate re-used as part of the approved project. This would likely include for landform creation, rehabilitation and revegetation activities.

Waste that cannot be re-used within the Site, such as crushed concrete and general waste, will be removed from the development footprint and transported off site to an appropriate waste management facility.

Chemicals generated by the proposal may include accidental fuel or oil spills from vehicles and machinery. No chemicals are proposed to be stored within the development footprint.

4.10. Visual Amenity

The proposal is unlikely to impact the visual amenity of the broader Site as it will involve ground level drainage works that will not be visible from a distance. Revegetation works with Blue Gum High Forest species will improve the visual amenity of the development footprint following construction works. In the broader context, the approved project, in conjunction with the proposal, will increase the visual amenity of the Site substantially relative to current levels as it will be converted into a community use recreational area.

4.11. Traffic

The proposal will result in increased traffic at the Site, due to the ingress and egress of vehicles and machinery within the development footprint. Roads impacted include Bridge Road, Quarry Road, Dural Street and Peats Ferry Road. The works which will increase traffic will be short-term (approximately 12 months), and will be limited to standard work hours as detailed in **Table 2**. Furthermore, increases in traffic levels are anticipated to only occur during limited periods of the construction phase of the proposal.

4.12. Cumulative Impacts

The proposal will contribute to cumulative impacts occurring as a result of the approved project. As the proposal will occur concurrently with the approved project, the duration of impacts is not considered to be extended. However, all the impacts detailed in the sections above, are also applicable to the approved project. Therefore the proposal will contribute to an overall increase on environmental impacts.

One of the key environmental impacts of the approved project is the removal of vegetation. **Table 9** summarises the cumulative vegetation impacts of the approved project and the proposal. The approved project will remove 3.85 ha of vegetation, and the proposal will remove 0.62 ha of native vegetation, resulting in a total of 4.47 ha of vegetation to be removed. Whilst there is a 0.12 ha overlap between the development footprint and the boundary of the approved project, this overlapping area does not contain any mapped area of vegetation. The area of Blue Gum High Forest CEEC impacted will increase from 0.68 ha to 1.02 ha. However it is noted that the additional area of the Blue Gum High Forest CEEC to be impacted by the proposal is highly modified and has significant levels of weed invasion.

Table 9 Cumulative vegetation impacts

Vegetation Community (GHD)	PCT	BC Act Status	EPBC Act Status	Approved Project (ha)	Development Footprint (ha)	Cumulative Impact (ha)	Extent Remaining within Site (ha)
Sydney Blue Gum – Blackbutt – Smooth-barked Apple moist shrubby open forest (moderate/good-poor)	1237	CEEC	-	0.68	0.34	1.02	14.73

Vegetation Community (GHD)	PCT	BC Act Status	EPBC Act Status	Approved Project (ha)	Development Footprint (ha)	Cumulative Impact (ha)	Extent Remaining within Site (ha)
Blackbutt Gully Forest (moderate/good-high)	1841	-	-	0.06		0.06	19.58
Blackbutt Gully Forest (moderate/good-poor)	1841	-	-	0.80	0.02	0.82	
Exotic Vegetation (Blackbutt Gully Forest, Low)	1841	-	-	2.31	0.26	2.57	4.38
Total^				**3.85**	**0.62**	**4.47**	**38.69**

^*In some cases totals may not equal the equivalent sum of numbers due to rounding.*

The development footprint is located within an area subject to biodiversity management under the VMP and HCEP. Hence, the VMP and HCEP for the approved project will need to account for the additional impacts of the proposal, and any management measures proposed for the operational phase of the proposal.

Under the approved project, Condition 41 requires that an offsets package is developed and agreed upon with the Biodiversity Conservation Trust (BCT). Whilst the BOS for the approved project indicates the pathway being used to develop the offsets package, which will follow Council's *Green Offsets Code 2015* (Hornsby Shire Council 2015a), no formal offsets package and agreement with the BCT has been developed and entered into to date. The finalisation of the offsets package for the approved project will need to account for the development footprint and ensure its sufficient for the impacts associated with the approved project.

5. Mitigation Measures

The purpose of this chapter is to outline the avoidance, mitigation and offset measures proposed to ameliorate the impacts of the proposal on environmental values. The impact reduction measures for the proposal include the following hierarchy of principles:

- Avoid - to the extent possible, the proposal has been located and designed to avoid or minimise environmental impacts;
- Mitigate - where certain impacts are unavoidable through design changes, mitigation measures have been introduced to ameliorate the environmental impacts of the proposal; and
- Compensate - the residual ecological impacts of the proposal, following the implementation of mitigation measures, have been compensated to offset what would otherwise be a net loss of vegetation and habitat.

5.1. Avoidance Measures

Due to the environmental constraints identified within the Site during previous investigations for the approved project, Council investigated a number of alternative options for the proposal. Both location and design options were considered in an effort to avoid and minimise the direct and indirect impacts of the proposal on environmental values. Measures adopted by the proposal include:

- Aligning the drainage infrastructure in the eastern half of the development footprint with the existing access road, to minimise impacts on native vegetation including Blue Gum High Forest;
- inclusion of numerous bends within the culvert infrastructure has also assisted in minimising the extent of native tree removal;
- Using precast box culverts and slabs rather than an open channel to minimise the extent of vegetation removal and excavation that would be required for adequate batters; and
- Use of box culverts to allow for soil placement and revegetation with endemic species above the culverts.

5.2. Mitigation Measures

Table 10 details the mitigation measures that will be implemented for the proposal. The majority of these measures build upon the measures and environmental management plans that are required for the approved project. This includes the following:

- Construction Environmental Management Plan, and subplans:
    - Construction Noise and Vibration Management Plan
    - Construction Traffic Management Plan
    - Waste Management Plan
    - Water Management Plan;
    - Erosion and Sediment Control Plan

- Heritage Management Plan;
- Vegetation Management Plan and Habitat Creation and Enhancement Plan.

Table 10 Environmental safeguards and mitigation measures

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
Landform, Geology and Soils	Sedimentation and erosion	• Sediment and erosion controls are to be implemented in accordance a Soil and Water Management Plan and Erosion and Sediment Control Plan to be prepared for the proposal.
		• Overburden will be placed in the form of a bund upslope of the site where necessary to reduce surface water entering the work area.
		• Sediment basins to collect, reuse or treat runoff to an acceptable water quality prior to discharge to receiving waterways.
		• Enhanced sediment and erosion control measures are to be used in areas of steep grades and significant site constraints.
		• All erosion and silt control devices will be visually inspected weekly to ensure effectiveness as well as after each rainfall event.
	Soil stabilisation and restoration	• Areas above box culverts to be stabilised and revegetated in accordance with the VMP.
Contaminated Land and Acid Sulfate Soils	Contaminated land	• Prepare and implement a procedure for handling the unexpected discovery of contamination prior to the commencement of construction. It will outline the process for the identification and assessment of potentially contaminated material in the event that previously unidentified contamination is discovered during construction of the proposal.
	Acid Sulfate Soils	• If acid sulfate soils are encountered, they would be managed in accordance with the *Acid Sulfate Soil Manual*.
Hydrology and Water Quality	Water quality	• Sediment and erosion controls are to be implemented in accordance with the Soil and Water Management Plan and Erosion and Sediment Control Plan prepared for the proposal (and incorporated into the CEMP).
		• No dirty water may be released into drainage lines and/or waterways.

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
		• Visual monitoring of local water quality (i.e. turbidity, hydrocarbon spills/slicks) is to be undertaken on a regular basis to identify any potential spills or deficient erosion and sediment controls.
		• Water quality control measures are to be used to prevent any materials (e.g. concrete, grout, sediment etc.) entering drain inlets or waterways.
	Water pollution	• Spill kits to be available during works in the event of fuel, oil or other chemical (e.g. herbicide) spills.
Biodiversity	Awareness	• All workers will be provided with an environmental induction prior to starting work in the proposal area.
	General flora and fauna impacts	• A Flora and Fauna Management Plan will be prepared as part of the CEMP.
		• Disturbance of vegetation will be limited to the minimum necessary to construct works.
		• Where the project area adjoins native vegetation, mark the limits of clearing and install temporary protective fencing around the vegetated area prior to the commencement of construction activities to prevent vegetation and habitat removal
		• Clearing of mature, native trees will be minimised where possible and exclusion barriers set up to prevent indirect impacts.
		• Access to the bushland is to be restricted to authorised personnel only during construction.
	Loss of fauna species and their habitats (Pre-clearing protocols)	• A trained ecologist will be present during the clearing of native vegetation or removal of potential fauna habitat to avoid impacts on resident fauna and to salvage habitat resources as far as is practicable. Clearing surveys should include: ◦ Inspections of native vegetation for resident fauna and/or nests or other signs of fauna occupancy;

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
		○ Inspection of culverts proposed for demolition/removal for roosting microbats prior to works commencing; ○ Inspection and identification/marking of hollow-bearing trees; and ○ Marking of habitat features that could be salvaged and used for habitat improvement works.
		• Hollows to be impacted by the proposal are to be incorporated into the Nest Box Strategy to be developed for the approved project.
	Loss of fauna species and their habitats (Clearing protocols)	• Whenever possible, vegetation clearing will be scheduled for mid to late summer.
		• Licensed wildlife spotter/catchers must be engaged for any vegetation clearing and development activities or process undertaken onsite. They must: ○ Be present during the clearing of vegetation or damage or disturbance to any structural habitat or refugia; and ○ Clearly define the allowable and non-allowable methods of clearing vegetation to minimise risk of injury or death to wild animals.
		• In order of preference, outcomes for removed wildlife are as follows: ○ Relocation back to suitable and sufficient habitat on original site following operational works. ○ Relocation to suitable habitat adjacent to site; ○ Relocation to distant suitable habitat; and ○ Placement in captive institution for conservation, educational or research purposes ○ Euthanasia.
	Disturbance to Powerful Owls and their habitat impacts	• Noisy works (chainsaw, mulching, machine movement) must not be carried out between an hour before sunset and an hour after sunrise OR within 50 m of identified roost sites.

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
		• No clearing or earthworks disturbance (chainsaw, mulching, machine movement) is to occur within 100m of an identified nesting tree or a current roosting site, between April and October.
		• If clearing or earthworks disturbance (chainsaw, mulching, machine movement) is unavoidable between April and October, works are not to be undertaken between an hour before sunset and an hour after sunrise within 100m of identified nesting tree or 50m of a current roosting site.
	Invasion by exotic species and pathogens	• Weed management actions were developed (as part of the VMP) to manage weeds during the construction phase of the project. This included the management and disposal of the weeds.
		• Vehicles and other equipment to be used within the impact area will be cleaned to prevent the introduction of further exotic plant species or disease
		• Protocols to prevent introduction or spread of chytrid fungus will be implemented (as part of the VMP).
		• A strict hygiene protocol is essential to prevent the spread of pathogens, including *Phytophthora cinnamomi,* Myrtle Rust and weed propagules Procedures and guidelines musts include disinfecting machinery, Personal Protective Equipment, tools and equipment prior to entering and when leaving the site.
	Site restoration	• Vegetative material required to be removed is to be retained for mulch, compost, habitat or site stabilisation as appropriate.
		• Stabilised surfaces will be reinstated as quickly as practicable after construction.
		• Revegetation works within the proposal area are to be undertaken in accordance with the VMP.
		• Habitat enhancement works within the proposal area are to be undertaken in accordance with the HCEP.

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
Aboriginal Heritage	Unexpected finds	• An Unexpected Finds Procedure would be prepared prior to works commencing and be put in place for the entirety of the proposal.
Non-Aboriginal Heritage	Awareness	• A heritage induction will be prepared and presented to workers prior to work commencing.
	Management of existing heritage items	• A detailed Heritage Management Plan will be prepared and to provide guidance and management for heritage items.
		• All heritage items in the immediate vicinity of the proposal will be marked on site plans, fenced off where appropriate, and avoided during construction works for their protection.
Noise and Vibration	Notification	• All sensitive receivers (e.g. local residents) likely to be affected will be notified at least five working days prior to the start of any works associated with the activity that may have an adverse noise or vibration impact.
	Increased noise and vibration	• A detailed Construction Noise and Vibration Management Plan (CNVMP) will be prepared and will describe the methods that will be implemented for each construction work phase to minimise noise and vibration impacts.
		• All personnel on site will be made aware of the potential for noise impacts and should aim to minimise impact or elevated noise levels, where possible.
		• All activities on site will be confined between 7:00am to 6:00pm from Monday to Friday and 7:00am to 1:00pm on Saturday.
		• Where reasonably practicable, noisy plant will be replaced by less noisy alternatives.
		• Plant and vehicles will be kept properly serviced and fitted with appropriate mufflers and silencers, where applicable.
Air Quality	Air quality	• Where appropriate, material will be watered prior to it being loaded for on-site haulage and loads will be covered.
		• The size of storage piles will be minimised, where possible.

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
		• Cleared areas will be monitored and dust suppression (watering) will be used when adverse conditions prevail.
		• Cleared areas of land will be limited where practicable and only cleared when necessary to reduce fugitive dust emissions.
		• On-site traffic will be controlled by designating specific routes for haulage and access and limiting vehicle speeds to below 25 km/h
		• All trucks hauling material on the way to the site will be covered and a reasonable amount of vertical space will be maintained between the top of the load and top of the trailer
		• Operations conducted in areas of low moisture content material would be suspended during high wind speed events or water sprays would be used.
		• Water will be applied to exposed surfaces that are causing dust generation.
		• Vehicles must travel at appropriate speeds to limit dust generation.
Waste and Chemical Management	Waste generation	• Prepare Waste Management Plan (and include within the CEMP), which will detail procedures for the management of waste.
		• Cleared vegetation to be mulched and used for soil manufacture or reused within the Site, where practical.
		• General waste will be temporarily stored on site, and collected for recycling or disposal. All waste to be covered during transportation.
		• Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
	Chemical waste	• Spill kits to be available during works in the event of fuel, oil or other chemical (e.g. herbicide) spills.
Visual Amenity	Notification	• Erect signs regarding proposed works.
		• Notify nearby residents of proposal works prior to commencement.

Category	Type of Impact	Environmental Safeguards and Mitigation Measures
	Visual amenity	• Contain all work within the boundaries designated on the civil plans.
		• Rehabilitation to be undertaken in accordance with the VMP and HCEP.
Traffic	Notification	• Erect signs regarding proposed works.
		• Property access is to be maintained during the proposed works.
	Unsafe traffic conditions and increased traffic	• Install appropriate exclusion barriers, signage and site supervision
		• Prepare Construction Traffic Management Plan (and include within the CEMP), which will detail: ○ Traffic control measures ○ Vehicle and machinery restrictions ○ Entry/exit points.
		• Safe passage for emergency service vehicles and/or emergency personnel through the development footprint will be maintained.

5.3. Compensatory Measures

To compensate for the loss of 0.62 ha of native vegetation within the development footprint, the proposal includes provision for ecological offsetting in accordance with the *Green Offsets Code 2015* (Hornsby Shire Council 2015a). **Table 11** details the extent of impacts, the required offset ratios and the calculated offset area. Use of the *Green Offsets Code 2015* (Hornsby Shire Council 2015a) will ensure all offsets are local. It is proposed that the offsets will have in-perpetuity protection through a Voluntary Conservation Agreement in partnership between Council and the Biodiversity Conservation Trust. Such a mechanism will provide a feasible financial approach to fund ongoing management of the offset.

Table 11 Extent of offsets required for the proposal in accordance with the Green Offset Code

Vegetation Community	Development Footprint (ha)	Offset Ratio	Calculated Offset Area (ha)
Blue Gum Diatreme Forest (moderate/good-poor)	0.34	6:1	2.04
Blackbutt Gully Forest (moderate/good-poor)	0.02	6:1	0.12
Blackbutt Gully Forest (low)	0.26	6:1	1.56
Total	**0.62**		**3.72**

6. Consultation

Division 1 of the Infrastructure SEPP Provides recommendations for consultation with affected stakeholders. **Table 12** details the consultation requirements and whether consultation is required for the proposal.

Table 12 Infrastructure SEPP consultation requirements

Infrastructure SEPP Clause	Consultation Required
Clause 13. Consultation with councils - development with impacts on council-related infrastructure or services.	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice.
Clause 14. Consultation with councils - development with impacts on local heritage	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice.
Clause 15. Consultation with councils - development with impacts on flood liable land	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice.
Clause 15AA. Consultation with State Emergency Service - development with impacts on flood liable land	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice.
Clause 15A. Consultation with councils - development with impacts on certain land within the coastal zone	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice.
Clause 16. Consultation with public authorities other than councils	No. Written notice of the intention to carry out the development is required, as well as consideration of any response to the notice. The proposal does not constitute any specified development under this clause and therefore no consultation with the specified authorities is required.

7. Conclusion

The proposal seeks to upgrade the existing drainage infrastructure to the east and north of the existing quarry void to a suitable standard. To ensure stormwater is safely conveyed through the Site, the drainage system is to be upgraded to current standards to cater for a 1 in 100 year event. An assessment was undertaken to identify the significance of any adverse environmental impacts that could arise from the proposal and to determine whether there is a need for further assessment through an EIS.

Due to the presence of the TEC Blue Gum High Forest within the Site, Council considered a number of location and design iterations to minimise the extent of works within this community, as well as minimising impacts to other areas of native vegetation. The proposed design was chosen for these reasons.

Given the increased frequency of large rainfall events occurring and the recurring significant impact on the existing infrastructure and natural systems, the do-nothing approach will lead to costly on-going maintenance issues and negative environmental impacts. Future embellishments and infrastructure planned within the void including a lift (subject to approval) would be jeopardised by future sediment and water inundation if a do-nothing approach is adopted.

The proposal will result in a number of impacts to environmental values including short-term impacts, such as construction-related impacts (noise, air quality etc.) and long-term impacts, such as impacts to biodiversity and non-Aboriginal heritage areas. A total of 0.94 ha of land will be disturbed for the proposal, including 0.62 ha of vegetation. Indirect impacts to retained vegetation and habitat may also occur. The proposal is not considered to result in a significant impact to Blue Gum High Forest and potentially occurring threatened fauna species in accordance with a test of significance.

One locally significant heritage item, Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area, will be directly impacted by the proposal (0.68 ha of additional impact). This heritage item will be impacted through vegetation clearing, earthworks, installation of drainage structures and revegetation. There will be no impact on the Diatreme face as part of the proposal. Artefact (2021b) has assessed the proposal as having only a minor physical and visual impact on the heritage item, and a minor cumulative impact.

There is some potential for minor short-term impacts during construction to the physical environment to occur, including alterations to the hydrological regime, an increase in noise and vibration and a decrease in air quality due to increased dust. Such impacts will be subject to mitigation measures to ensure impacts are reduced to an acceptable level. The proposal will also contribute to cumulative impacts in conjunction with the approved project within the Site.

A number of measures have been implemented to avoid or minimise any potential environmental impacts that are associated with the proposal, which includes location and design changes to reduce the area of native vegetation and habitat directly impacted. A comprehensive set of mitigation measures are proposed to manage impacts to environmental values that could not be avoided. A total of 3.72 ha of land is proposed to be used to offset the impacts to 0.62 ha of vegetation.

This assessment considers that impacts to environmental values are manageable through the implementation of mitigation and compensatory measures, and not significant. As a result, the proposal is unlikely to significantly affect the environment and an Environmental Impact Statement (EIS) is not required.

8. REF Determination

This REF has assessed the likely environmental impacts of a proposal by Hornsby Shire Council for the Hornsby Park Drainage Upgrade Project. This REF has considered the potential environmental effects of the proposal and the effectiveness and feasibility of measures for reducing or preventing detrimental effects. It is determined that:

- The proposed mitigation measures will be adopted and implemented;
- Implementation of these mitigation measures will reduce the potential environmental impact of the proposed activity; and
- An Environmental Impact Statement is not required for the proposed works if all mitigation measures in this REF are implemented by Council.

Signature: 

Name: Katrina Wolf

Title: Principal

Date: 25 October 2021

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APPENDIX A :

Clause 228 Factors Assessment

Clause 228 of the EP&A Regulation sets out 16 factors that need to be considered when assessing environmental impact under Part 5 of the EP&A Act. **Table 13** lists these factors and summarises how these have been assessed for the proposal.

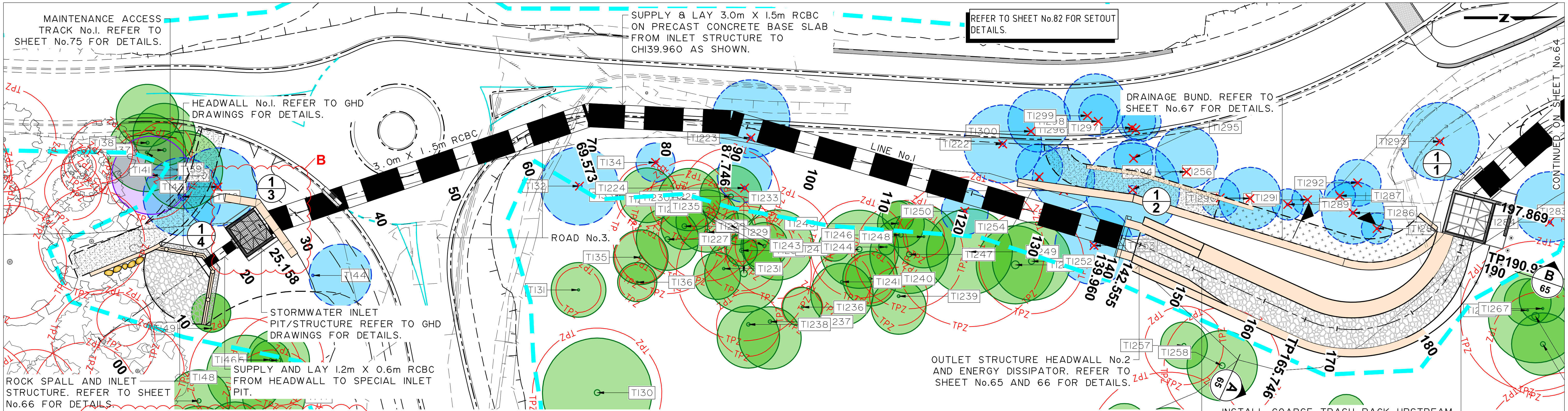
Table 13 Assessment of Clause 228 factors for the proposal

Factor/Assessment	Outcome
(a) any environmental impact on a community	
There will be no negative impact on the community of Hornsby. The work proposed is remote from any urban areas and there are no residential dwellings close to the works area. The land surrounding the development footprint comprises bushland and therefore the impacts will not affect the broader population. The works are associated with the approved project, which will rehabilitate the Site and convert it into a community use recreational area.	-ve ☐ Nil ☒ +ve ☐
b) any transformation of a locality	
The proposal seeks to improve the quality of the drainage infrastructure within the development footprint. The proposal also involves works that will in the long term result in a positive for the locality through contributing to the overall works involved in the rehabilitation of the Site.	-ve ☐ Nil ☐ +ve ☒
(c) any environmental impact on the ecosystems of the locality	
A minor negative environmental impact to the ecosystems of the locality is possible, due to clearing of native vegetation. However, through the implementation of mitigation measures, the impacts associated with the work on the ecosystems of the locality will be minimal.	-ve ☒ Nil ☐ +ve ☐
(d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	
There will be an initial temporary reduction in the aesthetics of the locality during the construction phase of the proposal. Longer term, the works are associated with the approved project, which will rehabilitate the Site and convert it into a community use recreational area.	-ve ☐ Nil ☒ +ve ☐
(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	
One locally significant heritage item, Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area, will be directly impacted by the proposal via vegetation clearing, earthworks, installation of drainage structures and revegetation. There will be no impact on the diatreme face from the proposal. In the broader context, the proposal in conjunction with the approved project, will enable retention of the characteristics of the quarry.	-ve ☒ Nil ☐ +ve ☐
(f) any impact on the habitat of protected fauna (within the meaning of the *Biodiversity Conservation Act 2016*)	
The proposal will result in the remove of 0.34 ha of Blue Gum High Forest CEEC, and 0.62 ha of habitat for eight threatened fauna species. The proposal has been assessed as not having a significant impact on these entities in accordance with Clause 7.3 of the BC Act. A suite of mitigation measures are proposed to minimise impacts to these entities, as well as the provision of offsets.	-ve ☒ Nil ☐ +ve ☐

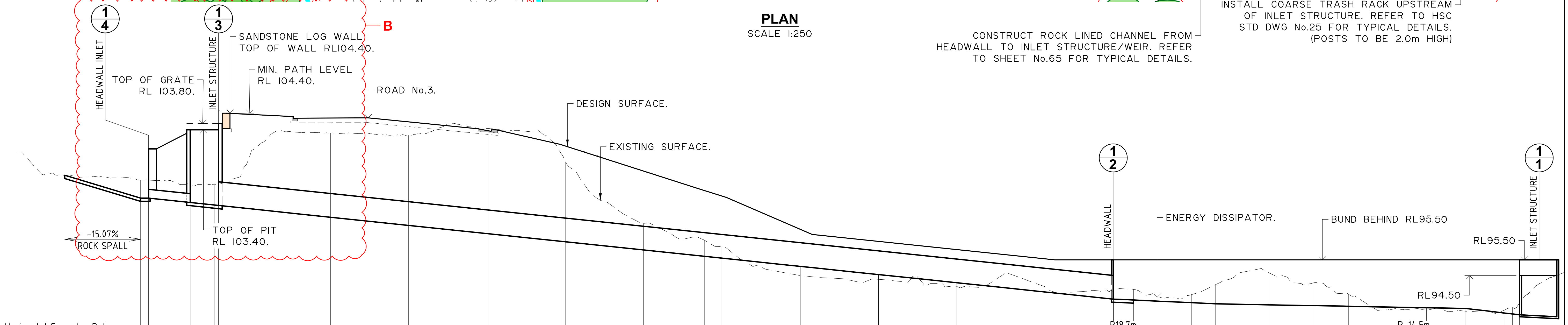
Factor/Assessment	Outcome
(g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air	
The proposal is not likely to endanger any species of animal, plant or other living thing. The works will implement appropriate mitigation measures to ensure no impact on the neighbouring bushland or riparian areas, and in the long term habitat amenity will increase.	-ve ☐ Nil ☒ +ve ☐
(h) any long-term effects on the environment	
The long-term impact of the proposal on the environment is the removal of vegetation. The proposal requires the clearing of 0.62 ha of vegetation. The proposal does however include provisions for the rehabilitation of some areas of land, as well as the provision of offsets to compensate for the loss of vegetation and habitat.	-ve ☒ Nil ☐ +ve ☐
(i) any degradation of the quality of the environment	
There may be some degradation off the quality of the environment during the construction phases, however a range of mitigation measures will be employed to manage these impacts. Overall, the proposal seeks to improve the quality of the environment in the long term by preventing future impacts.	-ve ☐ Nil ☒ +ve ☐
(j) any risk to the safety of the environment	
The proposal includes landform stabilisation works to minimise the risk of slippage sedimentation and erosion of adjoining steep land. The risk of the potential sedimentation and erosion is that it could block the main drainage channel, sending all stormwater into the quarry void and resulting in significant scouring. There may be some risk to the safety of the environment during the construction phases, however a range of mitigation measures will be employed to manage safety risks associated with the proposal.	-ve ☐ Nil ☒ +ve ☐
(k) any reduction in the range of beneficial uses of the environment	
The development footprint is partially located within an area previously identified as suitable for use as an offset in the BOS, and subject to biodiversity management under the VMP and HCEP. A total of 0.41 ha of the development footprint overlaps with the identified offset area and vegetation/habitat management area, including 0.08 ha of Blue Gum High Forest CEEC. Notwithstanding this, the proposal includes provision for the rehabilitation of some areas of the development footprint.	-ve ☒ Nil ☐ +ve ☐
(l) any pollution of the environment	
Minor, short term air, noise, and water quality impacts may be generated during the construction phase of the proposal. Mitigation measures are proposed to minimise pollution to the environment. The proposal seeks to improve drainage infrastructure which in turn will minimise the risk of scour in adjoining areas.	-ve ☐ Nil ☒ +ve ☐
(m) any environmental problems associated with the disposal of waste	
Certain types of waste will be re-used within the Site, where possible. Other waste will be disposed of at a registered waste disposal location. There are no anticipated environmental problems of waste disposal.	-ve ☐ Nil ☒ +ve ☐
(n) any increased demand on resources (natural or otherwise), that are, or are likely to become, in short supply	

Factor/Assessment	Outcome
The works are minor in nature and no increases in demand for limited resources are anticipated.	-ve ☐ Nil ☒ +ve ☐
(o) any cumulative environmental effect with other existing or likely future activities	
The proposal will contribute to cumulative impacts occurring as a result of the approved project. Therefore the proposal will contribute to an overall increase on environmental impacts.	-ve ☒ Nil ☐ +ve ☐
(p) any impact on coastal processes and coastal hazards, including those under projected climate change conditions	
The proposal will not result in any impacts on costal processes and coastal hazards.	-ve ☐ Nil ☒ +ve ☐

APPENDIX B :
Civil Drawings



PLAN
SCALE 1:250



Horizontal Geometry Data

Pipe / Channel Grade (%): -5.226% (1.2 X 0.6 RCBC CLASSS 2-A); -5.226% (3.0 X 1.5 RCBC - CLASS 2-A WITH PRECAST BASE); -2.301% OPEN CHANNEL; -0.937% OPEN CHANNEL; -5.824%

Pipe / Culvert Size (m)

Pipe Flow (cum) Q100

ANGLE; ANGLE; ANGLE; R18.7m; R-14.5m

DATUM R.L.86.000

DEPTH TO INVERT	1.159	1.151	1.1554		1.353	3.758	5.372	5.737	6.708		5.099	1.700		0.734	-0.576	-0.303
PIPE / CHANNEL INVERT LEVEL	99.037	99.037	98.759	98.599	98.570	98.346	97.824	97.301	96.779	96.278	96.256	95.733	95.329	95.211	94.688	94.166
EXISTING SURFACE LEVEL	100.196	100.188	99.913		99.923	102.104	103.196	103.039	103.486		101.355	97.434		95.944	94.113	93.863
PIPE / CHANNEL CHAINAGE	15.777	16.777	22.103	25.158	25.721	30	40	50	60	69.573	70	80	87.746	90	100	110

DEPTH TO INVERT	-0.243	0.495	0.502	0.512	0.683	0.518	1.210	2.011	1.478	0.775	-0.128	-0.167	0.202	0.411	0.760
PIPE / CHANNEL INVERT LEVEL	93.643	93.120	92.600	92.599	92.540	92.369	92.300	92.234	92.181	92.141	92.047	92.000	91.709	91.652	91.600
EXISTING SURFACE LEVEL	93.400	93.615	93.102	93.111	93.223	92.887	93.510	94.245	93.658	92.916	91.919	91.833	91.911	92.063	92.360
PIPE / CHANNEL CHAINAGE	120	130	139.96	140	142.555	150	153	160	165.746	170	180	185	190	190.972	191.868

CONTINUED ON SHEET No.64

LONGITUDINAL SECTION - DRAINAGE LINE No.1
SCALE 1:250 HOR
1:125 VERT

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Drawn	S. COMISH
Surveyor	VARIOUS
Design Checked-Design Team Leader	Signed:
Drawing Checked	Signed:
Field Book	NA
Level Book	NA
Datum	AHD
Project Identifier\-\CAD File Name	H:\\\Hornsby Quarry_OT_100125\Design\ACAD\Hornsby Pk Cons.dwg
TRIM Document Number	D08151985

Issue	Description	Name	Initial	Date
B	INLET STRUCTURE 1/3 MODIFIED & ISSUED FOR CONSTRUCTION	C. CLENDINNING		
A	ISSUED FOR CONSTRUCTION	C. CLENDINNING	CC	11/05/21

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Bar Scales 0 5 10 15m
SCALE 1:250 @ A1
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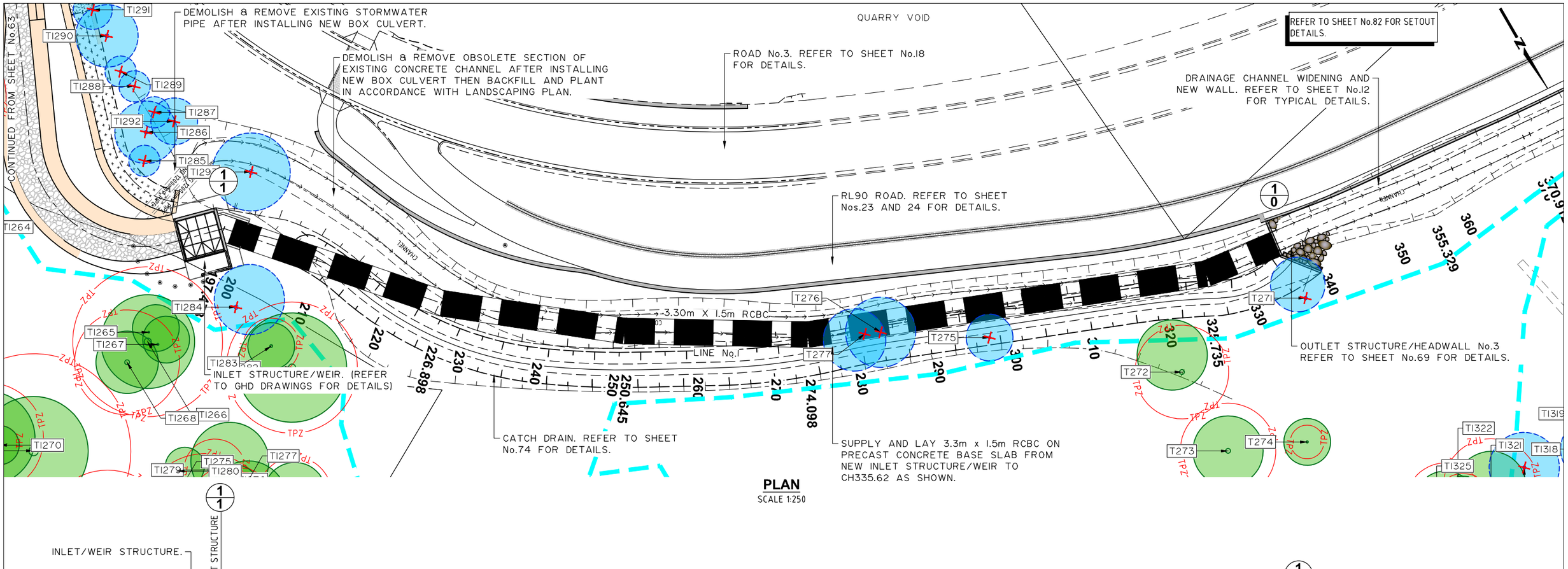
PO BOX 37, HORNSBY NSW 1630

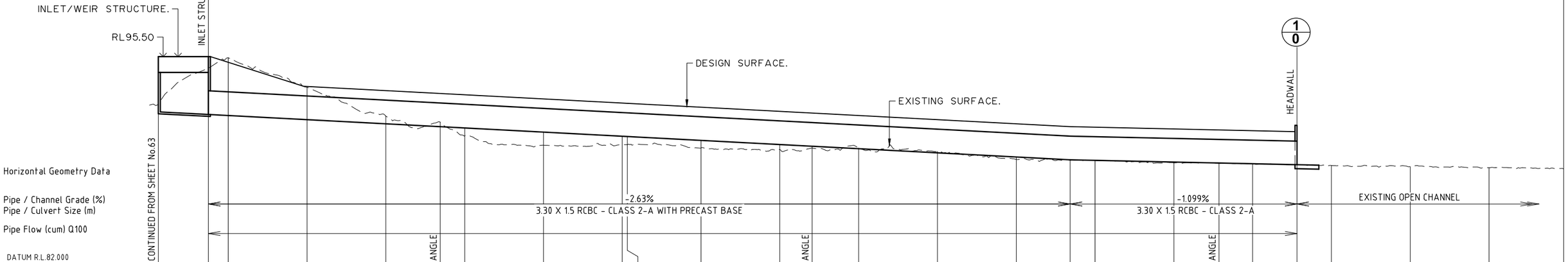
HORNSBY PARK REDEVELOPMENT
OLD MANS VALLEY & QUARRY
GRADING & EARTHWORKS

PLAN & LONGITUDINAL SECTION OF DRAINAGE LINE No.1
SHEET 1 OF 2

Project Number	100125
Sheet	63 of 106
Issue	B
HSC Drawing Number	428.47



PLAN
SCALE 1:250



Horizontal Geometry Data

Pipe / Channel Grade (%)
Pipe / Culvert Size (m)

Pipe Flow (cum) Q100

DATUM R.L.82.000

	CONTINUED FROM SHEET No.63						ANGLE						ANGLE					ANGLE					
DEPTH TO INVERT	0.496	2.924	3.664	2.054	0.490	0.284	-0.508	-0.836	-0.531	-0.520	-0.480	-0.322	-0.121	0.040	0.092	-0.157	-0.029	-0.018	-0.050	-0.013	-0.010	-0.000	
PIPE / CHANNEL INVERT LEVEL	91.600	91.433	91.367	91.104	90.841	90.659	90.578	90.315	90.052	90.035	89.789	89.526	89.418	89.263	89.000	88.737	88.557	88.522	88.412	88.349	88.302	88.240	
EXISTING SURFACE LEVEL	92.096	94.357	95.031	93.157	91.331	90.943	90.070	89.479	89.520	89.515	89.308	89.204	89.297	89.303	89.091	88.580	88.528	88.504	88.362	88.362	88.334	88.495	88.192	88.124	88.051
PIPE / CHANNEL CHAINAGE	191.123	197.473	200	210	220	226.898	230	240	250	250.645	260	270	274.098	280	290	300	306.84	310	320	325.735	330	335.620	340	350	360

LONGITUDINAL SECTION - DRAINAGE LINE No.1
SCALE 1:250 HOR
1:125 VERT

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Drawn: S. COMISH	Drawing Checked Signed:		
Surveyor: VARIOUS	NA Field Book	NA Level Book	AHD Datum
Project Identifier\-\CAD File Name: H:\\\Hornsby Quarry_OT_100125\Design\ACAD\Hornsby Pk Cons.dwg			
TRIM Document Number: D08151985			

Issue	Description	Name	Initial	Date
A	ISSUED FOR CONSTRUCTION	C. CLENDINNING	CC	11/05/21

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Bar Scales
0 5 10 15m
SCALE 1:250 @ A1
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HORNSBY PARK REDEVELOPMENT
OLD MANS VALLEY & QUARRY
GRADING & EARTHWORKS

PLAN & LONGITUDINAL SECTION OF DRAINAGE LINE No.1
SHEET 2 OF 2

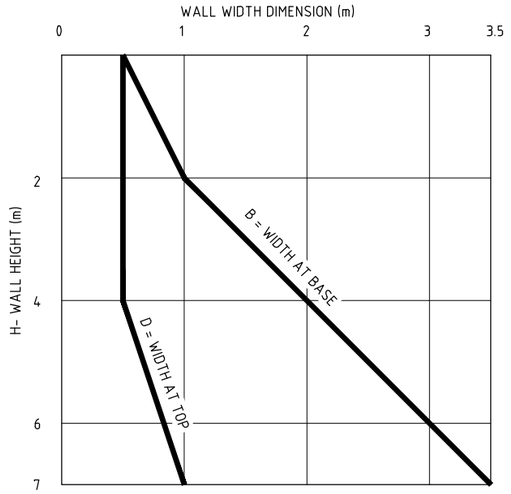
Project Number: 100125
Sheet: 64 of 106
Issue: A
HSC Drawing Number: 428.47

ROCK CHANNEL NOTES:

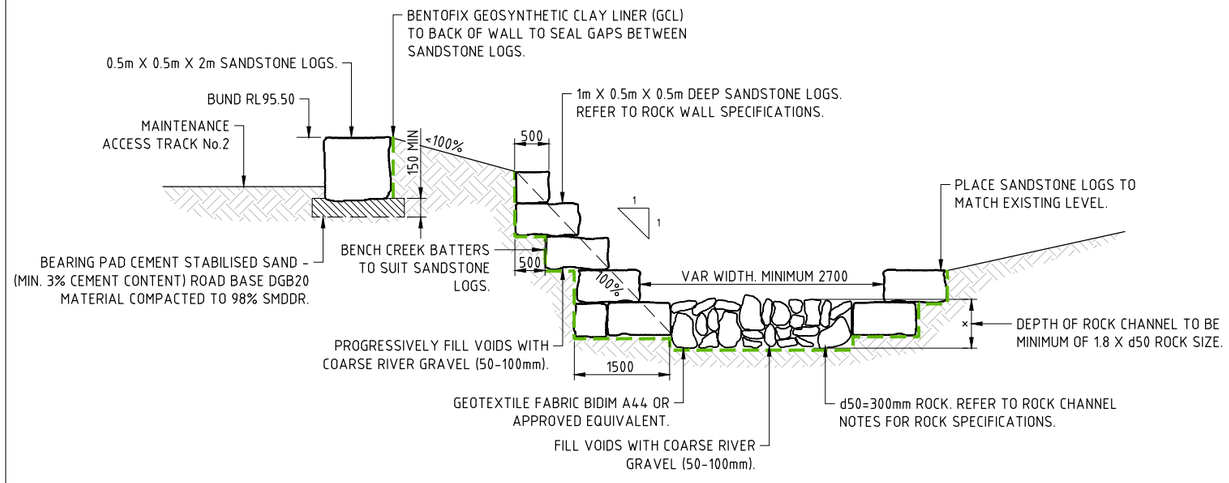
1. ROCK IS TO BE SOUND, DURABLE BASALT WITH MINIMUM DENSITY OF 2200 Kg/m^3.
2. INDIVIDUAL ROCKS SHALL BE FREE OF CRACKS, CLEAVAGE PLANES, SEAMS AND DEFECTS WHICH WOULD RESULT IN THE BREAKDOWN OF THE ROCK IN A FRESH WATER ENVIRONMENT.
3. ROCK SHALL BE ROUGH AND ANGULAR.
4. RATIO OF MAXIMUM DIMENSION TO MINIMUM DIMENSION SHALL NOT EXCEED 2.0.
5. SECTION 1. CHANNEL ROCK SHALL COMPLY WITH THE FOLLOWING GRADING SPECIFICATION: MINIMUM DENSITY 2200 kg/m^3
   d_{50} = 700 mm
   M_{50} = 750 kg
   M_{15} = 500 kg
   M_{100} = 1000 kg
6. SECTION 2. CHANNEL ROCK SHALL COMPLY WITH THE FOLLOWING GRADING SPECIFICATION: MINIMUM DENSITY 2200 kg/m^3
   d_{50} = 300 mm
   M_{50} = 60 kg
   M_{15} = 30 kg
   M_{100} = 120 kg
7. SECTION 3. CHANNEL ROCK SHALL COMPLY WITH THE FOLLOWING GRADING SPECIFICATION: MINIMUM DENSITY 2200 kg/m^3
   d_{50} = 350 mm
   M_{50} = 95 kg
   M_{15} = 60 kg
   M_{100} = 150 kg

ROCK WALL NOTES:

1. ROCK IS TO BE SOUND, DURABLE SANDSTONE WITH MINIMUM DENSITY OF 2200 Kg/m^3. GENERALLY 1.0 m SQUARE PLAN AREA AND 500 DEEP.
2. INDIVIDUAL ROCKS SHALL BE FREE OF CRACKS, CLEAVAGE PLANES, SEAMS AND DEFECTS WHICH WOULD RESULT IN THE BREAKDOWN OF THE ROCK IN A FRESH WATER ENVIRONMENT.
3. FOUNDATION TO BE APPROVED FOR A SAFE BEARING CAPACITY OF 300 KPa PRIOR TO CONSTRUCTION.
4. ROCKS SHALL BE PLACED IN SUCH A MANNER THAT THEY ARE STABLE AND INTERLOCKING, ONE LAID ROUGHLY COURSED AND BEDDED ON BROADEST BASE
5. BACKFILL IS TO BE GRANULAR, FREE DRAINING AND COMPACTED.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
7. LONGITUDINALLY ROCKS ARE TO BE LAID IN A RUNNING BOND STAGGERED PATTERN.

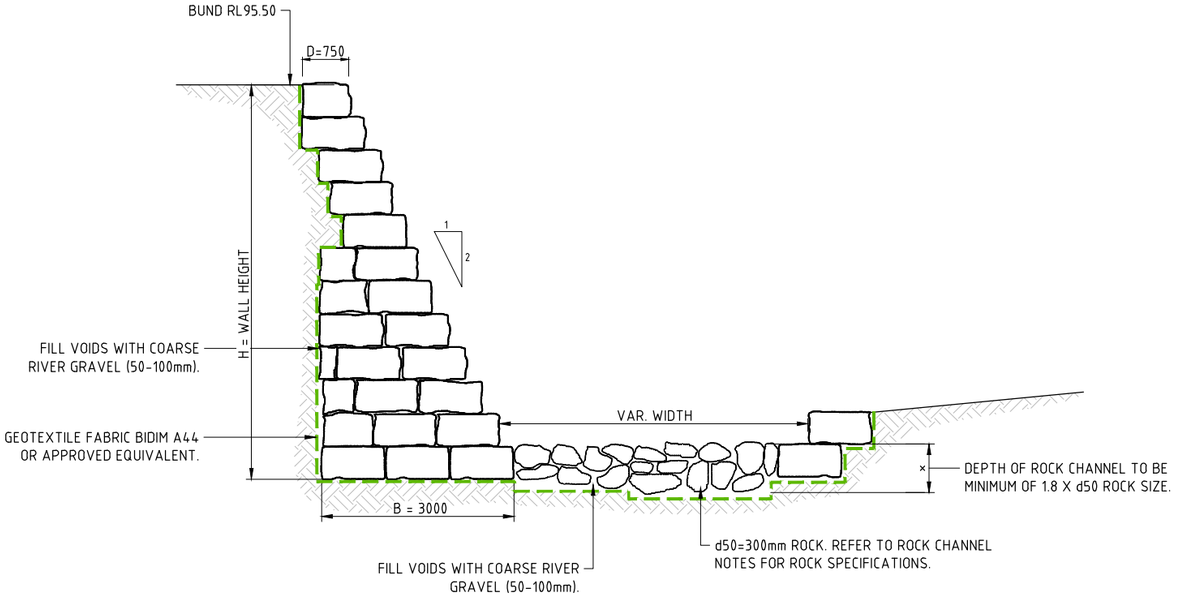


ROCK WALL DESIGN CHART



SECTION A
NOT TO SCALE 63

IDEAL CHANNEL GEOMETRY FOR CHANNEL SECTIONS WITH 1v : 1h ROCK WALL SLOPE AND SOIL SLOPE AT 2v : 1h OR FLATTER



SECTION B
NOT TO SCALE 63

TYPICAL SECTIONS AT APPROACH TO SECOND WEIR. 2v : 1h ROCK WALL SLOPE OR GREATER TO RL 95.5 BUND.

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Surveyor: VARIOUS	NA Field Book	NA Level Book	AHD Datum
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TRIM Document Number: D08151985			

Issue	Description	Name	Initial	Date
A	ISSUED FOR CONSTRUCTION	C. CLENDINNING	CC	11/05/21

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Bar Scales: NOT TO SCALE
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HORNSBY SHIRE COUNCIL
PO BOX 37, HORNSBY NSW 1630

HORNSBY PARK REDEVELOPMENT OLD MANS VALLEY & QUARRY GRADING & EARTHWORKS

ROCK CHANNEL & WALL NOTES & SECTIONS

Project Number: 100125
Sheet 65 of 106
Issue: A
HSC Drawing Number: 428.47

GENERAL NOTES:

1. DESIGN OF ENERGY DISSIPATER MINIMUM DIMENSION BASED ON FLOW RATES FROM DRAINS FOR 1% AEP STORM EVENT & MAXIMUM FLOW VELOCITY OF 4.5 m/s.

2. DESIGN DIMENSIONS CALCULATED FROM RMS ROAD DESIGN GUIDE SECTION 8.2.10, TYPE B ENERGY DISSIPATERS.

ENERGY DISSIPATOR ROCK NOTES:

3. ALL ROCK MUST CONSIST OF ANGULAR RUN-OF-QUARRY DURABLE ROCK PLACED OVER A 200mm LAYER OF ANGULAR COBBLES D_{50}=100mm MIXED WITH GRAVEL D_{50}=10mm.

4. ALL ROCK IS TO BE A HARD, BASALT ROCK WITH A POINT INDEX LOAD IS50 GREATER THAN 1.0MPa AS DETERMINED IN ACCORDANCE WITH AS 4133.4.1-2007.

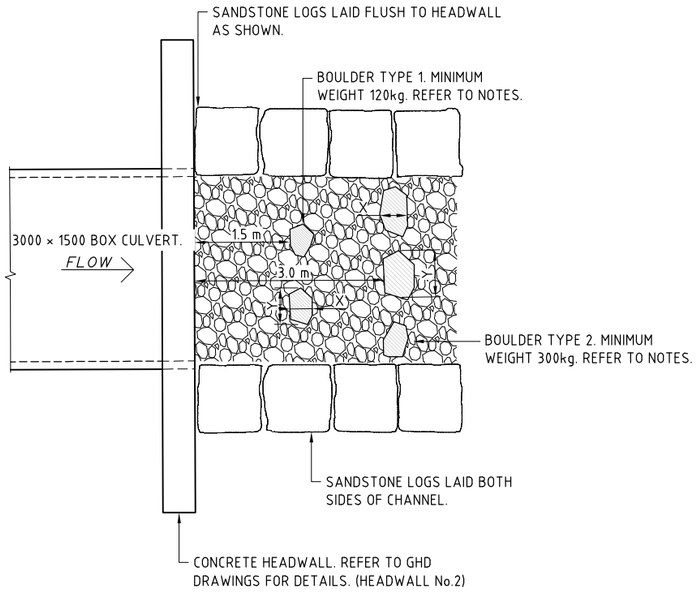
5. ROCK IS TO BE PLACED INDIVIDUALLY AND CROW-BARRED INTO PLACE TO ENSURE FIT WITH MINIMUM VOIDS. ANY VOIDS BETWEEN ROCK ARE TO BE FILLED WITH D_{50}=10mm GRAVEL.

6. ENERGY DISSIPATOR ROCK FOR BED OF CHANNEL UP TO 8 m DOWNSTREAM OF CULVERT EXIT IS TO COMPLY WITH THE FOLLOWING SIZE AND WEIGHT REQUIREMENTS:
   - 6.1. D_{50} = 500
   - 6.1.1. M_{50} = 250kg
   - 6.1.2. M_{100} = 430kg
   - 6.1.3. M_{15} = 80kg

7. THE MAXIMUM DIMENSION IS NOT TO EXCEED 2.0 TIMES THE MINIMUM DIMENSION.

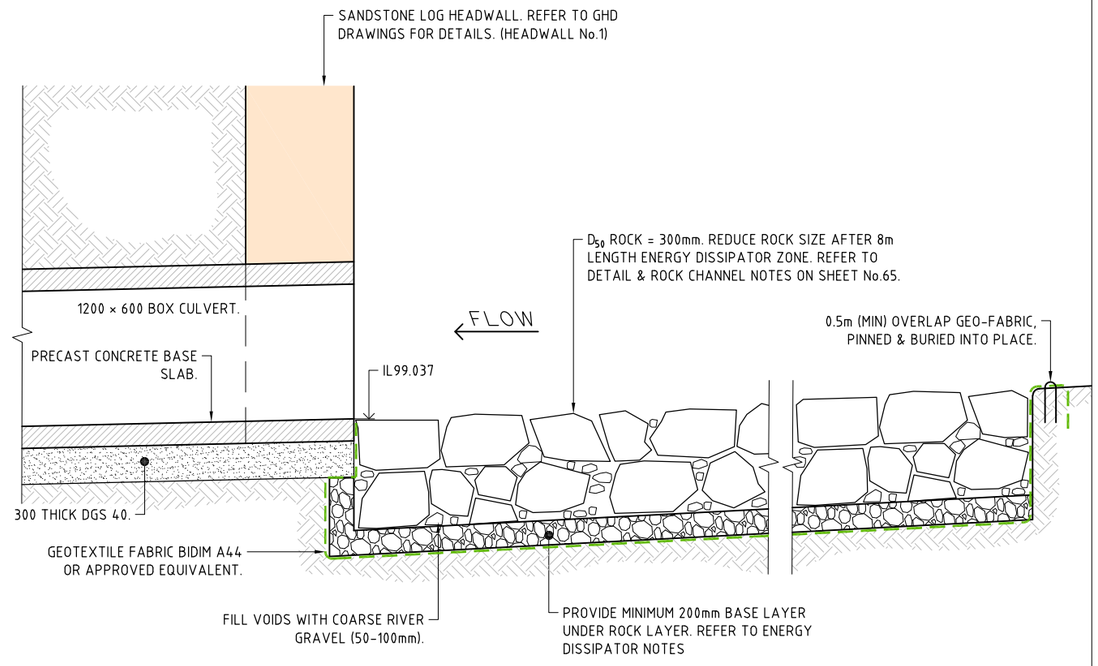
8. BOULDER TYPE 1 ROCK IS TO COMPLY WITH THE FOLLOWING REQUIREMENTS:
   - 8.1. X = 350 - 400 mm
   - 8.2. Y = 500 - 600 mm
   - 8.3. Z = 600 - 700 mm
   - 8.4. WEIGHT = 200 - 360 kg

9. BOULDER TYPE 2 ROCK IS TO COMPLY WITH THE FOLLOWING REQUIREMENTS:
   - 9.1. X = 400 - 500 mm
   - 9.2. Y = 650 - 800 mm
   - 9.3. Z = 900 - 10000 mm
   - 9.4. WEIGHT = 500 - 850 kg



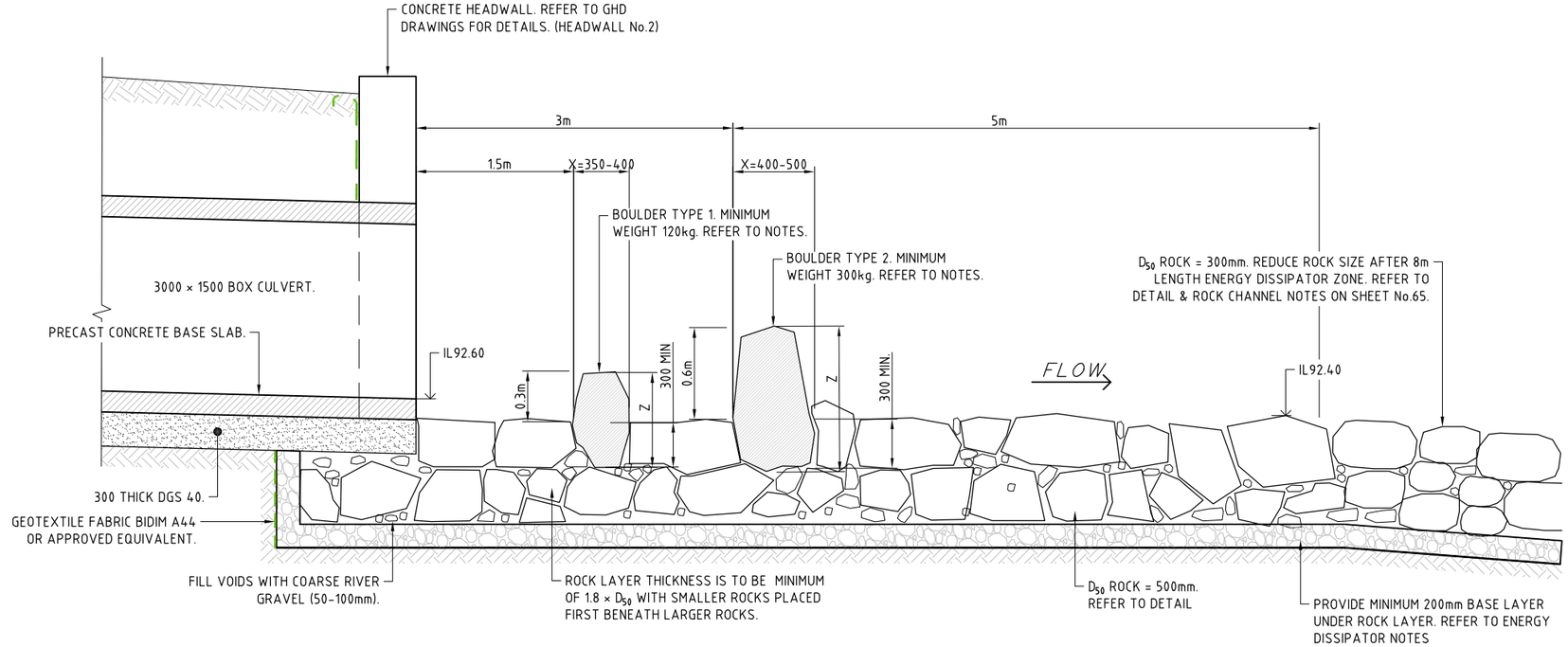
ENERGY DISSIPATOR DETAILED PLAN

NOT TO SCALE



ROCK SPALL DETAIL

NOT TO SCALE



ENERGY DISSIPATOR SECTION DETAIL

NOT TO SCALE

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Issue	Description	Name	Initial	Date
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Bar Scales: NOT TO SCALE

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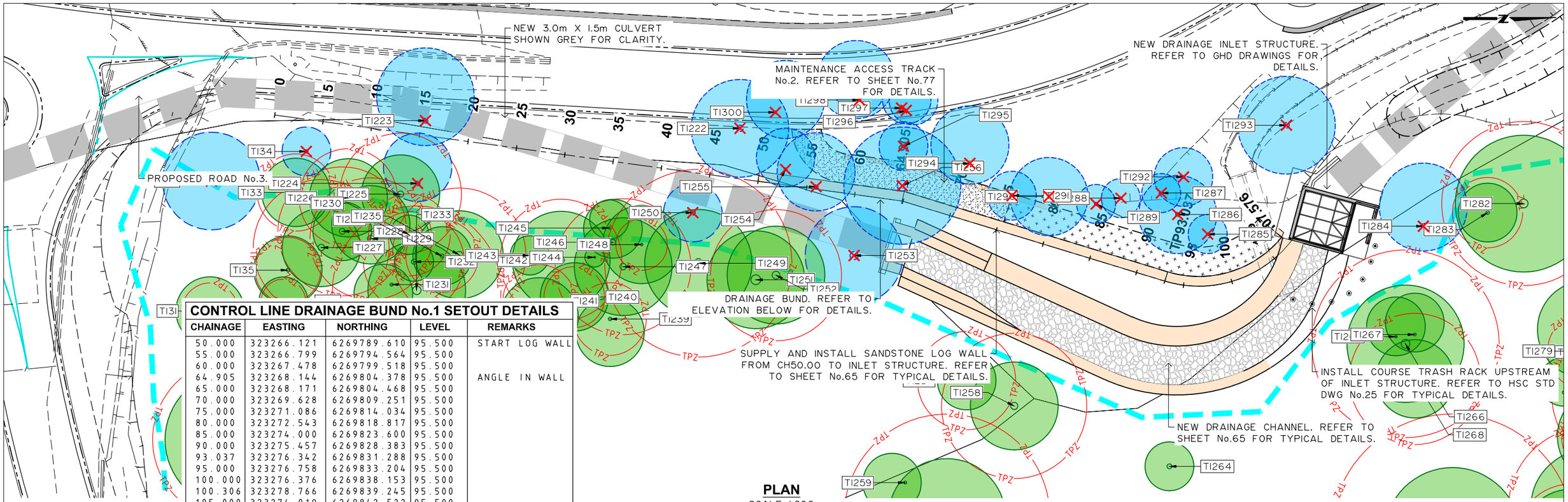
HORNSBY PARK REDEVELOPMENT OLD MANS VALLEY & QUARRY GRADING & EARTHWORKS

ENERGY DISSIPATOR (HEADWALL No.2) DETAILS, NOTES & ROCK SPALL DETAIL

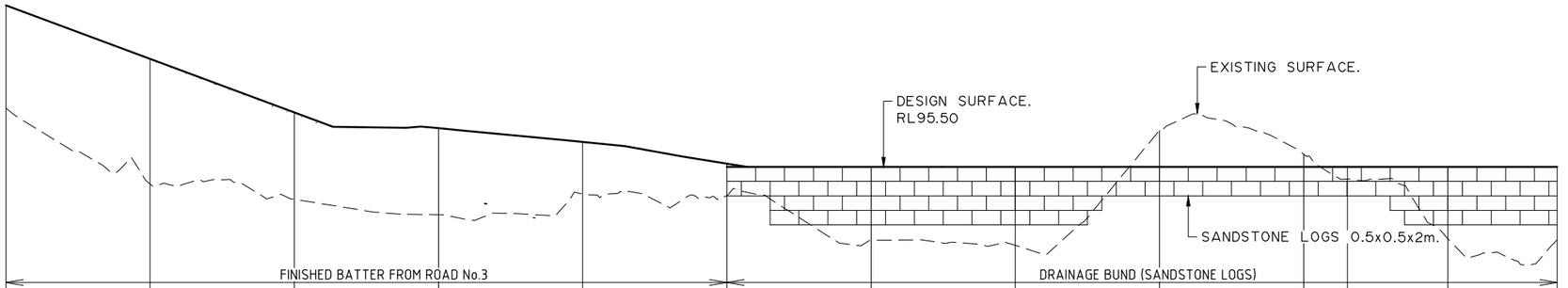
Project Number: 100125
Sheet: 66 of 106
Issue: A
HSC Drawing Number: 428.47



PLAN
SCALE 1:200

CONTROL LINE DRAINAGE BUND No.1 SETOUT DETAILS

CHAINAGE	EASTING	NORTHING	LEVEL	REMARKS
50.000	323266.121	6269789.610	95.500	START LOG WALL
55.000	323266.799	6269794.564	95.500	
60.000	323267.478	6269799.518	95.500	
64.905	323268.144	6269804.378	95.500	ANGLE IN WALL
65.000	323268.171	6269804.468	95.500	
70.000	323269.628	6269809.251	95.500	
75.000	323271.086	6269814.034	95.500	
80.000	323272.543	6269818.817	95.500	
85.000	323274.000	6269823.600	95.500	
90.000	323275.457	6269828.383	95.500	
93.037	323276.342	6269831.288	95.500	
95.000	323276.758	6269833.204	95.500	
100.000	323276.376	6269838.153	95.500	
100.306	323278.766	6269839.245	95.500	
105.000	323274.019	6269842.522	95.500	
107.576	323272.155	6269844.292	95.500	END OF WALL



Horizontal Geometry Data

Grade (%)

DATUM R.L.87.000

CUT / FILL DEPTH TO EXISTING	-3.540	-4.336	-3.012	-2.997	-1.810	-0.994	-2.542	-2.716	1.268	0.439	-0.417	-2.490	-2.530
CONTROL LINE FINISHED LEVEL	101.102	99.247	97.391	96.843	96.366	95.500	95.500	95.500	95.500	95.500	95.500	95.500	95.500
EXISTING SURFACE LEVEL	97.562	94.911	94.379	93.846	94.556	94.506	92.958	92.784	96.768	95.939	95.083	93.010	92.970
CONTROL LINE CHAINAGE	0	10	20	30	40	50	60	70	80	90	93.037	100	107.576

LONGITUDINAL SECTION - DRAINAGE BUND No.1

SCALE 1:200 HOR
1:100 VERT

Hornsby Shire Council
Design & Construction Branch
TELEPHONE: (02) 9847 6666
FACSIMILE: (02) 9847 6999

Authorised for release - Manager Design & Construction
Name: R. RAJCA Signed: Date: 11/05/21

Designer: S. COMISH	Design Checked-Design Team Leader Signed:		
Drawn: S. COMISH	Drawing Checked Signed:		
Surveyor: VARIOUS	NA Field Book	NA Level Book	AHD Datum
Project Identifier\-\CAD File Name: H:\\\Hornsby Quarry_OT_100125\Design\ACAD\Hornsby Pk Cons.dwg			
TRIM Document Number: D08151985			

Issue	Description	Name	Initial	Date
A	ISSUED FOR CONSTRUCTION	C. CLENDINNING	CC	11/05/21

Design not to be amended without authorisation by Manager Design & Construction

Bar Scales: 0 2 4 6 8 10m
SCALE 1:200 @ A1

DO NOT SCALE, USE FIGURED DIMENSIONS ONLY

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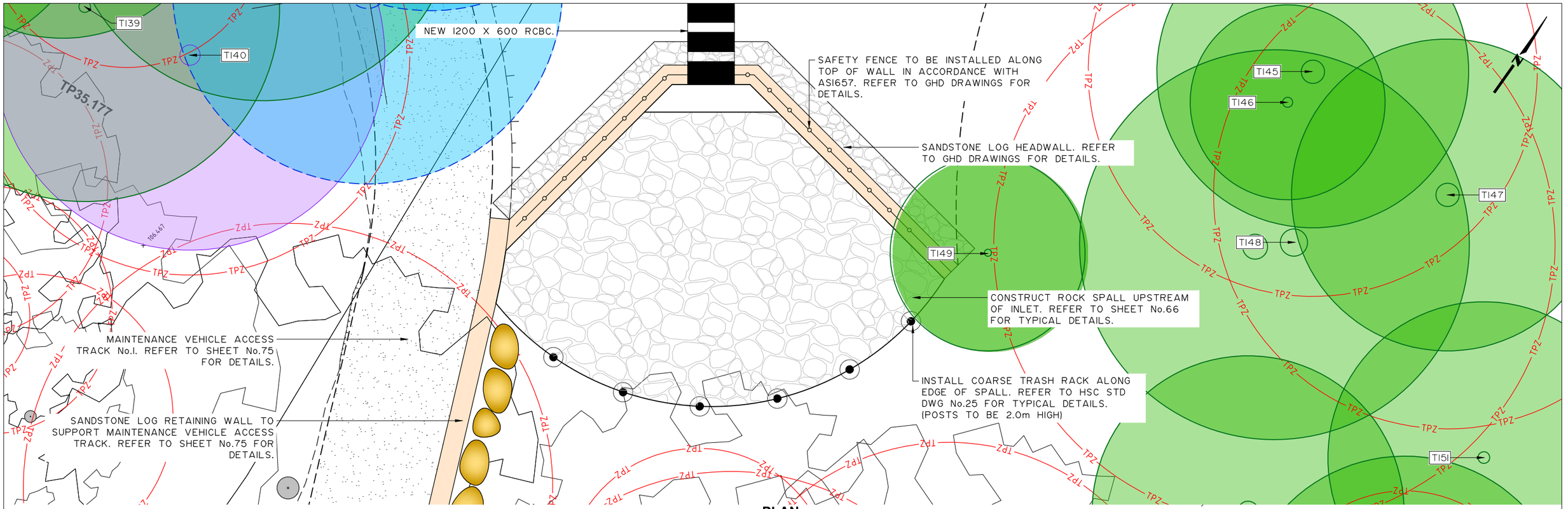
PO BOX 37, HORNSBY NSW 1630

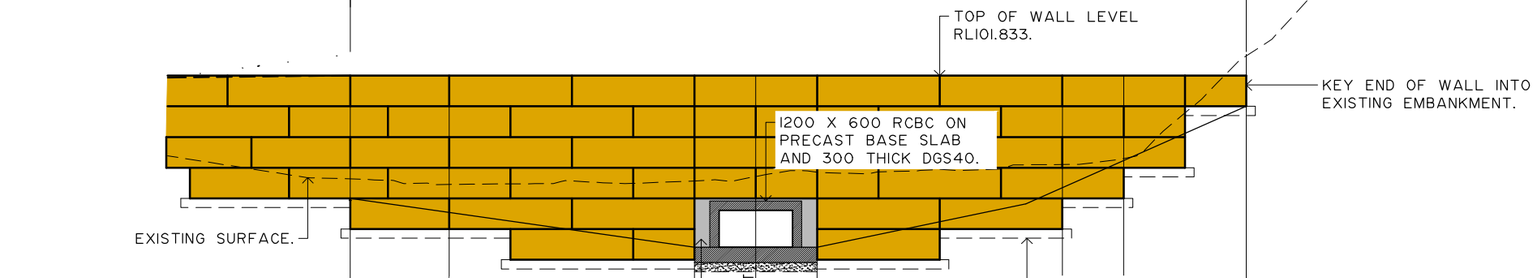
HORNSBY PARK REDEVELOPMENT
OLD MANS VALLEY & QUARRY
GRADING & EARTHWORKS

PLAN & LONGITUDINAL SECTION OF DRAINAGE BUND No.1

Project Number: 100125
Sheet: 67 of 106
Issue: A
HSC Drawing Number: 428.47



PLAN
SCALE 1:50



DATUM R.L 97.000

WALL HEIGHT	2.500	2.500	3.000	3.000	3.000	2.500	2.000	0.500	
TOP OF WALL LEVEL	101.833	101.833	101.833	101.833	101.833	101.833	101.833	101.833	
EXISTING SURFACE LEVEL	100.151	100.059	100.115		100.259	100.385	100.483	102.154	
CONTROL LINE CHAINAGE	0	1.614	5.614	6.616	7.618	11.614	12.614	14.618	
			ANGLE	℄ OF CULVERT	ANGLE				

SECTIONAL ELEVATION OF HEADWALL No.1
SCALE 1:50 NATURAL

Hornsby Shire Council
Design & Construction Branch
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Issue	Description	Name	Initial	Date
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Bar Scales: 0 1 2 3m — SCALE 1:50 @ A1

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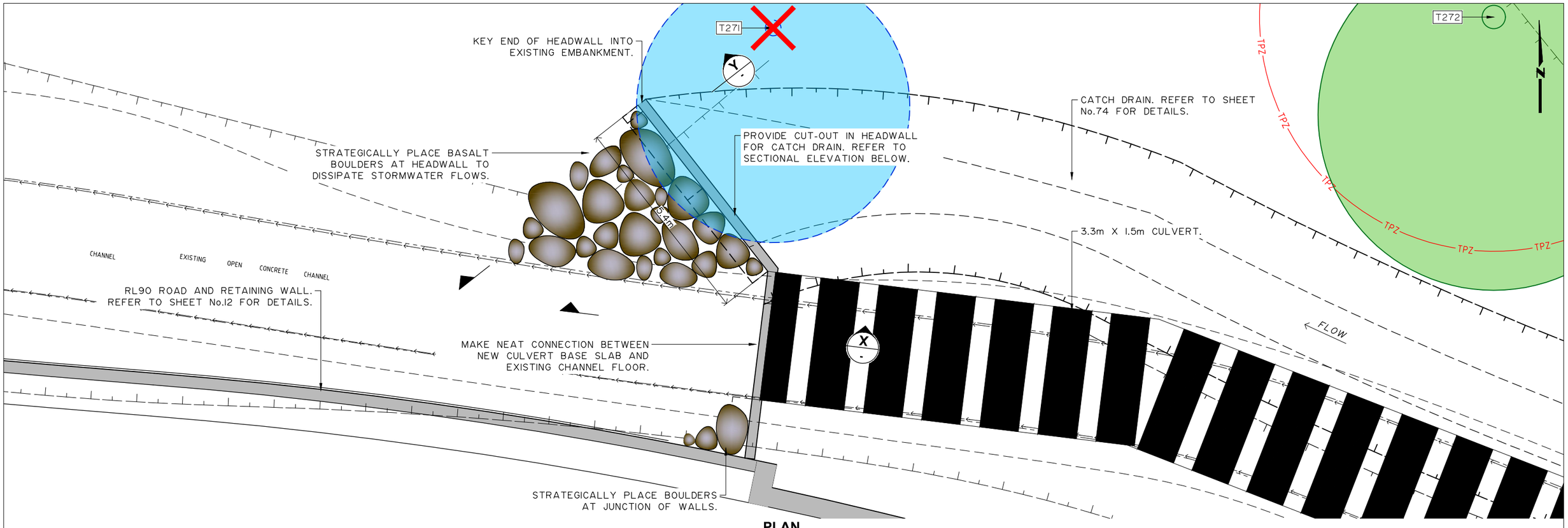
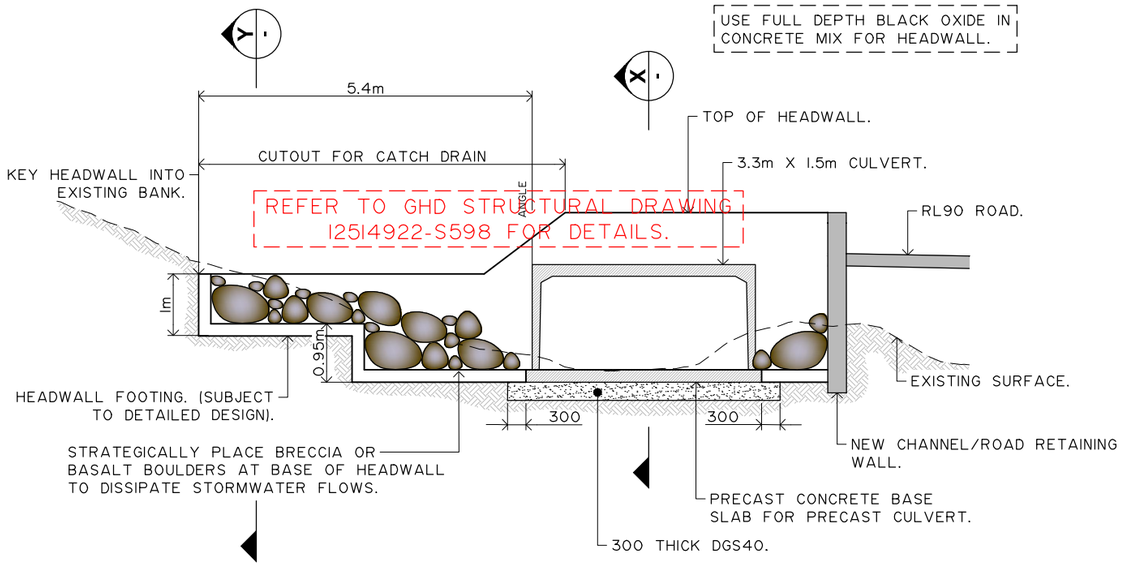
HORNSBY PARK REDEVELOPMENT
OLD MANS VALLEY & QUARRY
GRADING & EARTHWORKS

PLAN & SECTIONAL ELEVATION OF HEADWALL No.1

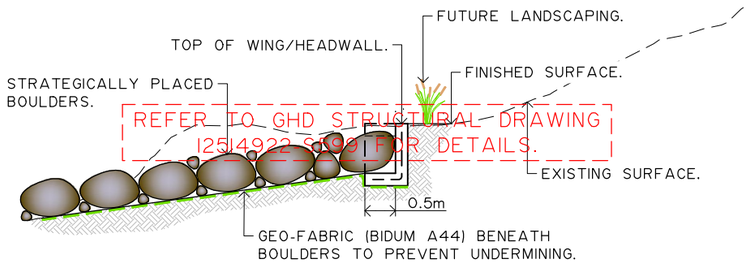
Project Number: 100125
Sheet: 68 of 106
Issue: A
HSC Drawing Number: 428.47



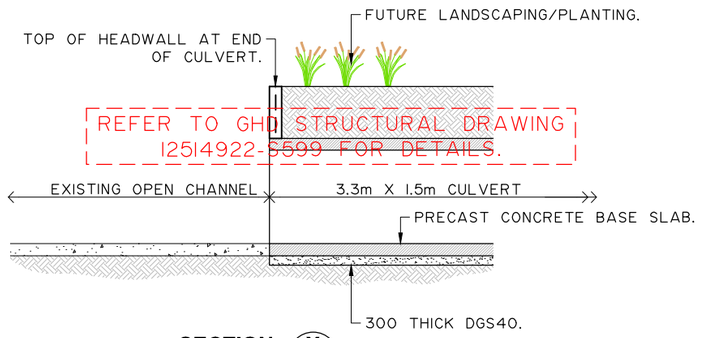
PLAN
SCALE 1:50



SECTIONAL ELEVATION OF HEADWALL No.3
SCALE 1:50 NATURAL



SECTION Y
SCALE 1:50



SECTION X
SCALE 1:50

Hornsby Shire Council
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TRIM Document Number: D08151985			

Issue	Description	Name	Initial	Date
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Bar Scales: 0 1 2 3m
SCALE 1:50 @ A1
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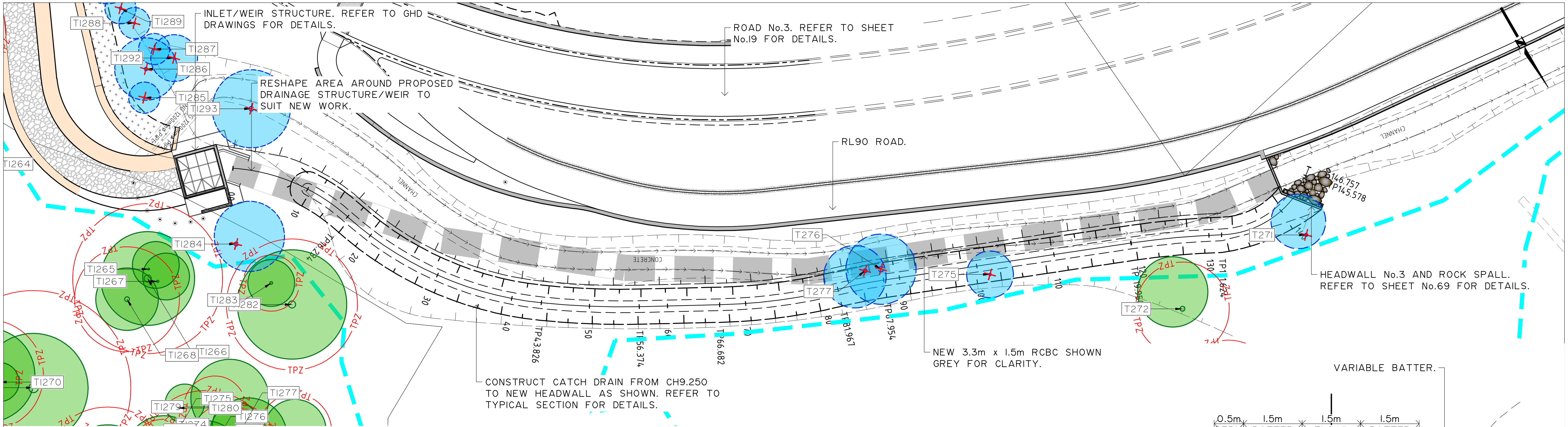
HORNSBY PARK REDEVELOPMENT OLD MANS VALLEY & QUARRY GRADING & EARTHWORKS

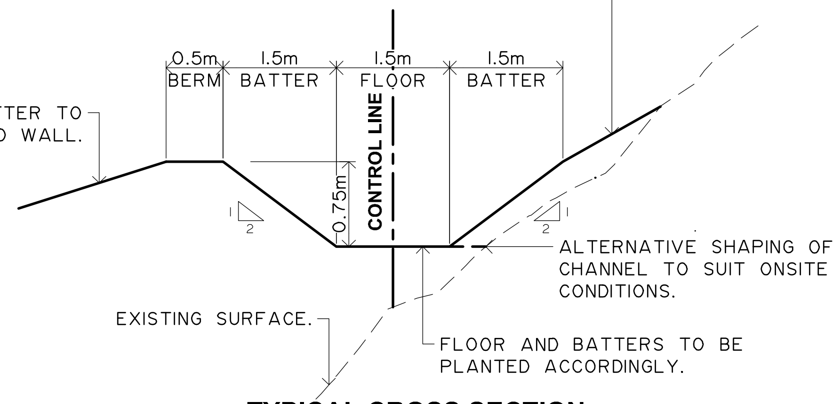
DETAILED PLAN & SECTIONS FOR HEADWALL No.3

Project Number: 100125
Sheet 69 of 106
Issue: A
HSC Drawing Number: 428.47



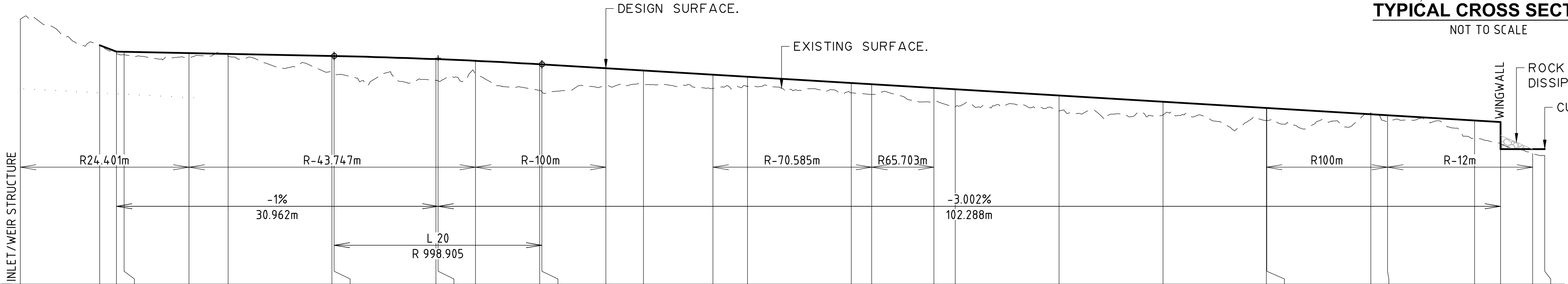
PLAN

SCALE 1:250



TYPICAL CROSS SECTION

NOT TO SCALE



CUT / FILL DEPTH TO EXISTING		-0.000	-0.034	-0.132	-0.219	-0.102	-0.796	-0.886	-1.018	-1.034	-0.615
CONTROL LINE FINISHED LEVEL		93.493	93.082	93.173	93.111	93.073	92.973	92.971	92.825	92.821	92.742
EXISTING SURFACE LEVEL	94.756	93.493	93.048	93.041	92.892	92.971	92.177	92.085	91.807	91.786	92.127
CONTROL LINE CHAINAGE	0	7.650	9.250	10	16.234	20	30	30.212	40	40.212	43.826

CUT / FILL DEPTH TO EXISTING	-1.252	-1.309	-0.875	-0.675	-0.661	-0.457	-0.469	-0.494	-0.651	-0.854	-0.754
CONTROL LINE FINISHED LEVEL	92.577	92.571	92.386	92.277	92.076	91.977	91.676	91.617	91.438	91.376	91.076
EXISTING SURFACE LEVEL	91.325	91.262	91.510	91.602	91.416	91.520	91.208	91.123	90.786	90.522	90.322
CONTROL LINE CHAINAGE	50	50.212	56.374	60	66.682	70	80	81.967	87.954	90	100

CUT / FILL DEPTH TO EXISTING	-0.639	-0.600	-0.600	0.060	-0.298	-0.851			
CONTROL LINE FINISHED LEVEL	90.776	90.477	90.475	90.175	90.127	89.875	89.800		
EXISTING SURFACE LEVEL	90.137	89.877	89.876	90.235	89.828	89.024		88.287	88.192
CONTROL LINE CHAINAGE	110	119.95	120	130	131.624	140	142.500	145.578	146.757

LONGITUDINAL SECTION - CATCH DRAIN 1

SCALE 1:250 HOR
1:125 VERT

Hornsby Shire Council Design & Construction Branch

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Drawn: S. COMISH
Drawing Checked Signed:
Surveyor: VARIOUS | NA Field Book | NA Level Book | AHD Datum
Project Identifier\-\CAD File Name: H:\\\Hornsby Quarry_OT_100125\Design\ACAD\Hornsby Pk Cons.dwg
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Issue	Description	Name	Initial	Date
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Bar Scales: 0 5 10 15m
SCALE 1:250 @ A1
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HORNSBY PARK REDEVELOPMENT
OLD MANS VALLEY & QUARRY
GRADING & EARTHWORKS

PLAN & LONG SECTION OF CATCH DRAIN ABOVE DRAINAGE LINE No.1

Project Number: 100125
Sheet 74 of 106
Issue: A
HSC Drawing Number: 428.47

APPENDIX C :

Potential Damage from 'Do Nothing' Scenario

25 September 2019

25 September 2019

10 February 2020

10 February 2020

12 February 2020

12 February 2020

12 February 2020

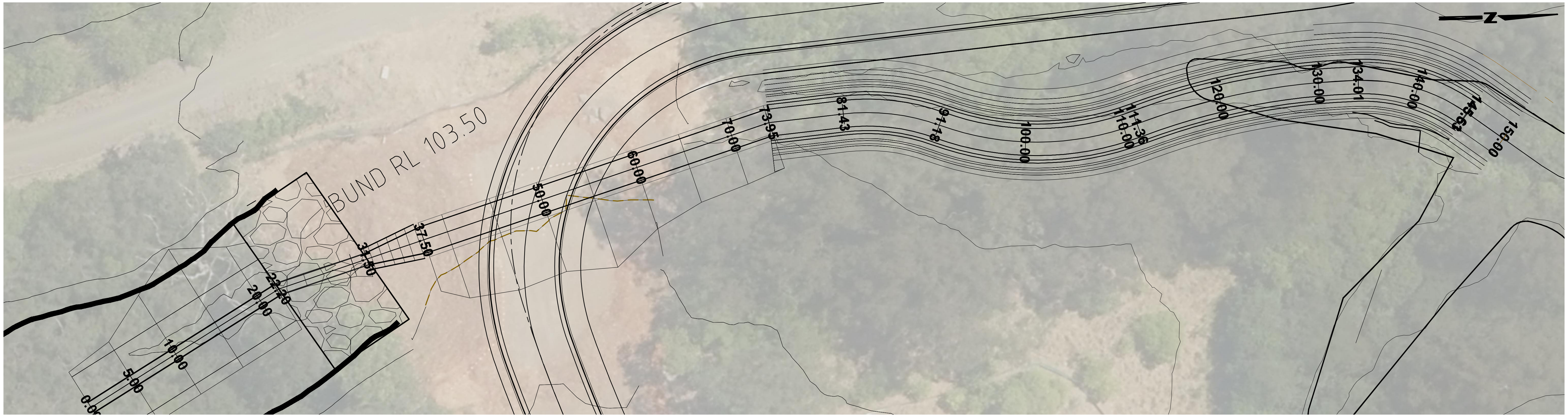
12 February 2020

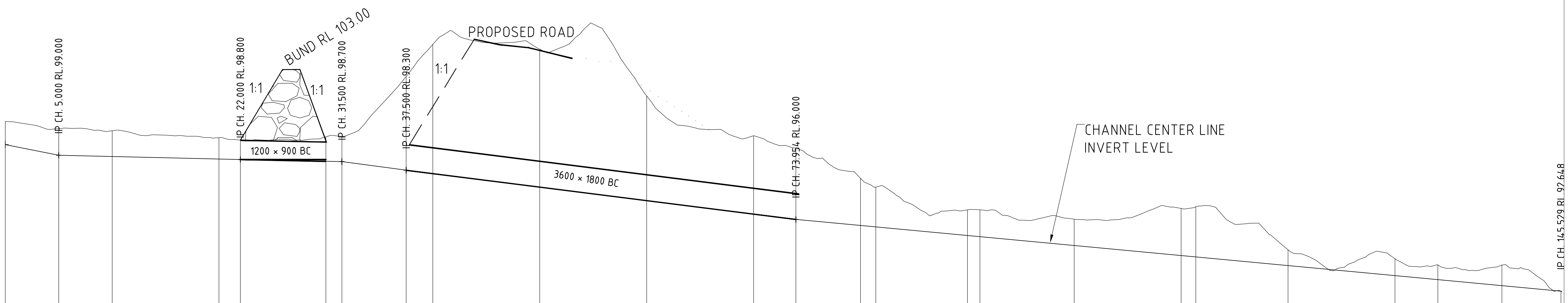
12 February 2020

12 February 2020

APPENDIX D :

Alternative Designs Considered





Horizontal Geometry Data: R21m | R-28.549m | R68.466m | R18.011m

Vertical Geometry Grade (%) / Vertical Grade Length (m): -10% 5m | -1.176% 17m | -1.053% 9.5m | -6.667% 6m | -6.309% 36.454m | -4.683% 71.575m

Vertical Curve Length (m)
Vertical Curve Radius (m)

DATUM R.L.86.00

CUT / FILL DEPTH TO EXISTING	1.080	1.242	1.204	0.999	0.907	1.147	1.181	4.377	6.032	6.445	4.897	3.658	3.338	2.210	1.860	1.198	1.254	1.230	2.209	2.350	0.742	0.792	0.691	0.965	-0.002
INVERT FINISHED LEVEL	99.500	99.000	98.941	98.824	98.800	98.716	98.700	98.300	98.142	97.511	96.880	96.249	96.000	95.717	95.650	95.249	95.193	94.780	94.312	94.248	93.844	93.375	93.188	92.907	92.648
EXISTING SURFACE LEVEL	100.580	100.242	100.145	99.823	99.707	99.863	99.881	102.677	104.174	103.956	101.777	99.908	99.338	97.927	97.509	96.447	96.448	96.010	96.521	96.599	94.585	94.168	93.878	93.872	92.646
INVERT CHAINAGE	0	5	10	20	22	30	31.5	37.5	40	50	60	70	73.954	80	81.432	90	91.177	100	110	111.364	120	130	134.005	140	145.529

LONGITUDINAL SECTION - D CULVERT ALIGN 1

SCALE 1:200 HOR
1:100 VERT

Hornsby Shire Council Design & Construction Branch
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Drawn: M. MAKOMASKI
Surveyor: JAMES HART
Design Checked-Design Team Leader Signed:
Drawing Checked Signed:
NA Field Book | NA Level Book | AHD Datum
Project Identifier\-\CAD File Name
TRIM Document Number

Issue | Description | Name | Initial | Date
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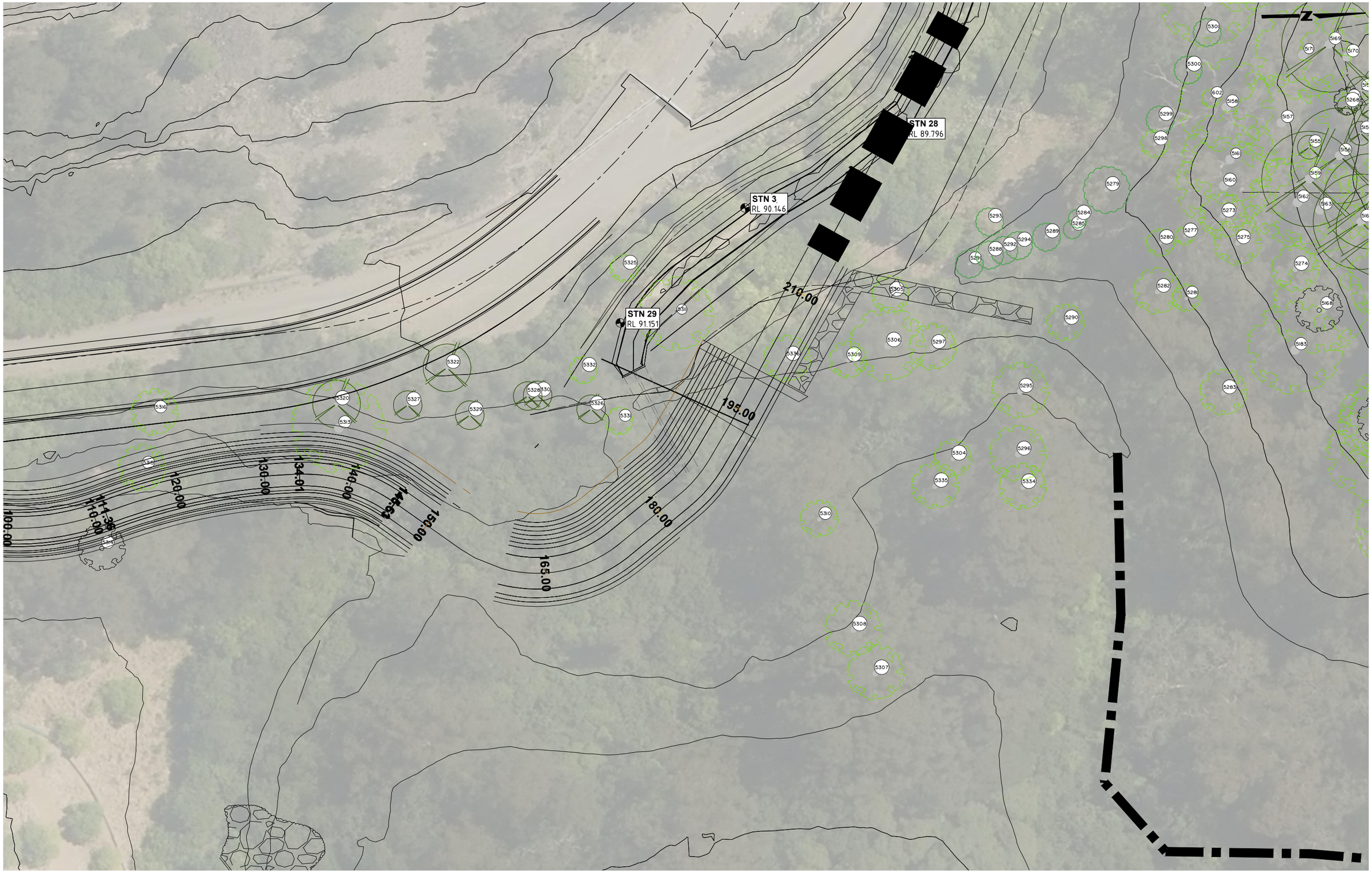
DX 9655 HORNSBY

HORNSBY QUARRY

CULVERT UNDER ROAD 3 &
PROPOSED SANDSTONE CHANNEL
PLAN & LONGITUDINAL SECTION

Project Number
Sheet 1 of 8
Issue 1
HSC Drawing Number



Hornsby Shire Council
Design & Construction Branch
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HORNSBY QUARRY

CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

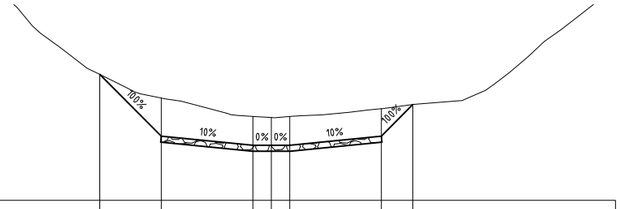
PLAN & LONGITUDINAL SECTION

Project Number

Sheet 2 of 8

Issue 1

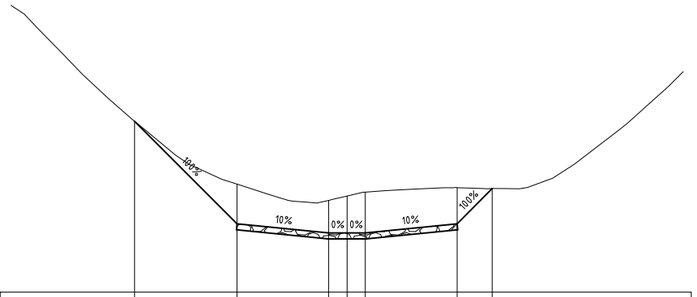
HSC Drawing Number



Datum R.L.97

DESIGN LEVELS	101.117	99.100	98.800	98.800	99.100	100.134
EXISTING LEVELS	101.117	100.343	99.745	99.707	99.739	99.995	100.134
OFFSET	-5.617	-3.600	-0.600	0.000	0.600	3.600	4.634

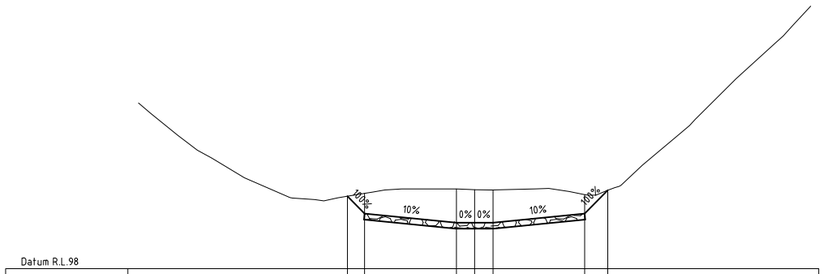
CH 22.000



Datum R.L.97

DESIGN LEVELS	102.595	99.241	98.941	98.941	99.241	100.389
EXISTING LEVELS	102.595	100.538	100.005	100.145	100.276	100.421	100.389
OFFSET	-6.953	-3.600	-0.600	0.000	0.600	3.600	4.747

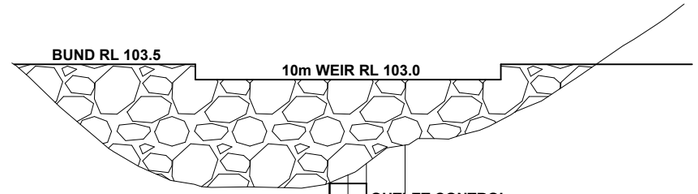
CH 10.000



Datum R.L.98

DESIGN LEVELS	100.364	99.800	99.500	99.500	99.800	100.557
EXISTING LEVELS	100.364	100.456	100.603	100.580	100.573	100.420	100.557
OFFSET	-4.164	-3.600	-0.600	0.000	0.600	3.600	4.357

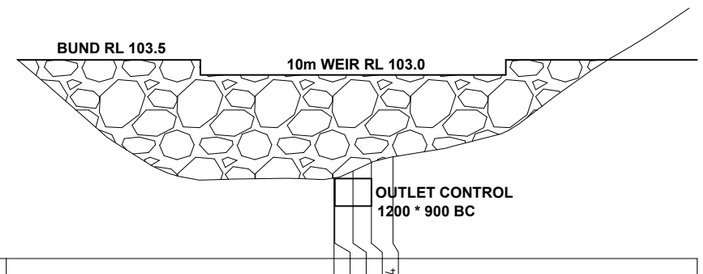
CH 0.000



Datum R.L.97

DESIGN LEVELS	99.621	99.600	98.700	98.700	100.863
EXISTING LEVELS	99.621	99.630	99.881	100.254	100.863
OFFSET	-0.621	-0.600	0.000	0.600	1.863

CH 31.500



Datum R.L.97

DESIGN LEVELS	99.635	99.616	98.716	98.716	100.324
EXISTING LEVELS	99.635	99.639	99.863	100.139	100.324
OFFSET	-0.620	-0.600	0.000	0.600	1.308

CH 30.000

Hornsby Shire Council
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Project Identifier\-\CAD File Name			
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Issue	Description	Name	Initial	Date

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Bar Scales

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HORNSBY QUARRY

CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

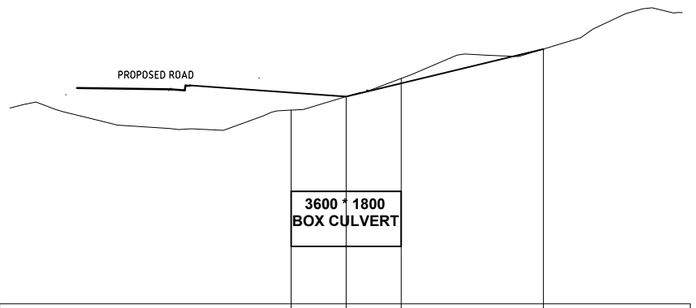
CROSS SECTIONS

Project Number

Sheet 1 of 4

Issue 2

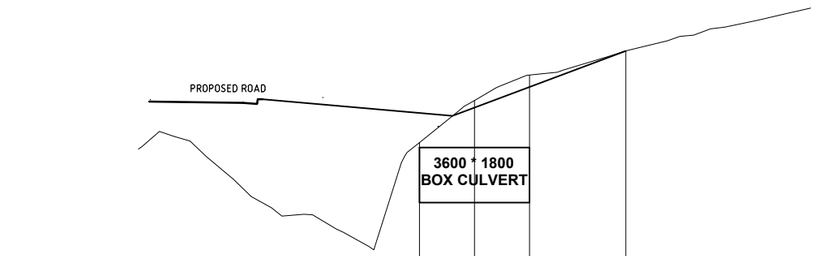
HSC Drawing Number



Datum R.L.95

DESIGN LEVELS	98.680	96.880	96.880	103.339	
EXISTING LEVELS	101.336	101.777	102.374	103.339	
OFFSET	-1.800	0.000	1.800	6.459	

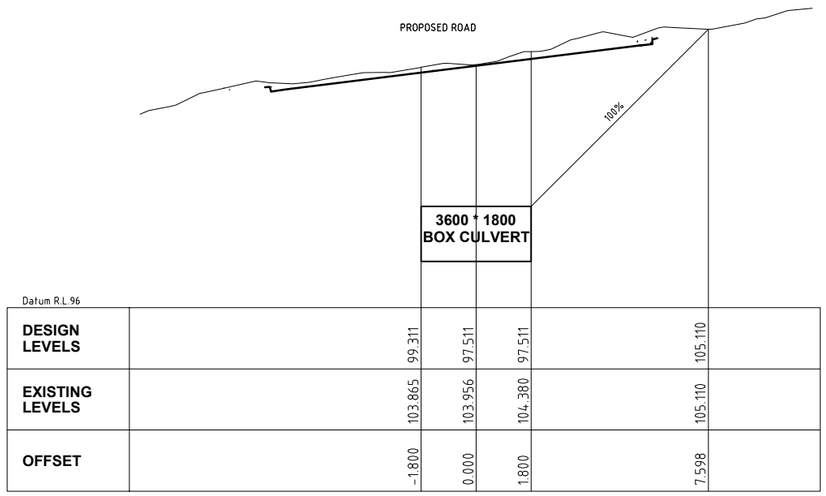
CH 60.000



Datum R.L.93

DESIGN LEVELS	97.800	96.000	96.000	100.957	
EXISTING LEVELS	97.966	99.338	100.171	100.957	
OFFSET	-1.800	0.000	1.800	4.957	

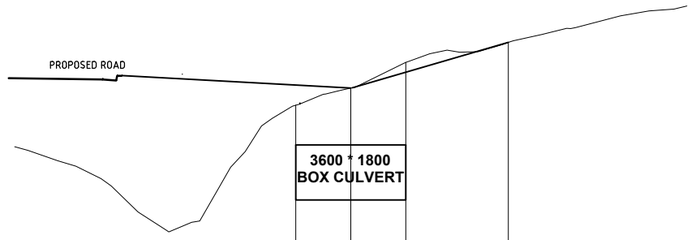
CH 73.954



Datum R.L.96

DESIGN LEVELS	99.311	97.511	97.511	105.110	
EXISTING LEVELS	103.865	103.956	104.380	105.110	
OFFSET	-1.800	0.000	1.800	7.598	

CH 50.000



Datum R.L.94

DESIGN LEVELS	98.049	96.249	96.249	101.400	
EXISTING LEVELS	99.346	99.908	100.746	101.400	
OFFSET	-1.800	0.000	1.800	5.150	

CH 70.000

Hornsby Shire Council
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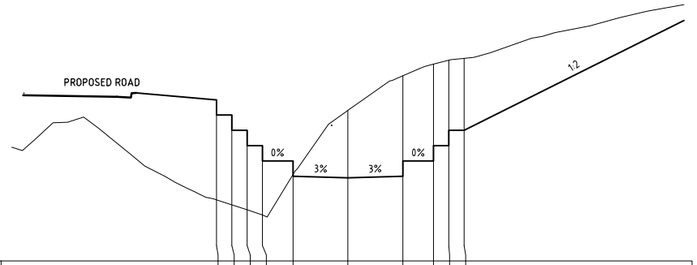
CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

CROSS SECTIONS

Project Number

Sheet 2 of 8 — Issue 2

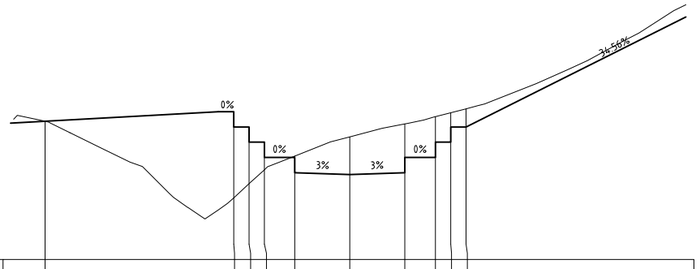
HSC Drawing Number



Datum R.L.93

DESIGN LEVELS		98.271	97.771	97.271	96.771	96.271	95.717	95.771	96.271	96.771	97.271	
EXISTING LEVELS		95.001	94.836	94.671	94.506	95.827	97.927	99.057	99.436	99.570	99.630	
OFFSET		-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	

CH 80.000



Datum R.L.92

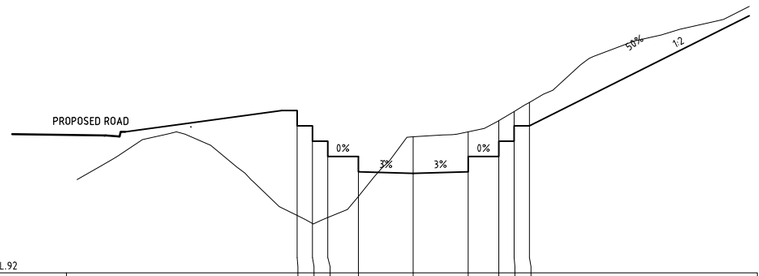
DESIGN LEVELS	95.719		96.834	96.334	95.834	95.334	94.780	94.834	95.334	95.834	96.334	
EXISTING LEVELS	96.518		94.014	94.476	94.933	95.382	96.010	96.431	96.668	96.798	96.929	
OFFSET	-9.974		-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	

CH 100.000

Datum R.L.93

DESIGN LEVELS		98.554	98.054	97.554	97.054	96.554	96.000	96.054	96.554	97.054	97.554	
EXISTING LEVELS		95.598	95.396	95.035	94.757	94.457	96.010	97.966	99.338	100.171	100.293	100.451	100.603	
OFFSET		-5.300	-4.957	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	

CH 73.954



Datum R.L.92

DESIGN LEVELS		97.303	96.803	96.303	95.803	95.249	95.303	95.803	96.303	96.803		
EXISTING LEVELS		93.876	93.614	93.806	94.498	96.447	96.610	96.975	97.276	97.573		
OFFSET		-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800		

CH 90.000

Hornsby Shire Council
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Designer: M. MAKOMASKI — Design Checked-Design Team Leader — Signed:
Drawn: M. MAKOMASKI — Drawing Checked — Signed:
Surveyor: JAMES HART — NA Field Book — NA Level Book — AHD Datum
Project Identifier\-\CAD File Name
TRIM Document Number
Authorised for release - Manager Design & Construction
Name: R. RAJCA Signed: Date:

Issue	Description	Name	Initial	Date

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Bar Scales
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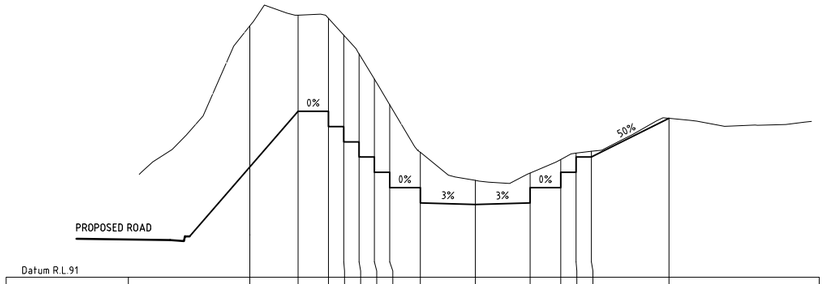
HORNSBY QUARRY

CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

CROSS SECTIONS

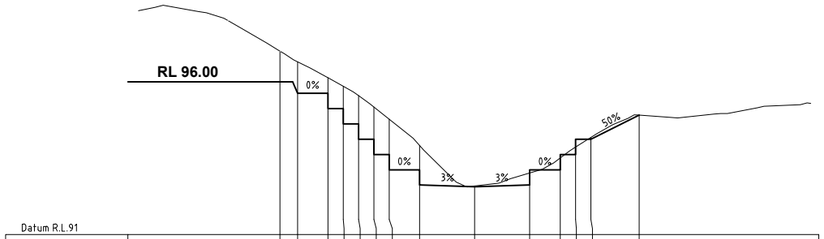
Project Number
Sheet 3 of 8
Issue 2
HSC Drawing Number



Datum R.L.91

DESIGN LEVELS	92.389	96.429	96.429	95.929	95.429	94.929	94.429	93.929	93.375	93.429	93.929	94.429	94.929	96.197	
EXISTING LEVELS	99.219	99.573	99.467	98.914	98.305	97.478	96.642	95.086	94.168	94.410	94.852	95.058	95.118	96.197	
OFFSET	-7.381	-5.800	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	6.336	

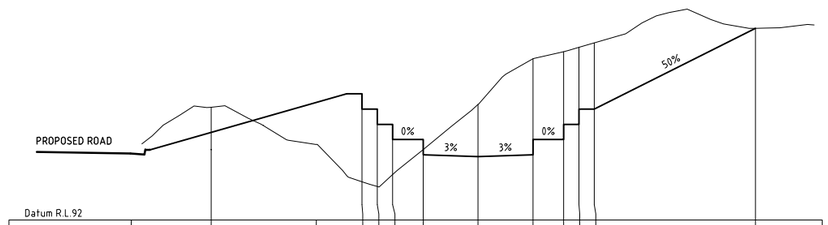
CH 130.000



Datum R.L.91

DESIGN LEVELS	96.000	95.622	95.622	95.122	94.622	94.122	93.622	93.122	92.568	92.622	93.122	93.622	94.122	94.911	
EXISTING LEVELS	97.000	96.653	96.133	95.854	95.547	95.174	94.775	93.916	92.589	93.014	93.509	93.862	94.177	94.911	
OFFSET	-6.371	-5.800	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	5.378	

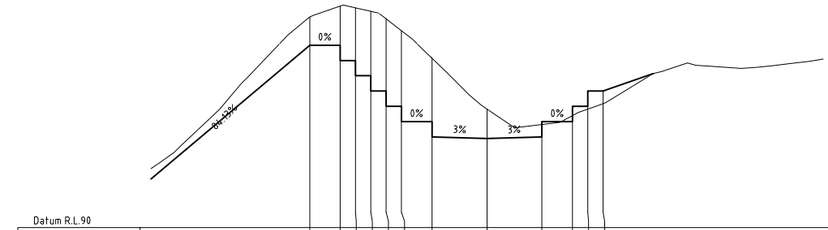
CH 148.000



Datum R.L.92

DESIGN LEVELS	94.304	96.132	95.632	95.132	94.632	94.078	94.132	94.632	95.132	95.632	98.272		
EXISTING LEVELS	95.692	93.254	93.099	93.489	94.307	95.780	97.280	97.506	97.648	97.794	98.272		
OFFSET	-8.734	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	9.079		

CH 115.000



Datum R.L.90

DESIGN LEVELS	95.961	95.961	95.461	94.961	94.461	93.961	93.461	92.907	92.961	93.461	93.961	94.461			
EXISTING LEVELS	96.881	97.242	97.185	97.068	96.823	96.437	95.532	93.872	93.366	93.656	93.868	94.046			
OFFSET	-5.800	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800			

CH 140.000

Hornsby Shire Council
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Name: R. RAJCA Signed: Date:

Designer: M. MAKOMASKI	Design Checked-Design Team Leader Signed:		
Drawn: M. MAKOMASKI	Drawing Checked Signed:		
Surveyor: JAMES HART	NA Field Book	NA Level Book	AHD Datum
Project Identifier\-\CAD File Name			
TRIM Document Number			

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Bar Scales

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CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

CROSS SECTIONS

Project Number

Sheet 4 of 4

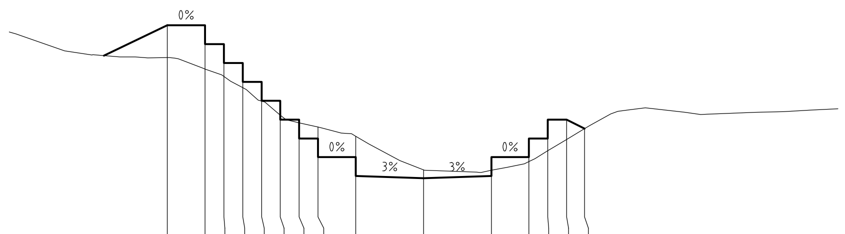
Issue 2

HSC Drawing Number

Datum R.L.91

DESIGN LEVELS	96.233	96.233	95.733	95.233	94.733	94.233	93.733	93.233	92.733	92.179	92.233	92.733	93.233	93.733	95.360
EXISTING LEVELS	95.501	95.032	94.745	94.412	94.121	93.889	93.652	93.572	93.340	92.703	92.718	93.391	93.748	94.054	95.360
OFFSET	-6.800	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	7.053

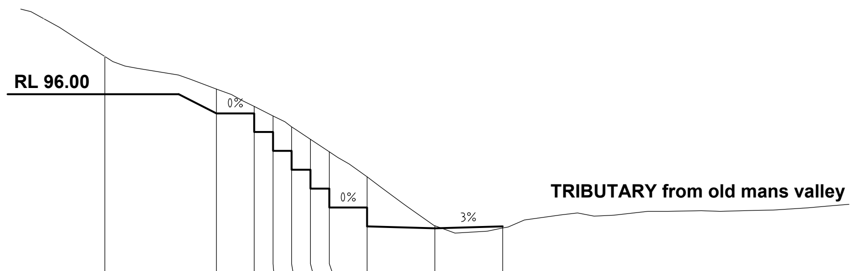
CH 160.000



Datum R.L.90

DESIGN LEVELS	95.586	95.586	95.086	94.586	94.086	93.586	93.086	92.586	92.086	91.532	91.586	92.086	92.586	93.086	92.847
EXISTING LEVELS	94.731	94.430	94.229	93.930	93.576	93.205	93.001	92.887	92.641	91.753	91.738	91.970	92.258	92.561	92.847
OFFSET	-6.800	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	4.278

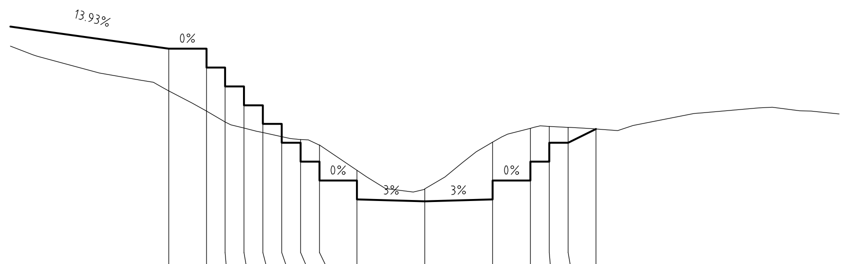
CH 180.000



Datum R.L.91

DESIGN LEVELS	97.000	95.492	95.492	94.992	94.492	93.992	93.492	92.992	92.438	92.492
EXISTING LEVELS	97.000	96.136	95.672	95.422	95.136	94.800	94.469	93.803	92.509	92.446
OFFSET	-8.766	-5.800	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800

CH 152.000



Datum R.L.90

DESIGN LEVELS	95.910	95.910	95.410	94.910	94.410	93.910	93.410	92.910	92.410	91.856	91.910	92.410	92.910	93.410	93.779
EXISTING LEVELS	94.792	94.251	93.963	93.801	93.681	93.572	93.501	93.352	92.679	92.187	93.428	93.795	93.849	93.823	93.779
OFFSET	-6.800	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.800	4.539

CH 170.000

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Design Checked-Design Team Leader Signed:
Drawn: M. MAKOMASKI
Drawing Checked Signed:
Surveyor: JAMES HART
NA Field Book | NA Level Book | AHD Datum
Project Identifier\-\CAD File Name
TRIM Document Number

Issue | Description | Name | Initial | Date

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HORNSBY QUARRY

CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL

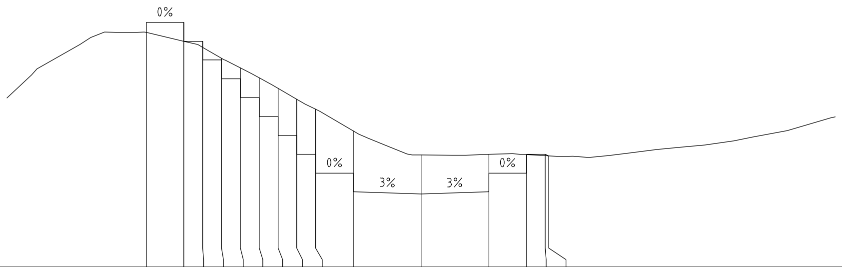
CROSS SECTIONS

Project Number

Sheet 7 of 8

Issue 2

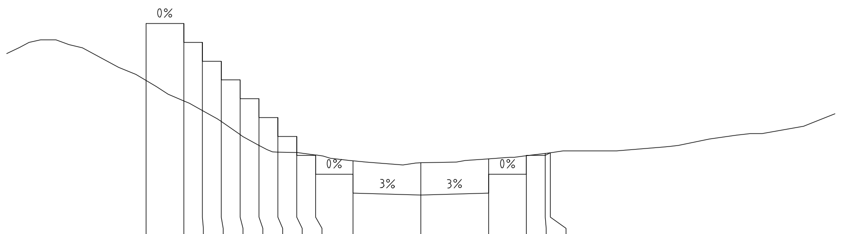
HSC Drawing Number



Datum R.L.89

DESIGN LEVELS	95.496	95.496	94.996	94.496	93.996	93.496	92.996	92.496	91.996	91.496	90.942	90.996	91.496	91.996	91.953
EXISTING LEVELS	95.226	94.994	94.833	94.541	94.285	94.023	93.743	93.451	93.190	92.614	91.977	91.990	91.984	91.957	91.953
OFFSET	-7.300	-6.300	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.386

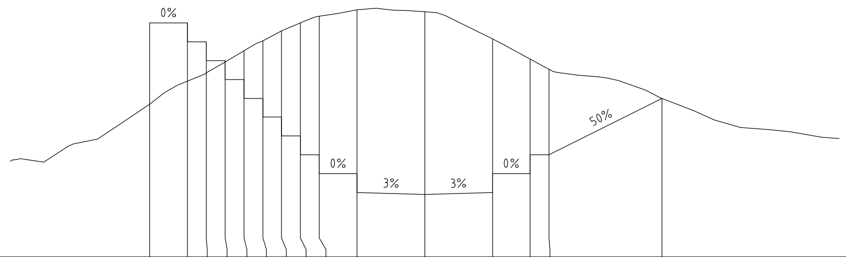
CH 193.067



Datum R.L.90

DESIGN LEVELS	95.638	95.638	95.138	94.638	94.138	93.638	93.138	92.638	92.138	91.638	91.084	91.138	91.638	92.138	92.208
EXISTING LEVELS	94.128	93.584	93.325	93.033	92.686	92.403	92.225	92.214	92.147	91.994	91.938	92.043	92.125	92.190	92.208
OFFSET	-7.300	-6.300	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	3.440

CH 190.000



Datum R.L.89

DESIGN LEVELS	95.208	95.208	94.708	94.208	93.708	93.208	92.708	92.208	91.708	91.208	90.654	90.708	91.208	91.708	93.206
EXISTING LEVELS	93.052	93.666	93.881	94.176	94.472	94.736	94.996	95.211	95.387	95.558	95.504	94.786	94.248	93.978	93.206
OFFSET	-7.300	-6.300	-5.800	-5.300	-4.800	-4.300	-3.800	-3.300	-2.800	-1.800	0.000	1.800	2.800	3.300	6.295

CH 200.000

Hornsby Shire Council Design & Construction Branch

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Drawn: M. MAKOMASKI
Surveyor: JAMES HART
Design Checked-Design Team Leader Signed:
Drawing Checked Signed:

NA	NA	AHD
Field Book	Level Book	Datum

Project Identifier\-\CAD File Name
TRIM Document Number

Issue	Description	Name	Initial	Date

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HORNSBY QUARRY

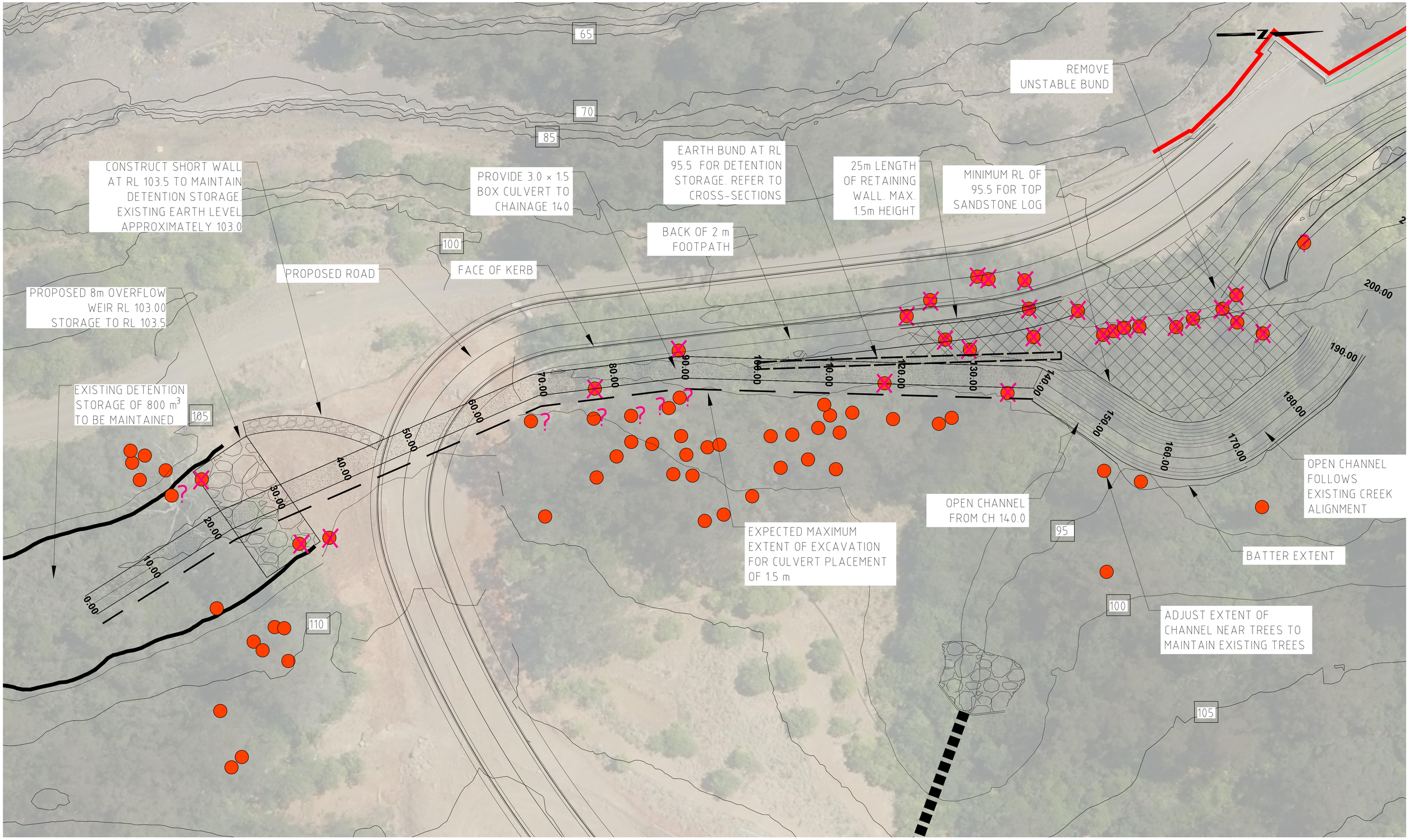
CULVERT UNDER ROAD 3 & PROPOSED SANDSTONE CHANNEL
CROSS SECTIONS

Project Number

Sheet 5 of 4

Issue 2

HSC Drawing Number



PLAN

SCALE 1:2000

Hornsby Shire Council
Design & Construction Branch

TELEPHONE: (02) 9847 6666
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Authorised for release - Manager Design & Construction
Name: R. RAJCA Signed: Date:

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Drawn: M. MAKOMASKI	Drawing Checked: Signed:		
Surveyor: JAMES HART	NA Field Book	NA Level Book	AHD Datum
Project Identifier\-\CAD File Name: H:\Branch -			
TRIM Document Number			

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HORNSBY QUARRY

CREEK DIVERSION OPTION 1

PLAN

Project Number

Sheet 1 of 5

Issue 1

HSC Drawing Number

CONTROL LINE CHAINAGE	CUT / FILL DEPTH TO EXISTING	CONTROL LINE FINISHED LEVEL	EXISTING SURFACE LEVEL
0	0.078	100.502	100.580
5	1.242	99.000	100.242
10	1.204	98.941	100.145
20	0.999	98.824	99.823
22	0.907	98.800	99.707
30	0.917	98.716	99.633
31.5	0.862	98.700	99.562
37.5	3.888	98.500	102.388
40	5.819	98.294	104.113
50	6.331	97.471	103.802
60	4.402	96.648	101.050
70	1.847	95.825	97.672
80	-0.417	95.002	94.584
90	0.434	94.179	94.613
100	1.199	93.356	94.555
104.32	0.933	93.000	93.933
110	0.369	92.902	93.271
120	1.090	92.729	93.819
130	1.617	92.556	94.173
140	0.891	92.383	93.274
150	0.354	92.210	92.563
156.047	0.200	92.105	92.305
160	0.385	92.036	92.421
170	0.478	91.863	92.342
173.436	0.171	91.804	91.975
180	0.068	91.690	91.759
183.832	0.245	91.624	91.869
189.097	0.369	91.533	91.902
190	0.404	91.517	91.922

LONGITUDINAL SECTION - Kurt Alignment2

SCALE 1:200 HOR
1:200 VERT

Hornsby Shire Council Design & Construction Branch

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Drawn: M. MAKOMASKI
Surveyor: JAMES HART

Design Checked-Design Team Leader
Signed:
Drawing Checked
Signed:

NA Field Book | NA Level Book | AHD Datum

Project Identifier\-\CAD File Name
H:\Branch - Design and Construction\PROJECTS\The Glade_DR_100621\Design\The Glade

TRIM Document Number

Issue | Description | Name | Initial | Date

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HORNSBY QUARRY

CREEK DIVERSION - OPTION 1

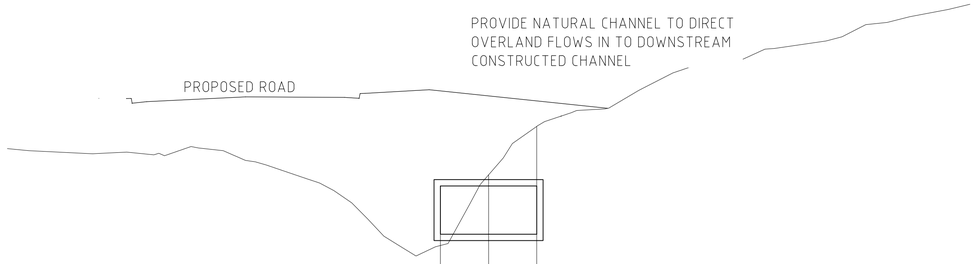
CULVERT LONGITUDINAL SECTION

Project Number

Sheet 2 of 5

Issue 1

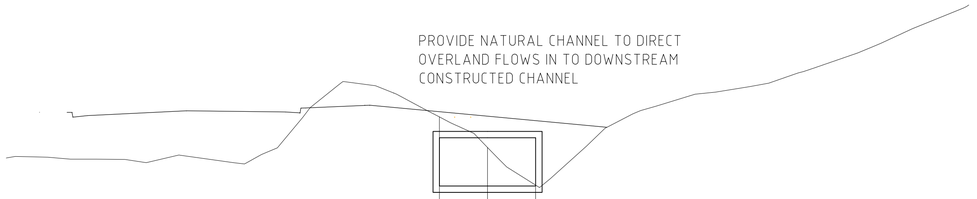
HSC Drawing Number



Datum R.L. 94

DESIGN LEVELS	97.325	95.825	95.825
EXISTING LEVELS	95.471	97.672	99.182
OFFSET	-1.500	0.000	1.500

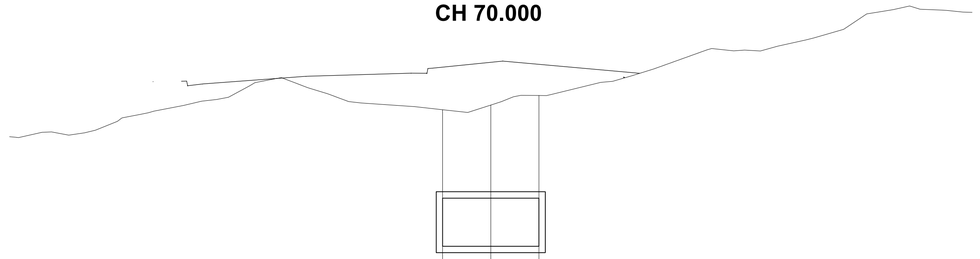
CH 70.000



Datum R.L. 92

DESIGN LEVELS	94.856	93.356	93.356
EXISTING LEVELS	95.507	94.555	93.381
OFFSET	-1.500	0.000	1.500

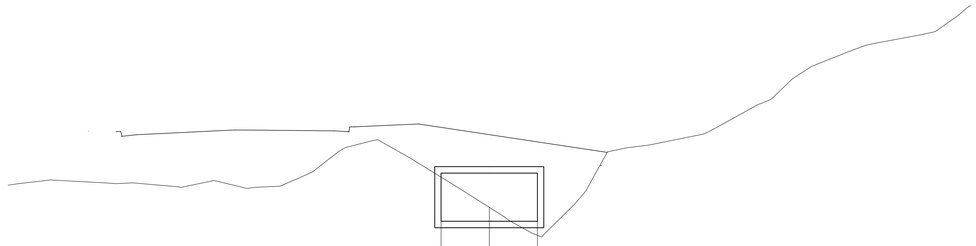
CH 100.000



Datum R.L. 95

DESIGN LEVELS	98.148	96.648	96.648
EXISTING LEVELS	100.903	101.050	101.347
OFFSET	-1.500	0.000	1.500

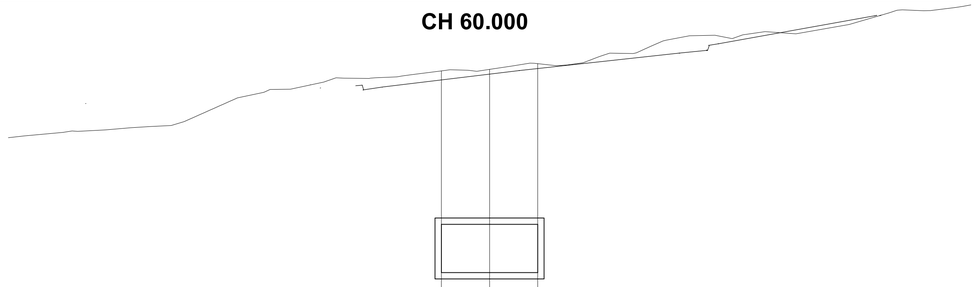
CH 60.000



Datum R.L. 92

DESIGN LEVELS	95.679	94.179	94.179
EXISTING LEVELS	95.552	94.613	93.743
OFFSET	-1.500	0.000	1.500

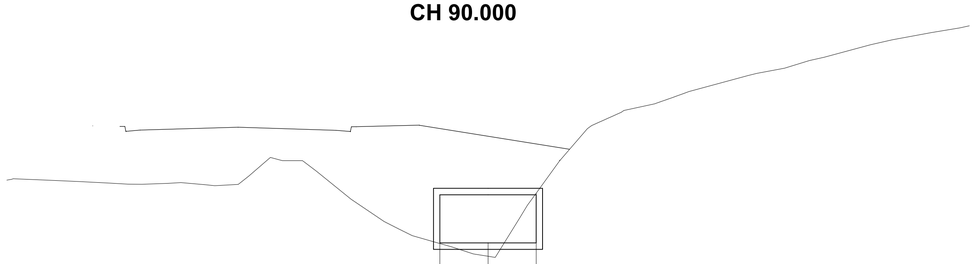
CH 90.000



Datum R.L. 96

DESIGN LEVELS	98.971	97.471	97.471
EXISTING LEVELS	103.754	103.802	103.979
OFFSET	-1.500	0.000	1.500

CH 50.000



Datum R.L. 93

DESIGN LEVELS	96.502	95.002	95.002
EXISTING LEVELS	94.983	94.584	96.550
OFFSET	-1.500	0.000	1.500

CH 80.000

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HORNSBY QUARRY

CREEK DIVERSION - OPTION 1

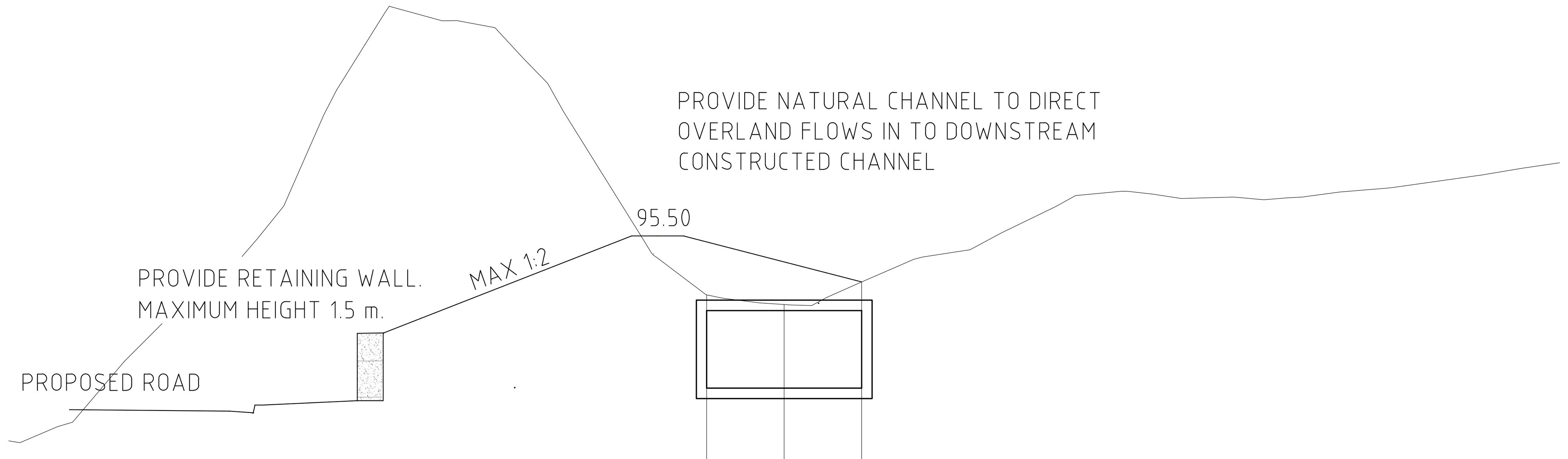
CROSS SECTIONS

Project Number

Sheet 3 of 5

Issue 1

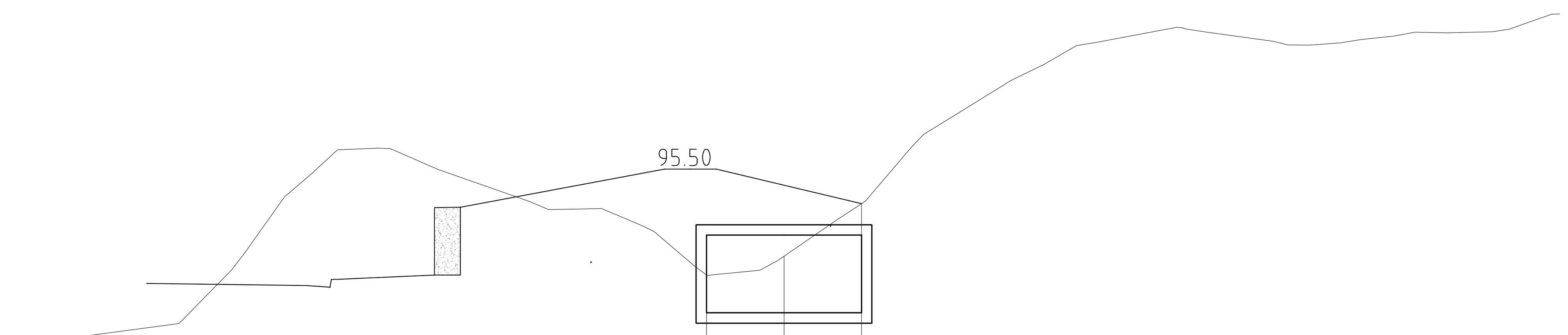
HSC Drawing Number



Datum R.L.90

DESIGN LEVELS	94.056	92.556	92.556
EXISTING LEVELS	94.360	94.173	94.607
OFFSET	-1.500	0.000	1.500

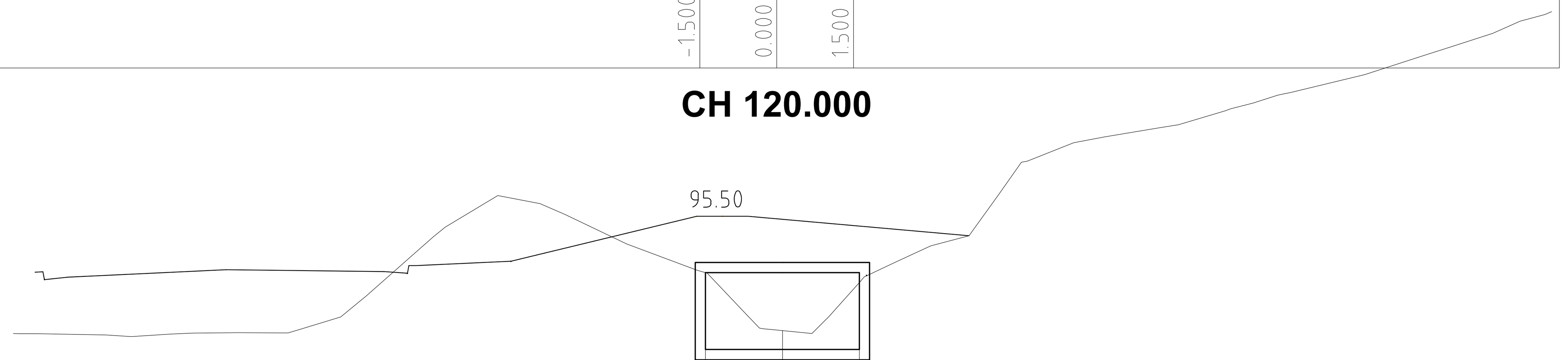
CH 130.000



Datum R.L.91

DESIGN LEVELS	94.229	92.729	92.729
EXISTING LEVELS	93.455	93.819	94.836
OFFSET	-1.500	0.000	1.500

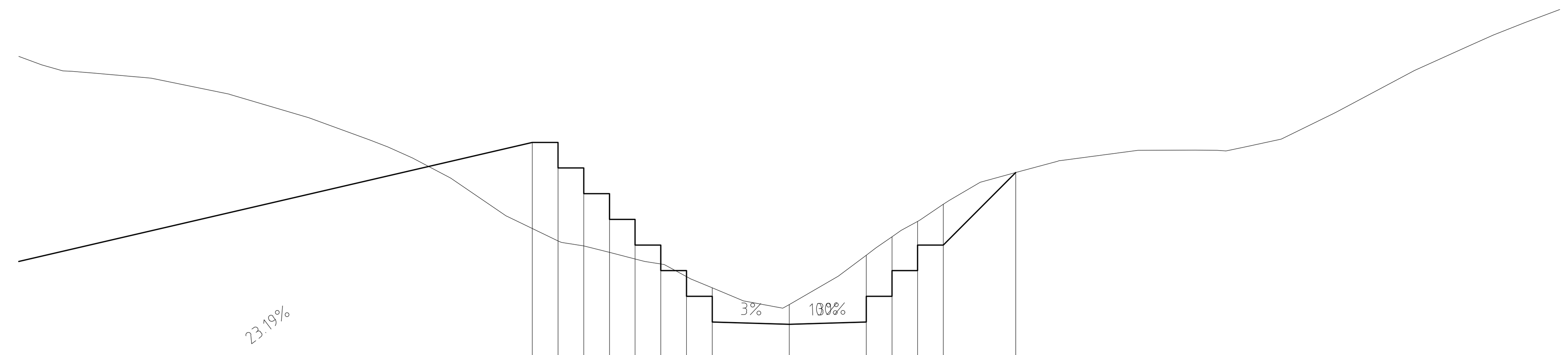
CH 120.000



Datum R.L.91

DESIGN LEVELS	94.402	92.902	92.902
EXISTING LEVELS	94.403	93.271	94.209
OFFSET	-1.500	0.000	1.500

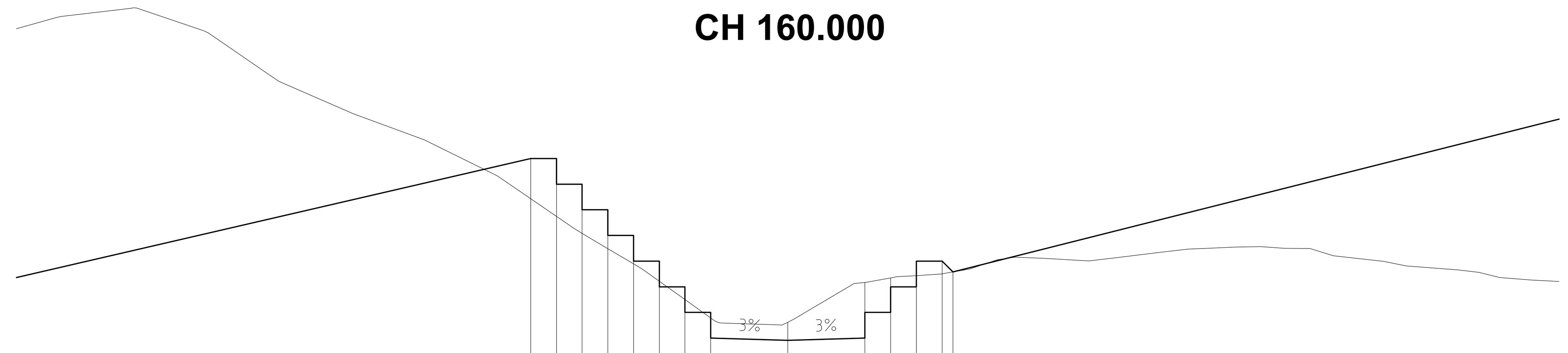
CH 110.000



Datum R.L.91

DESIGN LEVELS	95.581	95.581	95.081	94.581	94.081	93.581	93.081	92.581	92.036	92.081	92.581	93.081	93.581	94.992
EXISTING LEVELS	93.903	93.662	93.562	93.437	93.309	93.211	92.964	92.746	92.421	93.383	93.742	94.042	94.374	94.992
OFFSET	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	3.000	4.410

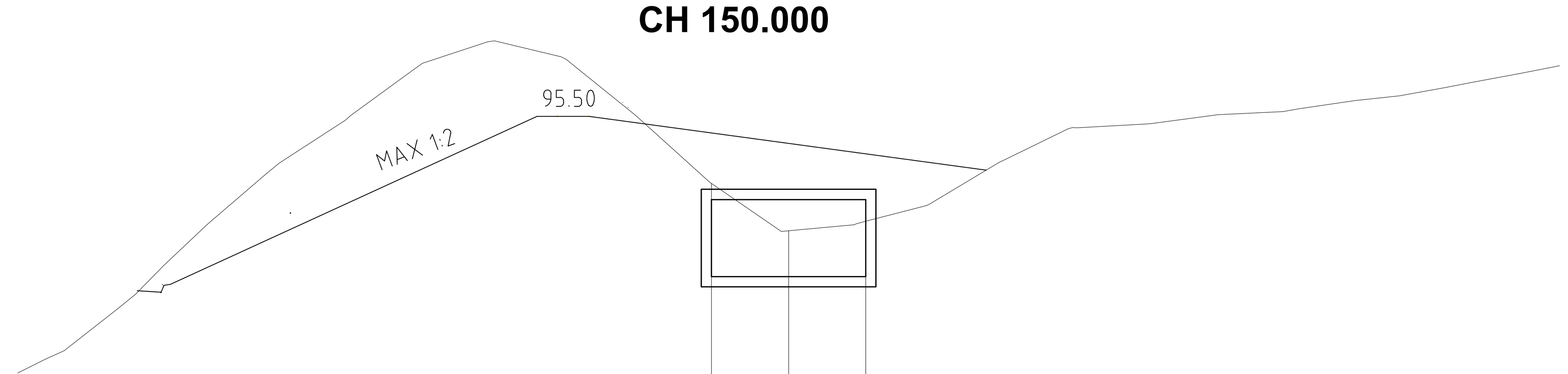
CH 160.000



Datum R.L.91

DESIGN LEVELS	95.755	95.755	95.255	94.755	94.255	93.755	93.255	92.755	92.210	92.255	92.755	93.255	93.755	93.543
EXISTING LEVELS	94.969	94.626	94.297	93.999	93.700	93.364	93.005	92.647	92.563	93.340	93.427	93.473	93.506	93.543
OFFSET	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	3.000	3.212

CH 150.000



Datum R.L.89

DESIGN LEVELS	93.883	92.383	92.383
EXISTING LEVELS	94.197	93.274	93.459
OFFSET	-1.500	0.000	1.500

CH 140.000

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CREEK DIVERSION - OPTION 1
CROSS SECTIONS

Project Number
Sheet 4 of 5
Issue 1
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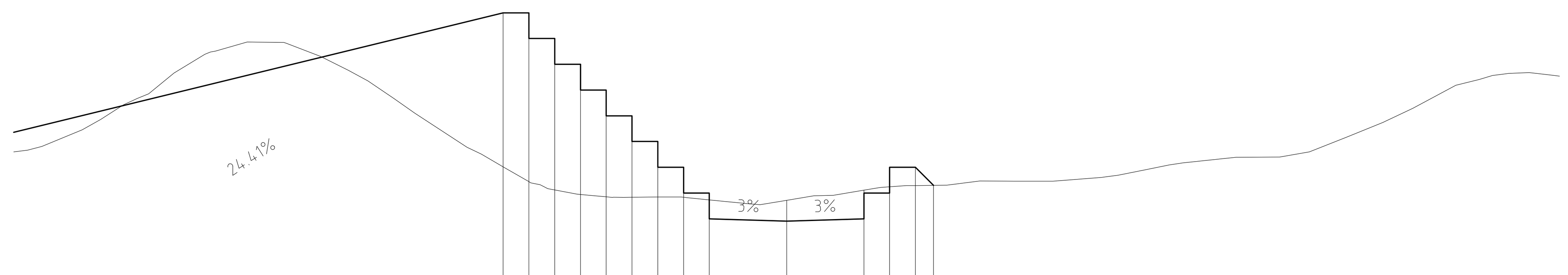
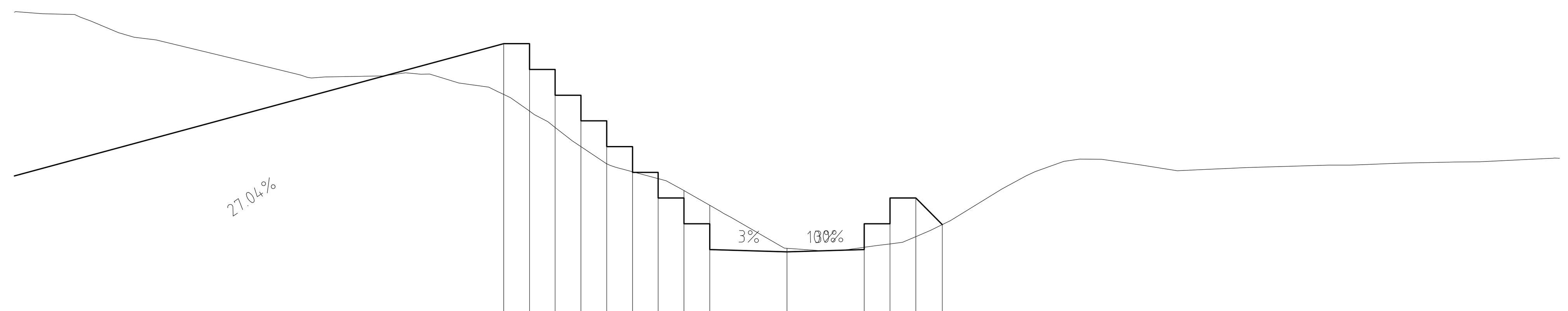


Datum R.L.90

DESIGN LEVELS	95.562	95.562	95.062	94.562	94.062	93.562	93.062	92.562	92.062	91.517	91.562	92.062	92.562	92.212
EXISTING LEVELS	92.572	92.283	92.122	92.034	91.989	91.980	91.983	91.981	91.930	91.922	92.118	92.184	92.208	92.212
OFFSET	-5.500	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	2.850

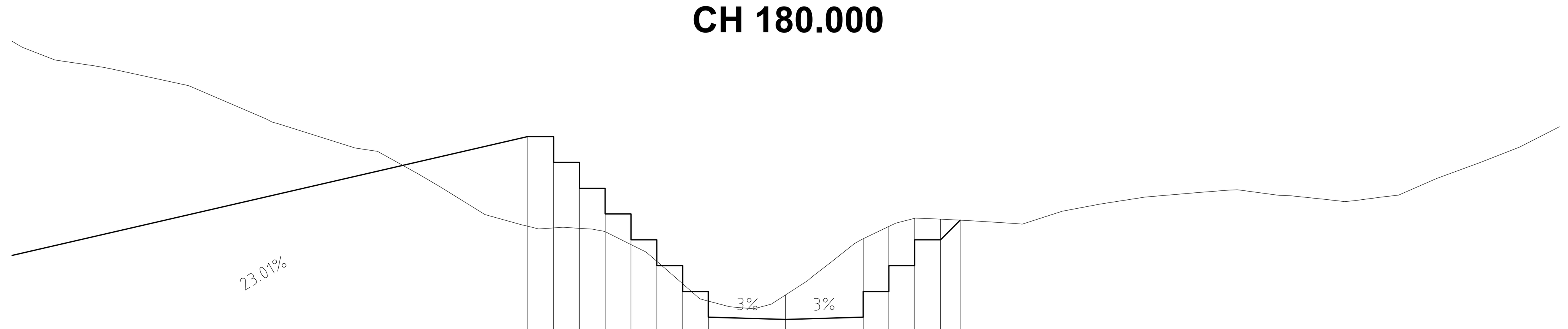
CH 190.000



Datum R.L.90

DESIGN LEVELS	95.735	95.735	95.235	94.735	94.235	93.735	93.235	92.735	92.235	91.690	91.735	92.235	92.735	92.220
EXISTING LEVELS	94.749	94.426	94.107	93.736	93.402	93.248	93.113	92.881	92.594	91.759	91.779	91.845	91.985	92.220
OFFSET	-5.500	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	3.016

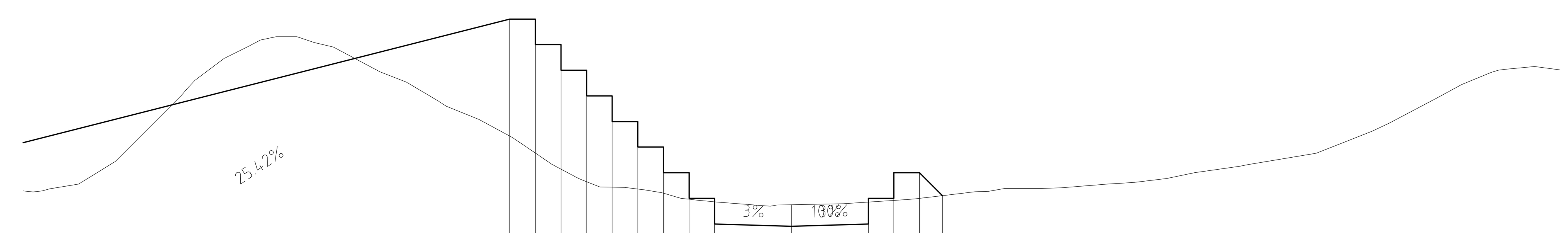
CH 180.000



Datum R.L.90

DESIGN LEVELS	95.408	95.408	94.908	94.408	93.908	93.408	92.908	92.408	91.863	91.908	92.408	92.908	93.408	93.788
EXISTING LEVELS	93.669	93.639	93.633	93.564	93.317	92.991	92.557	92.222	92.342	93.428	93.668	93.827	93.807	93.788
OFFSET	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	3.000	3.380

CH 170.000



Datum R.L.90

DESIGN LEVELS	95.545	95.545	95.045	94.545	94.045	93.545	93.045	92.545	92.045	91.500	91.545	92.045	92.545	92.098
EXISTING LEVELS	93.260	92.927	92.615	92.370	92.262	92.226	92.145	92.026	91.977	91.920	91.972	92.004	92.045	92.098
OFFSET	-5.500	-5.000	-4.500	-4.000	-3.500	-3.000	-2.500	-2.000	-1.500	0.000	1.500	2.000	2.500	2.947

CH 191.000

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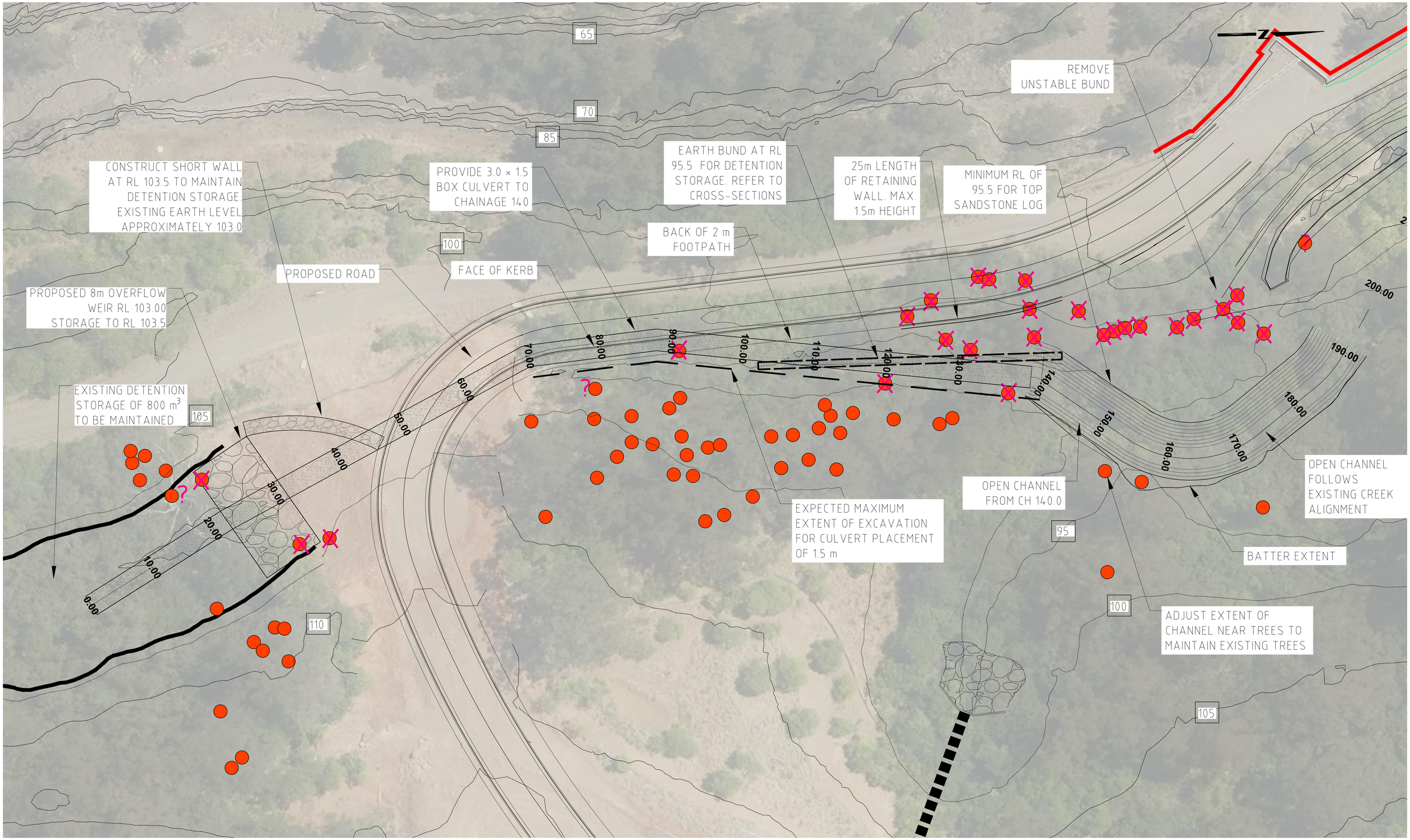

PLAN

SCALE 1:2000

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CREEK DIVERSION OPTION 2

PLAN

Project Number

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APPENDIX E :

Matters for Consideration under Clauses 5 and 6 of SREP20

Clause 5 of SREP20 provides that the general planning considerations, and Clause 6 provides specific planning policies and related recommended strategies that must be considered in determining an application for consent. **Table 12** lists these factors and summarises how these have been assessed for the proposal.

Table 14 Matters for consideration under Clause 5 and Clause 6 of SREP 20

Clause	Response
5 General Planning Considerations	
(a) the aim of this plan, and	This REF considered the potential impacts of the proposal.
(b) the strategies listed in the Action Plan of the Hawkesbury-Nepean Environmental Planning Strategy, and	Strategies have been addressed in the relevant sections below.
(c) whether there are any feasible alternatives to the development or other proposal concerned, and	Feasible alternatives are addressed in ***Section 1.4.4***.
(d) the relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored.	This REF considered the potential impacts of the proposal and recommends mitigation measures (see **Chapter 5**).
6 Specific planning policies and recommended strategies	
(1) Total catchment management	
Policy: Total catchment management is to be integrated with environmental planning for the catchment.	-
Strategies:	-
(a) Refer the application or other proposal for comment to the councils of each adjacent or downstream local government area which is likely to suffer a significant adverse environmental effect from the proposal.	No significant adverse environmental effect will occur as a result of the proposal.
(b) Consider the impact of the development concerned on the catchment.	The impact of the proposal on hydrology and water quality is discussed in ***Section 4.3***.
(c) Consider the cumulative environmental impact of development proposals on the catchment.	No cumulative environmental impacts on the catchment are predicted as a result of the proposal.
(2) Environmentally sensitive areas	
Policy: The environmental quality of environmentally sensitive areas must be protected and enhanced through careful control of future land use changes and through management and (where necessary) remediation of existing uses.	-
Strategies:	-
(a) Rehabilitate parts of the riverine corridor from which sand, gravel or soil are extracted so that attached aquatic plant beds are replaced and water quality and faunal habitats improved.	The proposal includes the revegetation of disturbed areas above the box culverts, with an aim to improve flora and fauna habitat. Mitigation measures will be implemented to

Clause	Response
	improve water quality. No aquatic plant beds are being impacted by the proposal.
(b) Minimise adverse impacts on water quality, aquatic habitats, riverine vegetation and bank stability.	Impacts to the hydrological regime and vegetation are addressed in ***Section 4.3*** and ***Section 4.4***, respectively. Mitigation measures are proposed to minimise potential adverse impacts.
(c) Minimise direct and indirect adverse impacts on land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916* and conservation area sub-catchments in order to protect water quality and biodiversity.	Mitigation measures are proposed to protect water quality and biodiversity. No direct or indirect impacts are predicted for land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*.
(d) Protect wetlands (including upland wetlands) from future development and from the impacts of land use within their catchments.	No wetlands have been identified as occurring in proximity to the development footprint, therefore no impacts to wetlands are anticipated.
(e) Consider the need to include buffer zones (such as adequate fire radiation zones) for proposals on land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*.	The development footprint is not located on land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974* or the *Forestry Act 1916*.
(f) Consider the views of the Director-General of National Parks and Wildlife about proposals for land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974*.	The development footprint is not located on land adjacent to land reserved or dedicated under the *National Parks and Wildlife Act 1974*.
(g) Consideration should be given to the impact of the development concerned on the water table and the formation of acid sulphate soils.	Potential hydrological impacts are addressed in ***Section 4.3***. The development footprint has been assessed as having a low probability of acid sulfate soils.
(h) New development in conservation area sub-catchments should be located in areas that are already cleared.	The proposal comprises improvement works along a previously modified drainage channel. The proposal has sought to maximise use of existing cleared areas, whilst minimising the need for additional land clearance.
(3) Water quality	
Policy: Future development must not prejudice the achievement of the goals of use of the river for primary contact recreation (being recreational activities involving direct water contact, such as swimming) and aquatic ecosystem protection in the river system. If the quality of the receiving waters does not currently allow these uses, the current water quality must be maintained, or improved, so as	-

Clause	Response
not to jeopardise the achievement of the goals in the future. When water quality goals are set by the Government these are to be the goals to be achieved under this policy.	
Strategies:	-
(a) Quantify, and assess the likely impact of, any predicted increase in pollutant loads on receiving waters.	Potential hydrological impacts are addressed in ***Section 4.3***.
(b) Consider the need to ensure that water quality goals for primary contact recreation and aquatic ecosystem protection are achieved and monitored.	Mitigation measures are proposed to ensure aquatic ecosystems are protected.
(c) Approve development involving primary contact recreation or the withdrawal of water from the river for human contact (not involving water treatment), such as showers, only in locations where water quality is suitable (regardless of water temperature).	The proposal does not involve primary contact recreation or the withdrawal of water from the river for human contact.
(d) Do not carry out development involving on-site disposal of sewage effluent if it will adversely affect the water quality of the river or groundwater. Have due regard to the nature and size of the site.	The proposal does not involve on-site disposal of sewage effluent.
(e) Develop in accordance with the land capability of the site and do not cause land degradation.	The proposal comprises improvement works along a previously modified drainage channel. Stabilisation works form part of the proposal which will serve to prevent land degradation.
(f) Consider the need for an Erosion and Sediment Control Plan (to be in place at the commencement of development) where the development concerned involves the disturbance of soil.	The proposal includes the implementation of an Erosion and Sediment Control Plan.
(g) Minimise or eliminate point source and diffuse source pollution by the use of best management practices.	Mitigation measures proposed include the use of best management practices for pollution.
(h) Site and orientate development appropriately to ensure bank stability. Plant appropriate native vegetation along banks of the river and tributaries of the river, but not so as to prevent or inhibit the growth of aquatic plants in the river, and consider the need for a buffer of native vegetation.	The proposal comprises improvement works along a previously modified drainage channel. Land above the box culverts are proposed for revegetation.
(i) Consider the impact of the removal of water from the river or from groundwater sources associated with the development concerned.	The proposal does not involve the removal of water from the river.
(j) Protect the habitat of native aquatic plants.	Native aquatic plants are not anticipated to be impacted by the proposal.

Clause	Response
(4) Water quality	
Policy: Aquatic ecosystems must not be adversely affected by development which changes the flow characteristics of surface or groundwater in the catchment.	-
Strategies:	-
(a) Future development must be consistent with the interim or final river flow objectives that are set for the time being by the Government.	Noted.
(b) Ensure the amount of stormwater run-off from a site and the rate at which it leaves the site does not significantly increase as a result of development. Encourage on-site stormwater retention, infiltration and (if appropriate) reuse.	The proposal involves the improvement of the existing stormwater management system and does not involve an increase of stormwater run-off.
(c) Consider the need for restricting or controlling development requiring the withdrawal or impoundment of water because of the effect on the total water budget of the river.	The proposal does not involve the withdrawal or impoundment of river water.
(d) Consider the impact of development on the level and quality of the water table.	Potential hydrological impacts are addressed in ***Section 4.3***. No water table impacts are anticipated.
(5) Cultural Heritage	
Policy: The importance of the river in contributing to the significance of items and places of cultural heritage significance should be recognised, and these items and places should be protected and sensitively managed and, if appropriate, enhanced.	-
Strategies:	-
(a) Encourage development which facilitates the conservation of heritage items if it does not detract from the significance of the items.	The proposal is not considered to detract from the significance of the heritage item identified in the development footprint (See ***Section 4.6***).
(b) Protect Aboriginal sites and places of significance.	No Aboriginal sites and places of significance have been identified within the development footprint.
(c) Consider an Aboriginal site survey where predictive models or current knowledge indicate the potential for Aboriginal sites and the development concerned would involve significant site disturbance.	Aboriginal site surveys have been undertaken across the wider Site (see ***Section 3.5***).
(d) Consider the extent to which heritage items (either identified in other environmental planning instruments affecting the subject land or listed in Schedule 2) derive their heritage significance from the river.	The heritage item occurring within the development footprint is associated with the existing quarry, and not the river.

Clause	Response
(6) Flora and fauna	
Policy: Manage flora and fauna communities so that the diversity of species and genetics within the catchment is conserved and enhanced.	-
Strategies, generally:	-
(a) Conserve and, where appropriate, enhance flora and fauna communities, particularly threatened species, populations and ecological communities, aquatic habitats, wetland flora, rare flora and fauna, riverine flora, flora with heritage value, habitats for indigenous and migratory species of fauna, and existing or potential fauna corridors.	The proposal has been designed to minimise impacts on flora and fauna, where possible. Portions of the development footprint will be subject to revegetation and habitat enhancement works.
(b) Locate structures where possible in areas which are already cleared or disturbed instead of clearing or disturbing further land.	The proposal comprises works along a previously modified drainage channel. The proposal has sought to maximum use of existing cleared areas, whilst minimising the need for additional land clearance.
(c) Minimise adverse environmental impacts, protect existing habitat and, where appropriate, restore habitat values by the use of management practices.	The proposal has been designed to minimise impacts on flora and fauna, where possible. Portions of the development footprint will be subject to revegetation and habitat enhancement works.
(d) Consider the impact on ecological processes, such as waste assimilation and nutrient cycling.	Potential hydrological impacts are addressed in ***Section 4.3***.
(e) Consider the range of flora and fauna inhabiting the site of the development concerned and the surrounding land, including threatened species and migratory species, and the impact of the proposal on the survival of threatened species, populations and ecological communities, both in the short and longer terms.	Potential impacts to flora and fauna are addressed in ***Section 4.4***. No significant impact to threatened species and communities is anticipated (see **Appendix H**).
(f) Consider the need to provide and manage buffers, adequate fire radiation zones and building setbacks from significant flora and fauna habitat areas.	Fire radiation zones and building setbacks are not relevant to the proposal.
(g) Consider the need to control access to flora and fauna habitat areas.	Mitigation measures are proposed to control access to retained flora and fauna.
(h) Consider the need to maintain corridors for fish passage, and protect spawning grounds and gravel beds.	The development footprint is not considered to comprise a corridor for fish passage.
Strategies for wetlands:	No wetlands have been identified as occurring in proximity to the development footprint, therefore no impacts to wetlands are anticipated.

Clause	Response
(i) Maintain the ability of wetlands to improve the quality of water entering the river through the filtering of sediments and the absorption of nutrients.	n/a
(j) Maintain the ability of wetlands to stabilise soils and reduce bank erosion.	n/a
(k) Maintain the ability of wetlands to reduce the impact of flooding downstream through the retention of floodwaters.	n/a
(l) Maintain a variety of wetland flora and fauna species in the region and consider the scarcity of particular species on a national basis.	n/a
(m) Encourage the appropriate management of wetlands, including monitoring and weed control.	n/a
(n) Provide opportunities for recreation, scientific research and education where they are compatible with the conservation of wetlands.	n/a
(o) Consider the need to protect and improve the quality and quantity of surface water and groundwater entering wetlands by controlling development in the catchment of wetlands.	n/a
(p) Consider the desirability of protecting any wetlands of local significance which are not included on the map.	n/a
(q) Consider the desirability of protecting or, if necessary, actively managing, constructed wetlands if they have significant conservation values or make a significant contribution to improvements in water quality.	n/a
(7) Riverine scenic quality	
Policy: The scenic quality of the riverine corridor must be protected.	-
Strategies:	-
(a) Maintain areas of extensive, prominent or significant vegetation to protect the character of the river.	Existing vegetation adjacent to the development footprint will be maintained and enhanced as part of the approved project. Portions of the development footprint will also be subject to revegetation and habitat enhancement processes.
(b) Ensure proposed development is consistent with the landscape character as described in the Scenic Quality Study.	n/a
(c) Consider the siting, setback, orientation, size, bulk and scale of and the use of unobtrusive, non-reflective material on any proposed building or work, the need to retain existing vegetation, especially along river banks, slopes visible from the river and its banks and along the skyline, and the need to	The proposal comprises works along a previously modified drainage channel and the associated structures are not considered to be obtrusive or reflective. Revegetation

Clause	Response
carry out new planting of trees, and shrubs, particularly locally indigenous plants.	works will also be conducted which will improve scenic quality.
(d) Consider the need for a buffer between new development and scenic areas of the riverine corridor shown on the map as being of significance beyond the region (which are also scenic areas of significance for the region) or so shown as being of regional significance only.	The development footprint does not comprise a scenic area of the riverine corridor.
(e) Consider the need for controls or conditions to protect those scenic areas.	The development footprint does not comprise a scenic area of the riverine corridor.
(f) Consider opportunities to improve riverine scenic quality.	The development footprint does not comprise a scenic area of the riverine corridor.
(8) Agriculture/aquaculture and fishing	The proposal does not involve agriculture, aquaculture or fishing.
Policy: Agriculture must be planned and managed to minimise adverse environmental impacts and be protected from adverse impacts of other forms of development.	-
Strategies:	-
(a) Give priority to agricultural production in rural zones.	n/a
(b) Ensure zone objectives and minimum lot sizes support the continued agricultural use of Class 1, 2 and 3 Agricultural Land (as defined in the Department of Agriculture's Agricultural Land Classification Atlas) and of any other rural land that is currently sustaining agricultural production.	n/a
(c) Incorporate effective separation between intensive agriculture and adjoining uses to mitigate noise, odour and visual impacts.	n/a
(d) Protect agricultural sustainability from the adverse impacts of other forms of proposed development.	n/a
(e) Consider the ability of the site to sustain over the long term the development concerned.	n/a
(f) Consider the likely effect of the development concerned on fish breeding grounds, nursery areas, commercial and recreational fishing areas and oyster farming.	n/a
(9) Rural residential development	The proposal does not constitute a rural residential development.
Policy: Rural residential development should not reduce agricultural sustainability, contribute to urban sprawl, or have adverse environmental impacts (particularly on the water cycle or on flora or fauna).	-

Clause	Response
Strategies:	-
(a) Give priority to agricultural production in rural zones.	n/a
(b) When considering a proposal for the rezoning or subdivision of land which will increase the intensity of development of rural land (for example, by increasing cleared or hard surface areas) so that effluent equivalent to that produced by more than 20 people will be generated, consider requiring the preparation of a Total Water Cycle Management Study or Plan.	n/a
(c) Maintain or introduce appropriate separation between rural residential use and agricultural use on the land that is proposed for development.	n/a
(d) Do not locate development in areas identified for future urban purposes in the Metropolitan Strategy.	n/a
(e) Consider the suitability of the land for keeping livestock, whether or not for commercial purposes, and appropriate mitigating measures to prevent land degradation.	n/a
(f) Consider the ability of the land to accommodate on-site effluent disposal in the long term.	n/a
(g) Consider any adverse environmental impacts of infrastructure associated with the development concerned.	n/a
(10) Urban development	The proposal does not constitute an urban development.
Policy: All potential adverse environmental impacts of urban development must be assessed and controlled.	-
Strategies:	-
(a) When considering a proposal for the rezoning or subdivision of land which will increase the intensity of development of that land (for example, by increasing cleared or hard surface areas) so that effluent equivalent to that produced by more than 2,500 people will be generated, consider requiring the preparation of a Total Water Cycle Management Study or Plan.	n/a
(b) Consider urban design options to reduce environmental impacts (such as variable lot sizes and shapes, and the clustering of development).	n/a
(11) Recreation and tourism	
Policy: The value of the riverine corridor as a significant recreational and tourist asset must be protected.	-
Strategies:	

Clause	Response
(a) Provide a wide range of recreational opportunities along the river which are consistent with conserving the river's natural values and character.	Whilst the proposal comprises drainage upgrade works, recreation areas are proposed for adjoining areas of the Site.
(b) Plan and manage recreational and tourist developments, and associated access points, cycleways and footpaths, so as to minimise any adverse environmental impacts on the river. Locate them where river banks are stable, away from river shallows, major beds of attached aquatic plants or fish breeding areas, where the proposed activities do not conflict with surrounding recreational activities and where significant flora and fauna habitats will not be adversely affected. The upgrading of existing public access to the river is to be preferred over the creation of new access points.	The proposal involves the improvement of drainage infrastructure, and includes revegetation and habitat enhancement works.
(c) Minimise conflicts between recreational uses.	Recreational uses do not form part of the proposal.
(d) Consider the availability of, or need to provide, land for vehicle parking and for suitable access (including access for cars and buses), for boat service areas and for water, electricity and sewage disposal.	Recreational uses do not form part of the proposal.
(e) Consider the environmental impact of ancillary services for recreation and tourist developments, such as amenities blocks and vehicle parking.	Recreational uses do not form part of the proposal.
(f) Consider the visual impact of development on the surrounding area.	The proposal includes revegetation and habitat enhancement works.
(12) Metropolitan strategy	
Policy: Development should complement the vision, goal, key principles and action plan of the Metropolitan Strategy.	-
Strategies:	-
(a) Consider the impacts of transport infrastructure proposals on water quality and air quality.	n/a
(b) Consider the impacts of metropolitan waste disposal on water quality.	n/a
(c) Consider the impacts of development on air quality.	Potential hydrological impacts are addressed in ***Section 4.8***.
(d) Consider the need for waste avoidance, waste reduction, reuse and recycling measures.	Mitigation measures are proposed for waste management.
(e) Consider the implications of predicted climate change on the location of development and its effect on conservation of natural resources.	Climate change impacts are not considered relevant to the proposal.

APPENDIX F :

Threatened Species Likelihood of Occurrence

Table 15 Threatened species likelihood of occurrence within the development site

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Likelihood of Occurrence
FLORA					
Acacia bynoeana	Bynoe's Wattle	E	V	6	Unlikely
Callistemon linearifolius	Netted Bottle Brush	V	-	1	Unlikely
Darwinia biflora		V	V	202	Unlikely
Darwinia peduncularis		V	-	15	Unlikely
Epacris purpurascens var. purpurascens		V	-	43	Unlikely
Eucalyptus camfieldii	Camfield's Stringybark	V	V	13	Unlikely
Galium australe	Tangled Bedstraw	E	-	7	Unlikely
Genoplesium baueri	Bauer's Midge Orchid	E	E	5	Unlikely
Grammitis stenophylla	Narrow-leaf Finger Fern	E	-	3	Unlikely
Haloragodendron lucasii		E	E	23	Unlikely
Hibbertia superans		E	-	5	Unlikely
Kunzea rupestris		V	V	1	Unlikely
Lasiopetalum joyceae		V	V	17	Unlikely
Leptospermum deanei		V	V	2	Unlikely
Macadamia integrifolia	Macadamia Nut	-	V	10	Unlikely
Melaleuca deanei	Deane's Paperbark	V	V	63	Unlikely
Persoonia hirsuta	Hairy Geebung	E	E	2	Unlikely
Persoonia mollis subsp. maxima		E	E	201	Unlikely
Rhodamnia rubescens	Scrub Turpentine	CE	-	3	Unlikely
Syzygium paniculatum	Magenta Lilly Pilly	E	V	9	Unlikely
Tetratheca glandulosa		V	-	171	Unlikely
FAUNA					
Amphibians					
Litoria aurea	Green and Golden Bell Frog	E	V	1	Unlikely
Heleioporus australiacus	Giant Burrowing Frog	V	V	4	Unlikely
Pseudophryne australis	Red-crowned Toadlet	V	-	148	Low
Birds					
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	3	Unlikely

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Likelihood of Occurrence
Hieraaetus morphnoides	Little Eagle	V	-	2	Unlikely
Lophoictinia isura	Square-tailed Kite	V	-	8	Unlikely
Apus pacificus	Fork-tailed Swift	-	M	4	Unlikely
Hirundapus caudacutus	White-throated Needletail	-	V, M	22	Low
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	5	Low
Callocephalon fimbriatum	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai LGAs	EP	-	5	Low
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	28	Low
Pluvialis squatarola	Grey Plover	-	M	2	Unlikely
Ptilinopus superbus	Superb Fruit-Dove	V,P	-	2	Unlikely
Cuculus optatus	Oriental Cuckoo	-	M	1	Unlikely
Stagonopleura guttata	Diamond Firetail	V	-	1	Unlikely
Anthochaera phrygia	Regent Honeyeater	CE	CE	1	Unlikely
Daphoenositta chrysoptera	Varied Sittella	V	-	2	High
Petroica boodang	Scarlet Robin	V	-	2	Unlikely
Glossopsitta pusilla	Little Lorikeet	V	-	4	Unlikely
Lathamus discolor	Swift Parrot	E	CE	2	Unlikely
Neophema pulchella	Turquoise Parrot	V	-	1	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper	-	M	9	Unlikely
Calidris ferruginea	Curlew Sandpiper	E	CE, M	5	Unlikely
Limicola falcinellus	Broad-billed Sandpiper	V	M	1	Unlikely
Ninox connivens	Barking Owl	V	-	3	Low
Ninox strenua	Powerful Owl	V	-	384	High
Tyto novaehollandiae	Masked Owl	V	-	7	Low
Gastropods					
Pommerhelix duralensis	Dural Land Snail	E	E	1	Unlikely
Mammals					
Cercartetus nanus	Eastern Pygmy-possum	V	-	37	Unlikely
Dasyurus maculatus	Spotted-tailed Quoll	V	E	5	Low
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	2	Moderate
Miniopterus australis	Little Bent-winged Bat	V	-	15	High

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Likelihood of Occurrence
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	51	High
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V	-	4	High
Pseudomys gracilicaudatus	Eastern Chestnut Mouse	V	-	2	Unlikely
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	16	Unlikely
Petaurus norfolcensis	Squirrel Glider	V	-	1	Unlikely
Phascolarctos cinereus	Koala	V	V	2	Unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	97	High
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	1	Unlikely
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	1	Low
Myotis macropus	Southern Myotis	V	-	3	Unlikely
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	5	High
Reptiles					
Varanus rosenbergi	Rosenberg's Goanna	V	-	9	Low

BC Act Status / EPBC Act Status: V = Vulnerable, EP = Endangered Population; CE = Critically Endangered; M = Migratory

APPENDIX G :

Non-Aboriginal (Historic) Heritage Impact Assessment

12 October 2021

Jenny Armstrong
Engineer Civil Works
Hornsby Shire Council
Email: jarmstrong@hornsby.nsw.gov.au

Dear Ms Armstrong,

Re: Non-Aboriginal (Historic) Heritage Impact Assessment (HIA) for stormwater drainage at Hornsby Quarry

Artefact Heritage (Artefact) have been engaged by Hornsby Shire Council, to provide a heritage impact assessment (HIA) of proposed storm drainage installation works within the former Hornsby Quarry. The former Hornsby Quarry is listed as an item of local significance on the Hornsby Local Environmental Plan (LEP) 2013 (LEP Item No, 538 and A54). Previously, the Hornsby Quarry Rehabilitation Works Development (DA/101/2019) was approved by the Sydney North Regional Planning Panel on 4 November 2020. The works approved facilitate the creation of a recreational parkland requiring bulk earthworks and associated civil works, including the construction of access tracks, retaining walls, site remediation, tree removal, revegetation work and site rehabilitation. Additional mitigation measures were outlined in the "Hornsby Quarry Rehabilitation Works Heritage Management Plan."[1]

In conjunction with these previously approved works, additional drainage works have been identified as necessary to ensure the safe transmission of stormwater through the site. These drainage works would occur concurrently with the previously approved bulk earthworks. The drainage works would comprise upgrade works to the existing drainage infrastructure to the east and north of the existing quarry void, to ensure that the drainage works would adequately satisfy current standards, to cater for a 1 in a 100 year event.

The aim of this HIA is to identify heritage items and archaeological areas which may be impacted by the proposed works, determine the level of heritage significance of each item, assess the potential impacts to those items, and recommend mitigation measures to reduce the level of heritage impact.

This report was prepared by Sammuel Sammut (Graduate Heritage Consultant, Artefact Heritage), Lauren Schutz (Senior Heritage Consultant, Artefact Heritage) and was overseen by Jenny Winnett (Principal, Artefact Heritage).

The study area

The Hornsby Diatreme is located at 1X Quarry Road and 14B Dural Street, Hornsby which is within the Hornsby Shire Local Government Area (LGA).

[1] Artefact Heritage, June 2021, "Hornsby Quarry Rehabilitation Works Heritage Management Plan."

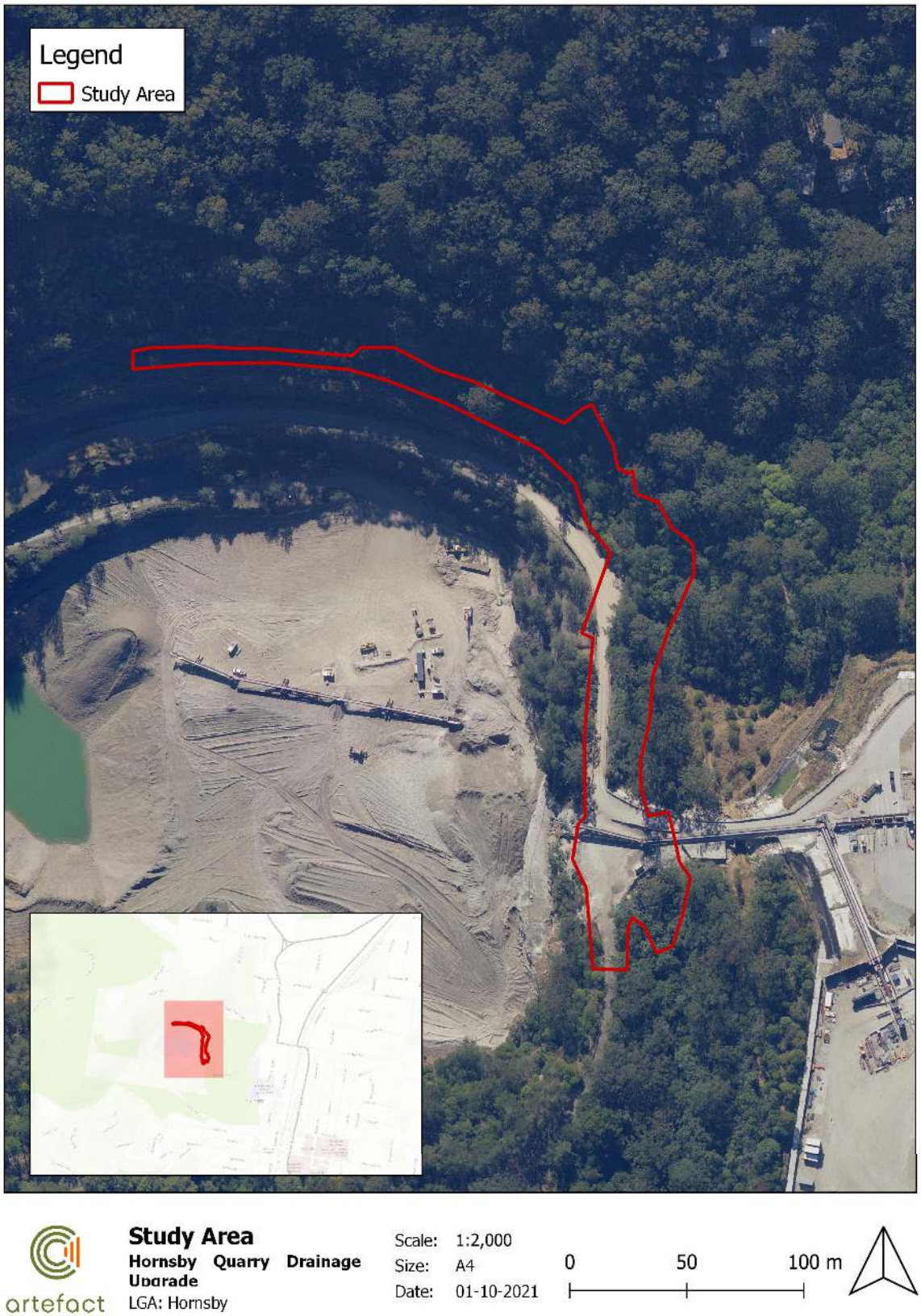
Hornsby Quarry consists of:

- Lots A, B, C, D, and E DP318676
- Lot 1 DP114323
- Lots 1 and 2 DP 169188
- Lot 1 DP926103
- Lot 1 DP926449
- Lot 1 DP743359
- Lot 1 DP1157797
- Lot 13 DP734459
- Lot 7079 DP 1050579
- Lot 7017 DP 1052646
- Lots 7018 and 7019 DP1059310
- Lots 7081 and 7082 DP1059313
- Lot 1 DP 594698
- Lot 1 DP 859646
- Part of the Bridge Road road reserve
- Part of the Quarry Road road reserve
- Part of the Summers Avenue road reserve.

The study area, the portion of the former quarry in which the works are proposed, as shown in Figure 1 below, comprises the following:

- Lot 1 DP 114323;
- Lot 2 DP 169188
- Lot A and E DP 318676.

Figure 1: Location of the study area and proposed works.



Heritage management framework

This section outlines the relevant statutory controls for the study area.

Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legislative framework for the protection and management of matters of national environmental significance, that is, flora, fauna, ecological communities and heritage places of national and international importance. Heritage items are protected through their inscription on the WHL, CHL or NHL.

Under Part 9 of the EPBC Act, approval under the EPBC Act is required for any action occurring within, or outside, a Heritage place that has, will have, or is likely to have a 'significant impact' on the heritage values of a World, National or Commonwealth heritage listed property (referred to as a 'controlled action' under the Act). A 'significant impact' is defined as:

> *an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.*

The EPBC Act stipulates that a person who has proposed an action that will, or is likely to, have a significant impact on a site that is listed on the World Heritage List (WHL), Commonwealth Heritage List (CHL) or National Heritage List (NHL) must refer the action to the responsible minister (hereafter the Minister). The Minister will then determine if the action requires approval under the EPBC Act. If approval is required, an environmental assessment would need to be prepared. The Minister would approve or decline the action based on this assessment.

In accordance with a test of significance, Cumberland Ecology concludes that the proposal is not considered to result in a significant impact to the Blue Gum High Forest and potentially occurring threatened fauna species.

National Heritage List

The National Heritage List (NHL) was established under the EPBC Act, which provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. Under the EPBC Act, nationally significant heritage items are protected through listing on the NHL or the Commonwealth Heritage List.

There are **no** National Heritage items within the project area or in proximity to the project area that would be affected by the proposed activity.

Commonwealth Heritage List

The Commonwealth Heritage List (CHL) was established under the EPBC Act, which provides a legal framework to protect and manage heritage places owned by the Commonwealth and managed by its various Departments and other organisations. Under the EPBC Act, significant heritage items owned by the Australian Government are protected through listing on the Commonwealth Heritage List.

There are **no** Commonwealth Heritage items within the project area or in proximity to the project area that would be affected by the proposed activity.

Heritage Act 1977

The NSW *Heritage Act 1977* (Heritage Act) provides protection for items of 'environmental heritage' in NSW. 'Environmental heritage' includes places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Items considered to be significant to the State are listed on the State Heritage Register (SHR) and cannot be demolished, altered, moved or damaged, or their significance altered without approval from the Heritage Council of NSW.

The 2009 'Relics provisions'

The Heritage Act also provides protection for 'relics', which includes archaeological material or deposits. According to Section 139 (Division 9: Section 139, 140-146):

(1) A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance is carried out in accordance with an excavation permit.

(2) A person must not disturb or excavate any land on which the person has discovered or exposed a relic except in accordance with an excavation permit.

(3) This section does not apply to a relic that is subject to an interim heritage order made by the Minister or a listing on the State Heritage Register.

(4) The Heritage Council may by order published in the Gazette create exceptions to this section, either unconditionally or subject to conditions, in respect of any of the following:

a. Any relic of a specified kind or description,
b. Any disturbance of excavation of a specified kind or description,
c. Any disturbance or excavation of land in a specified location or having specified features or attributes,
d. Any disturbance or excavation of land in respect of which an archaeological assessment approved by the Heritage Council indicates that there is little likelihood of there being any relics in the land.

Section 4 (1) of the Heritage Act (as amended in 2009) defines a relic as:

> *...any deposit, artefact, object or material evidence that:*
>
> *relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and is of State or local heritage significance*

A relic has been further defined as:

> *Relevant case law and the general principles of statutory interpretation strongly indicate that a 'relic' is properly regarded as an object or chattel. A relic can, in*

some circumstances, become part of the land be regarded as a fixture (a chattel that becomes permanently affixed to land).[2]

Excavation permits are issued by the Heritage Council of NSW, or its Delegate, under Section 140 of the Heritage Act for relics not listed on the SHR or under Section 60 for relics listed on the SHR. An application for an excavation permit must be supported by an Archaeological Research Design and Archaeological Assessment prepared in accordance with the NSW Heritage Division archaeological guidelines. Minor works that will have a minimal impact on archaeological relics may be granted an exception under Section 139 (4) or an exemption under Section 57 (2) of the Heritage Act.

Definition of works

The Heritage Act includes archaeological 'works' as a separate category to archaeological 'relics'. Exposure of a 'work' does not trigger reporting obligations under the Act. The following examples are commonly considered to be 'works': former road surfaces or pavement, kerbing, evidence of former infrastructure (such as drains or drainage pits where there are no relics in association), tram and train tracks and ballast and evidence of former rail platforms and bridges.

There is one item on the SHR **near** the study area, as indicated in Figure 2 below.

Table 1: SHR listed items near the study area

Item	Address	Proximity to the study area	Significance	Listing No.
Old Mans Valley Cemetery	Old Mans Valley, off Quarry Road, Hornsby, NSW 2077	Approx. 125m south of the study area	State	01764

Environmental Planning and Assessment Act 1979 (NSW)

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning and development consent process. The EP&A Act also requires that local governments prepare planning instruments (such as Local Environmental Plans and Development Control Plans [DCPs]) in accordance with the EP&A Act to provide guidance on the level of environmental assessment required. The investigation area falls within the boundaries of the Hornsby Shire Council local government area. Schedule 5 of the *Hornsby Local Environmental Plan 2013* (Hornsby LEP) includes a list of items/sites of heritage significance within this LGA.

Hornsby LEP 2013

The aim of the LEP in relation to heritage is to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings, views and archaeological sites. The LEP list items of heritage significance within the LGA and specify aims and objectives to be addressed in any development application. Clause 5.10 outlines the provisions which apply to heritage conservation and requirements in relation to development applications affecting a heritage item or within a conservation area.

[2] *Assessing Significance for Archaeological Sites and 'Relics'*, Heritage Branch, Department of Planning, 2009:7.

The study area is located **within** the LEP curtilage of 'Diatreme Hornsby Quarry and surrounding vegetation', listed on the Hornsby LEP 2013 as I538 and IA54.

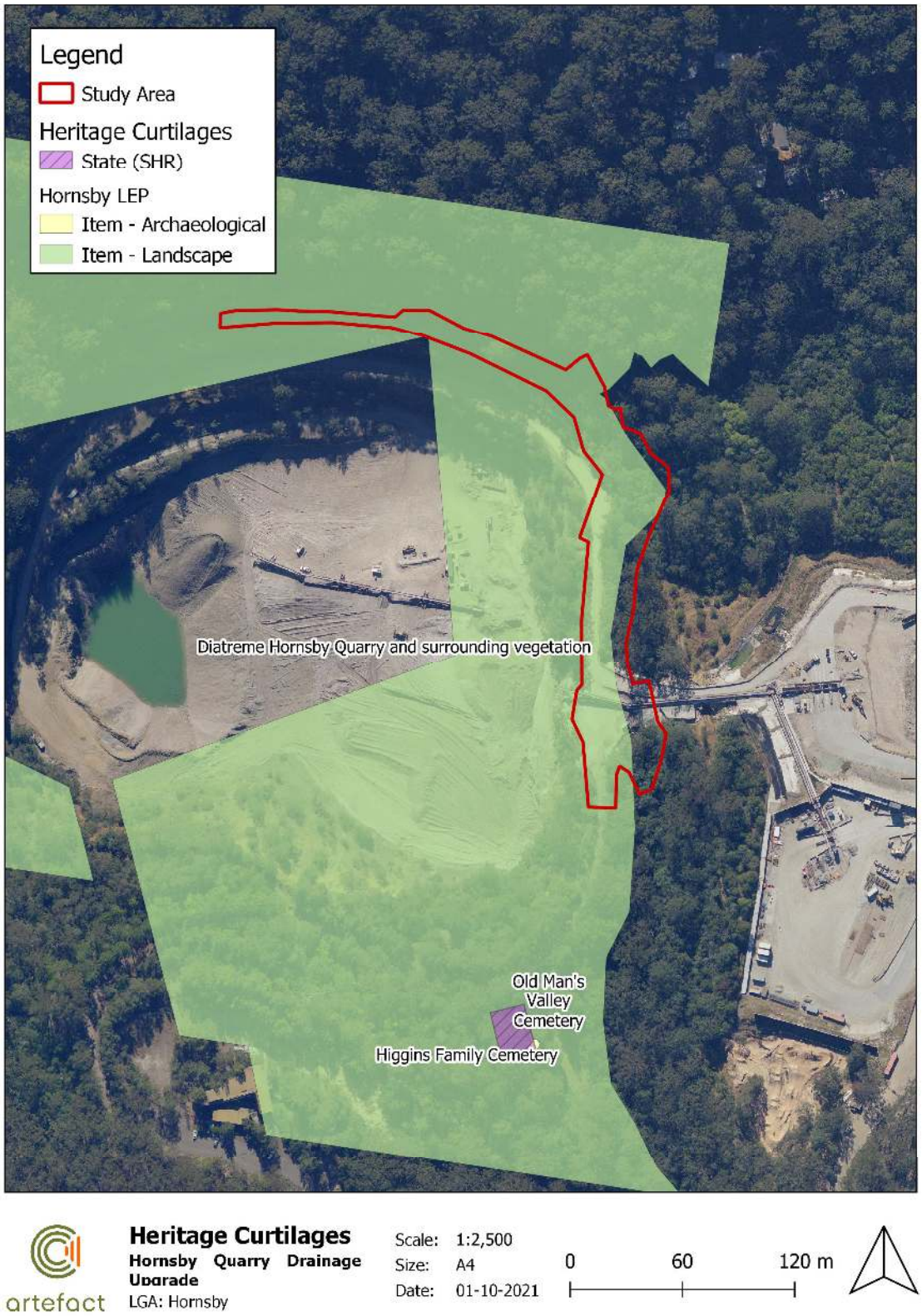
Heritage register search

A search of all relevant registers was undertaken on 1 October 2021. The results are displayed below in Table 2. The heritage curtilages are illustrated in Figure 2.

Table 2: Applicable listings to heritage items located in the vicinity of the study area

Item Name	Lot No.	Proximity to the study area	Significance	Item/Listing Number	Relevant Legislation
Diatreme, Hornsby Quarry and surrounding vegetation	Lot 1, DP 926103; Lots A and D, DP 318676	Within	Local	Hornsby LEP 2013 (Item No. I538 and IA54)	*Heritage Act* 1977 Hornsby LEP 2013
Old Mans Valley Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located	Lot D, DP 318676; Lots 1 and 2, DP 169188	Approx. 125m south of study area	State	State Heritage Register (01764) and Hornsby LEP 2013 (Item No. A55)	*Heritage Act* 1977 Hornsby LEP 2013

Figure 2. The study area and heritage curtilages.



Historical Context

The following history has been extracted from the Statement of Heritage Impact by Artefact Heritage, dated November 2018.[3]

Geological Background

The study area is located in an unusual geological formation - a diatreme.[4] Diatremes are the remains of Maar Volcanos, which typically form as a result of the explosive interaction between molten volcanic material and groundwater. Maar Volcanos are formed when hot magma extrudes up through overlying strata and meets with groundwater, resulting in stream pressure-driven explosions that eject rock from below the Earth's crust upwards, with the fragments subsequently falling into a conical cavity, or core, within a compact area.

The 2017 Geological Report on Hornsby Quarry describes the process as: [5]

> *This geological deposit comprises material ejected from deep in the earth's crust in a succession of explosive events which forced this material up through fractures and vents in the overlying rocks. This violent injection of material from deep beneath the earth's crust occurred in trumpet-like or column-like features with the material being blown up through the overlying Triassic sandstone and shales, and at the same time encapsulating pieces of sandstone and shale. Unlike other diatreme deposits in the Sydney area the Hornsby diatreme is made up of several of these trumpet or column intrusions from deep in the earth's crust.*

Within the study area, the core is composed of dolerite, which is surrounded by volcanic breccia containing coal, sandstone and shale.

The study area is situated within the Sydney Basin, a geological structure that spans 64,000 km^2, extending from Australia's east coast, inland to the Blue Mountains and Hunter Valley. While 95 diatremes have been mapped within the Basin, the diatreme in the study area, which is part of the diatreme complex of Hornsby and Thornleigh, is one of the largest and most accessible.

The diatreme has been exposed in the wall of the Hornsby Quarry as a result of quarrying activities between 1903 and the quarry's closure in the 1990s. This activity exposed a cross-section of the structure of the diatreme in the eastern face of the quarry. Hornsby Quarry is the largest diatreme known in the Sydney Basin, and the only cross section though a diatreme in the State.[6]

[3] Artefact Heritage 2018, 'Hornsby Quarry Stage 2: Statement of Heritage Impact,' Report to GHD, 14.
[4] Heritage NSW, "Diatreme, Hornsby Quarry and surrounding vegetation," https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=1780064
[5] Pells, Sullivan, Meynink. 2007. *Geotechnical and Hydrological report on Hornsby Quarry*. Submission to Hornsby Shire Council.
[6] Joplin, 1968; Taylor, 1976; Morgan, 1976, 1977, 1978; Helby & Morgan, 1979, as cited in Geological Society of Australia 2016 - Response to 2015 EIS Hornsby Quarry Road Construction Spoil Management Project.

Figure 3. Hornsby Quarry (Source: http://www.rms.nsw.gov.au/projects/sydney-north/hornsby-quarry/index.html)

Studies of pollen, coal and wood fragments included in the diatreme at Hornsby Quarry indicate that the diatreme was formed in the Jurassic age (200-146 million years ago), suggesting that, at that time, the Sydney Basin was a region with high groundwater levels with exploding volcanoes and crater lakes. The ancient volcanic activity in the area produced fertile soils making the surrounding area a prime location for tall timber growth and horticultural activities.[7]

The Hornsby diatreme also shows unusual 'dish beds' or basinal layering in a U shape, which occurred when the layers of rock fell back into the vent. The Geological Society of Australia states that there are no other sites in NSW or Australia where dish beds in a diatreme are exposed.[8]

Aboriginal History[9]

Prior to the appropriation of their land by Europeans, Aboriginal people lived in small family or clan groups that were associated with particular territories or places. Traditional Aboriginal tribal boundaries within Australia have been reconstructed, primarily, based on surviving linguistic evidence and are therefore only approximations. Social interaction, tribal boundaries and linguistic evidence may not always correlate, and it is likely boundaries and interaction levels varied and fluctuated over time. Aboriginal people traditionally lived in small family or clan groups that were associated with particular territories or places.[10]

The Hornsby area was home to members of the Darug language group and the study area is within the traditional country area of the Guringai (Kuringgai, Kurikgai and Kuring-gai) Aboriginal people. The coastal dialect of the Darug language group is thought to have been spoken on the Sydney peninsula (north of Botany Bay, south of Port Jackson, west to Parramatta) and north of Port Jackson, possibly as far as Broken Bay. The hinterland dialect is believed to have been spoken on the Cumberland Plain, west of the Georges River, Parramatta, the Lane Cove River and Berowra Creek; from Appin in the south to the Hawkesbury River in the north.[11]

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[7] Geological Society of Australia 2016, Response to 2015 EIS Hornsby Quarry Road Construction Spoil Management Project.
[8] ibid
[9] A separate report "*Hornsby Quarry Due Diligence Assessment*, Artefact Heritage, 2017" provides more detail on the Aboriginal cultural history of the study area.
[10] Tindale's Catalogue of Australian Aboriginal Tribes. Accessed online at http://archives.samuseum.sa.gov.au/tindaletribes/daruk.htm on 1/10/2021
[11] Attenbrow, V. 2010. *Sydney's Aboriginal Past: Investigating the archaeological and historical records*. UNSW Press. p34

British colonisation had a profound and devastating effect on the Aboriginal population of the Sydney region. In the early days of the colony Aboriginal people were disenfranchised from their land as the British claimed areas for settlement and agriculture. The colonists, often at the expense of the local Aboriginal groups, also claimed resources such as pasture, timber, fishing grounds, and water sources. Overall, the devastation of the Aboriginal culture did not come about through war with the British, but instead through disease and forced removal from traditional lands. It is thought that during the 1789 smallpox epidemic over half of the Aboriginal people of the Sydney region died.[12]

Early Settlement at Hornsby

The history of Hornsby Quarry and Old Mans Valley, immediately to the east of the Quarry, are closely linked, therefore the following sections summarise the history of both these areas.

Six weeks after the arrival of the first fleet, Governor Phillip led an expedition through Broken Bay in search of a large river to provide fertile land capable of cultivating crops for the colony. The Hawkesbury River was not discovered until the second expedition in the following year. This expedition continued the exploration of the river before reaching the fertile plains at Windsor. The Hawkesbury River provided the major transport route for the earliest settlers. The shoreline also provided a good location for commercial activities such as salt production, flour milling, and boat building.[13]

The harvesting of Blue Gums and Grey Ironbarks, which grew on the ridges, was the first economic activity undertaken by European settlers in the Hornsby area. Timber was transported by river for sale to Sydney builders. The activities of timber cutters opened the district for permanent settlement by farmers who took up the most fertile land located on the ridge tops.

Figure 4. First settlement at Hornsby n.d. (Source: Hornsby Library)

Samuel Horne and John Thorne were among the notable early settlers within Hornsby, the earlier of which inspired the name of the village, and Constable Thorn's land later became known as the suburb of Thornleigh. Horne and Thorne were police constables who were rewarded with sizable land grants for their role in the shooting of John MacNamara, an accomplice to the bush ranger John Donohue, and the capture of other members of his gang in 1830.[14]

12 Hornsby Shire Council www.hornsby.nsw.gov.au/council/history
13 Perumal Murphy Wu (1993) Hornsby Heritage Study. Prepared for Hornsby Council.
14 Kass T, 1993, Hornsby Shire Heritage Study, Thematic History, Prepared for Hornsby Council: 8

Throughout the 19th century, the region remained fairly remote and rural with large land holdings primarily utilised for agriculture. The fruit growing industry commenced in the 1830's and was the main industry within the region. The subdivision of the original Horne and Thorne grants resulted in a number of orchard lots being released to the market. Until the early twentieth century, the majority of subdivisions involved the development of small acreages developed as orchard lots.[15] In the 1890s, Dural and the Hills district was the chief supplier of citrus fruit for most of Australia. As well as growing fruit for sale in the Sydney market, local growers also entered the market as suppliers of seeds and seedlings of ornamental and fruit bearing plants.[16]

The Higgins Family

The first permanent settlers to the Hornsby area were the Higgins family. Thomas Edward Higgins (1800-1865) was the son of a convict transported on the Second Fleet. Higgins was promised a grant of 250 acres of land in the Hornsby area by Governor Brisbane in 1823, in the area called Old Mans Valley. The grant was formally recorded in 1835, though by that time Higgins had cleared the site and started to establish timber getting and sawmilling, felling the blue gums and ironbarks for the Sydney market. He also developed orchards and market gardens on the land, taking advantage of the fertile volcanic soils of the area. These activities were continued by the Higgins extended family on part of the land up until the 1960s.

From the 1860s to the 1890s, several houses and structures were built within the study area to accommodate members of the Higgins family. Thomas Higgin's only son, also named Thomas (1832-1885), inherited his father's grant in 1868, and after he died in 1885 his wife, Ann Higgins, sold almost half the property to John Nobbs in 1887. John Nobbs called his land 'Hornsby Park' and subdivided it, but the descendants of Higgins family maintained a continuous presence in Old Mans Valley up until 1970, when Freda Jones, daughter of Percy Higgins, left the site when quarrying operations expanded. The origin of the name Old Mans Valley is not clear, but could be related to 'old man Higgins' the original settler, or to the grey kangaroos ('old man kangaroos') that inhabited the valley.

In addition to the Higgins homestead and the homes for various family members, the Higgins family and their descendants also developed other structures and features in the landscape. In Old Mans Valley, a 'cool room' was built into a sandstone overhang, which is evidence of the domestic activities of the Higgins family. A sandstone receptacle was carved into the sandstone further up the slope that contains the cool room, and is also likely to have been associated with the Higgins family. [17]

The Higgins family also developed their own cemetery at the Hornsby Quarry site just to the western side of Old Mans Valley. The cemetery contains twenty-three known burials dating from 1879 until 1931, with listed family names including Higgins, Jansson and McKenzie. The isolation of Old Mans Valley would have led to the need for a private cemetery due to the difficulties of transporting the dead to established communal cemeteries. Sandstone and marble headstones and other monumental masonry, and cast iron rail surrounds were erected for some of the graves. A recent restoration of the cemetery restored headstones and railings, installed an interpretation board at the site with a layout plan of the burials, and constructed protective fencing. [18]

There are also tracks and staircases winding into the valley to the south, and to the west of Old Mans Valley is a set of hand carved sandstone steps called the 'Depression Steps'. They are thought to have been built in the 1930s as part of unemployment relief works, however some oral

15 Kass T, 1993, op cit: 11
16 Schofield 1988, The shaping of Hornsby Shire, Hornsby Shire Council: 112
17 Parsons Brinckerhoff, 2004 as cited in AECOM 2015.
18 NSW Heritage, "Old Mans Valley Cemetery,"
https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5054914

history evidence from Higgins family descendants stating that the stairs may have predated this, having been present in the 1920s linking some of the Higgins family houses in the area.[19]

As well as the original Higgins family homestead, several houses were built for family members from the 1860s until the 1890s - the home of Ann (nee Higgins) and Mathew Harrington, the house of Thomas Harrington, the home of Clara (nee Higgins) and Peter McKenzie, the home of Nairn (nee Higgins) and Thomas McKinnon, and the home of Thomas Edward Higgins IV and Maria Agnes Duffy. At the site of the original family homestead an area has been fenced off and a memorial was erected there in 1970 stating 'On this site stood the homestead of the Higgins Family, Pioneers of the Hornsby District 1834 – 1970'. Some houses were destroyed by rot or bushfire, while others survived until demolished in the 1960s during the development works for the Hornsby Quarry.[20]

As the original descendants of the Higgins family left Old Mans Valley, Council purchased those landholdings. In 1969, Hornsby Shire Council came to acquire Lots 1 and 2 of Plan Number 169188 (forming the greater southern portion of Old Mans Valley) and in 1980 Council acquired the remainder (Lot 1, DP 114323). In 1982, Council filled part of Old Mans Valley to establish playing fields.

Figure 5. Two of the former Higgins family homes in Old Mans Valley and in the adjoining Hornsby Quarry lands c1959. Based on the direction of the photo, the residence in the foreground may be that of Freda Jones, which was occupied until 1970 (Source: Hornsby Shire Council)

Hornsby Quarry

By 1903, mining for blue metal (dolerite) for road base and gravel had commenced at Hornsby Quarry. At that time, it was excavated by hand and transported out of the quarry by horse and cart. Mining in this area developed into a commercial enterprise in the 1920s, and Hornsby Council briefly held the quarry lease until it was taken over by Hornsby Road Metal Ltd from 1924 until the mid-1930s. Mining operations ceased during World War II and were resumed by Perry and Norman Higgins in the 1950s. Prior to the mid-1950's, the quarry consisted of only a small excavation in the valley floor up against the steep, natural slopes at the western side of the current pit. In 1954, Council briefly acquired the lease to Hornsby Quarry and a stockpile of blue metal, for the sum of £5,000, and the quarry was only mined sporadically in the 1950s.

[19] Parsons Brinckerhoff, 2004 as cited in AECOM 2015.
[20] Parsons Brinckerhoff, 2004 as cited in AECOM 2015.

Figure 6. Work in Hornsby Quarry, 1961 (Source: Daily Telegraph, 24 March 2015)

Mining activities continued at Hornsby Quarry from 1959 onwards. Farley & Lewers acquired the quarry lease for a brief period in 1959 before being appropriated into the CSR mining company. Quarrying works increased in scale during 1960s, with the pit doubling in size from 1956 to the mid-1960s, and a crusher plant operation was established at the end of Quarry road during this period. The slopes to the north were being mined but there was no works in eastern area in the 1960s.

In the 1960s and 1970s, with the quarry's expansion, the remains of houses and structures relating to the Higgins family were demolished, and machinery, infrastructure and offices were gradually added to the area as part of the quarrying operations. During the 1970s, access roads were built in the south, and excavations extended into the slopes to the north of the site with haul road ramps established up the slopes at the north-eastern side of the quarry. The pit was deepened and extended to the east, and in the mid-1980's the quarry void was further deepened.[21]

Figure 7. Hornsby Quarry, 1963 (Source: Hornsby Shire Council)

[21] Clouston 2014. Recreation Potential Study for Hornsby Quarry and Old Mans Valley Lands

By the 1990s, the quality of extracted material at the quarry had lessened, which lead to its closure. Structures from the quarry's operations, such as a steel-frame workshop, concrete block office, a crushing and screening plant, an administration building, a sub-station, pieces of equipment, pumps, stairs, pipes and fences, remained in-situ though have suffered from deterioration and vandalism.

Figure 8. Crusher Plant, 2013 (Source: www.hornsbypark.com.au)

CSR maintained ownership of the site until 2002, when Hornsby Shire Council was required to purchase the site at a price of $26 million, established through the Land and Environment Court. Since 2003, the quarry site has been fenced for safety reasons as the sides are unstable and the pit has filled with water to create a lake. Bushwalking tracks, heritage walks, and 6kms of mountain bike trails have been developed in the Old Mans Valley area. [22] The most recent activities within the study area has been Stage 1 of the previously approved rehabilitation project, with NorthConnex using the quarry pit to deposit fill.

Archaeological potential and research significance

Non-Aboriginal archaeological potential is defined as the potential of a site to contain historical archaeological relics, as classified under the *NSW Heritage Act* 1977. Non-Aboriginal archaeological potential is assessed by identifying former land uses and associated features through historical research and evaluating whether subsequent actions (either natural or human) may have impacted on evidence for these former land uses.

Assessment of archaeological potential

An assessment of the archaeological potential of the Hornsby Quarry has been previously outlined in earlier reports:

- *Hornsby Quarry Stage 2, Statement of Heritage Impact*, Artefact Report to GHD, November 2018.
- *Hornsby Quarry Rehabilitation Project, Non-Aboriginal Archaeological Research Design*, Artefact report to GHD, November 2020.

[22] Clouston 2014. Recreation Potential Study for Hornsby Quarry and Old Mans Valley Lands

The Non-Aboriginal Archaeological Research Design report stated the following archaeological potential for the Hornsby Quarry:[23]

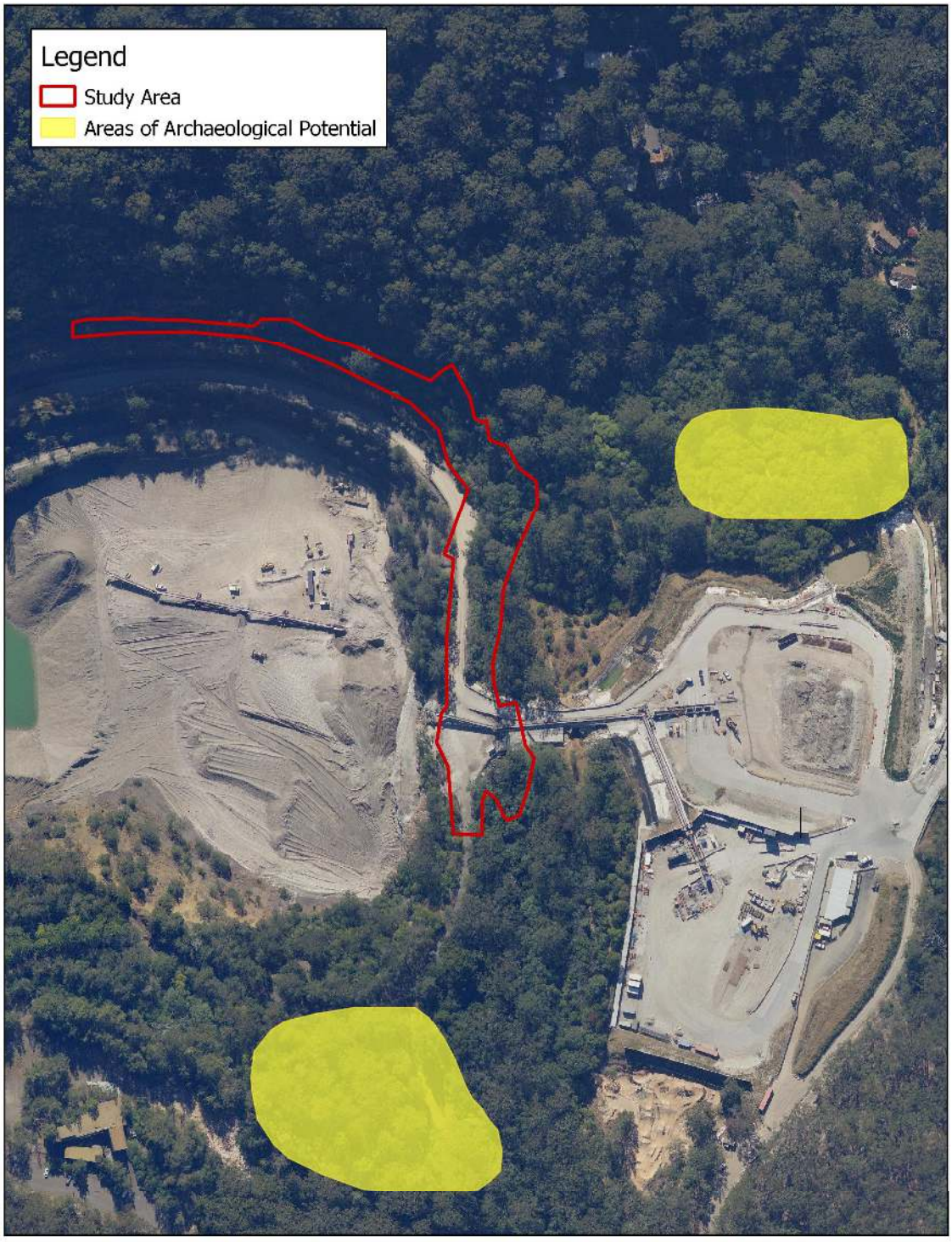
Phase	Potential remains	Archaeological potential
Phase 1 – Early settlement (c.1835-1900)	Footings of earlier structures, postholes, areas of hardstand, rubbish pits and evidence of landscaping and tree removal, saw-pits	Nil-low
Phase 2 – Later rural development (1901-1950)	Footings, waste pits, postholes and areas of hard stand associated with former roads and paths. Concrete slabs or brick foundations may also be present as well as evidence of landscaping and orcharding activity	Nil-low
Phase 3 – Quarrying and public use (1951-present)	Evidence of quarrying activities	Extant/not archaeological

A summary of the archaeological potential of the 2018 and 2020 study area is shown in Figure 9. Note that the site of the SHR and Hornsby LEP listed 'Old Mans Valley Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located' is outside the area proposed for excavation. A detailed archaeological assessment for this heritage item is therefore not included.

Overall, the study area has limited potential to contain significant archaeological resources from any of the outlined phases due to disturbances caused by 20th century quarrying activities. As the archaeological potential of the works area is limited, it is recommended that an Unexpected Archaeological Finds procedure be implemented during excavation works.

[23] Artefact Heritage 2020, "Non-Aboriginal Archaeological Research Design," 21.

Figure 9. Map of the study area, in relation to areas of archaeological potential.



Existing Significance Assessments

The Statement of Significance is the foundation for future management and impact assessment. Statements of Significance for the heritage items within the study area are provided below. Both have been extracted from the NSW State Heritage Inventory and the Hornsby Heritage Register.

Diatreme and Quarry

This item is associated with the period of use of the Hornsby Quarry and is a physical example of the works untaken for the quarry. Eroded valley of volcanic rock surrounded by parkland. Volcanic Rock in an area predominantly of sandstone has created an unusual environment, part of which is recreational reserve, part used for quarrying blue metal. Due to the link to quarrying in this area, the site has the potential to contribute to the local community's sense of place, and can provide a connection to the local community's past.[24]

'Old Mans Valley Family Cemetery'

The Old Mans Valley Cemetery is of State significance for its rarity as one of the few fully conserved family cemeteries in New South Wales and possibly the only one. It is also of State significance for the social value that this high state of conservation represents - firstly to a wide array of Higgins family descendants (now living all over Australia) who have funded its conservation over many years, accessing both professional advice and their own labour. Its social significance to the wider community is also demonstrated by its role as a heritage destination by visitors, cemetery enthusiasts and educational institutions. Acquired by Hornsby Shire Council in 2006, it provides an exemplary model of how a family cemetery may be conserved and valued.

Sited in Old Mans Valley, which was first agricultural land then a bluestone quarry (recently decommissioned), the cemetery is associated with the economic development of the locality and also has high local historical significance for its graves memorialising the descendants of Hornsby's earliest European settler family, Thomas Edward Higgins, son of Thomas Higgins and his wife Eleanor McDonald. Containing twenty-three known burials with internments dating from 1879 to 1931, its dates are unusually late for a private cemetery. Its establishment and use appears to have been a direct response to the isolation of Old Mans Valley and the difficulties of transporting the dead to established communal burial grounds. It is also of high local significance for its representative examples of late nineteenth and early twentieth century monumental masonry, providing a good record of the designs, inscriptions, motifs indicative of funerary symbolism and practices used in a modest family cemetery in NSW at that time. The cemetery also has high representative significance at a local level for its landscape setting amid both remnant natural vegetation and traditional European grave plantings. [25]

[24] AECOM, 2015. Hornsby Quarry Road Construction Spoil Management Project Technical working paper: non-Aboriginal heritage assessment. p.26.
[25] NSW Heritage, 'Old Mans Valley Cemetery,' https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5054914

Assessment of heritage impact

The following sections provide an assessment of potential heritage and archaeological impacts as a result of the project. It outlines the methodology used, provides a detailed heritage assessment, archaeological assessment, and statement of heritage impacts.

Methodology

An impact assessment is provided for direct, visual impact, and potential indirect impacts. In order to consistently identify the potential impact of the proposed works, the terminology contained in Table 3 has been referenced throughout this document. This terminology, and corresponding definitions, are based on those contained within guidelines produced by the International Council on Monuments and Sites (ICOMOS).

Table 3. Terminology for assessing the magnitude of heritage impacts

Grading	Definition
Major	Actions that would have a long-term and substantial impact on the significance of a heritage item. Actions that would remove key historic building elements, key historic landscape features, or significant archaeological materials, thereby resulting in a change of historic character, or altering of a historical resource. These actions cannot be fully mitigated.
Moderate	Actions involving the modification of a heritage item, including altering the setting of a heritage item or landscape, partially removing archaeological resources, or the alteration of significant elements of fabric from historic structures. The impacts arising from such actions may be able to be partially mitigated.
Minor	Actions that would result in the slight alteration of heritage buildings, archaeological resources, or the setting of an historical item. The impacts arising from such actions can usually be mitigated.
Negligible	Actions that would result in very minor changes to heritage items.
Neutral	Actions that would have no heritage impact.

Proposed works

The works would include the following:

- Improvements to existing drainage lines including the demolition and removal of stormwater pipes;
- The installation of new sections of drainage infrastructure to meet stormwater drainage requirements;
- Drainage channel widening;

- The installation of new precast box culverts, new outlet structure headwalls, stormwater inlet pits, retaining walls and drainage bunds;
- The construction of rock lined channels and boulder installation as energy dissipators;
- The removal of trees, with trees to be retained to be adequately protected during works; and
- Revegetation works.

Assessment of heritage impact

The impacts of the proposal on the listed items within and adjacent to the study area are outlined in Table 4 below.

Table 4. Impact of proposal on heritage items within and adjacent to the study area

Item	Location	Physical impact	Visual impact	Discussion
Diatreme Hornsby Quarry and surrounding vegetation (LEP 538)	Within study area	Minor	Minor	The proposal would include upgrade works to the existing stormwater drainage system which would minimise the overall impact upon the site as it would require the excavation of known areas in which the drainage system is located. The upgrades have been deemed necessary in order to ensure that the drainage system meets applicable standards, would facilitate the safe transmission of stormwater through the site and would ensure the continued use of the site following rehabilitation works and the opening up of the recreational space to the public. It is understood that the exposed diatreme face would not be impacted upon by the proposed works, and the vegetation would be reinstated following works. These measures would assist in mitigating potential visual impacts of the proposal.
Diatreme Hornsby Quarry and surrounding vegetation (LEP A54)	Within study area	Minor	Minor	It is understood that the vegetation of the site generally would be reinstated following works. The exposed diatreme would be preserved and the significant geological strata left exposed and free of vegetation. These measures would assist in mitigating potential visual impacts of the proposal, and would assist in the visual clarity and interpretation of the former quarry landscape.
Old Mans Valley Cemetery (SHR 01764)	Approx. 125m south of study area	Neutral	Neutral	The works would not encroach upon the SHR curtilage of the 'Old Mans Valley Cemetery'. The proposal would not result in a reduction of the item's curtilage or changes to any of the fabric of the place, and no physical impacts are anticipated.

Cumulative impact assessment

The proposal has been deemed necessary, in addition to the previously approved works, in order to ensure that the drainage system would satisfy necessary standards including the safe transmission of stormwater through the site. Alternative solutions were explored, including the potential 'do nothing' approach. However, the current proposal was deemed appropriate in that it would not generate a significant impact upon known heritage elements within the site, including areas of archaeological potential and listed heritage items. Further, the siting and design was deemed to generate the least amount of impact possible upon the existing vegetation, imperative when consideration is given to the previously approved works and vegetation required for removal.

The overall impact would be mitigated through the use of appropriate measures, as outlined in the "Hornsby Quarry Rehabilitation Works: Stage 2 Heritage Management Plan" by Artefact Heritage, dated June 2021. This includes other mitigation measures included within the proposal, including the introduction of additional vegetation.

Although the proposed works would be conducted in addition to the previously approved works, the overall impact has been minimised through the incorporating of appropriate mitigation measures and the design and siting of the works.

Overall, the project would generate a **minor** cumulative impact.

Statement of Heritage Impact

The following Statement of Heritage Impact is based on the assessed significance of heritage items in and near the study area, their relationship with the surrounding area and assessed impacts.

Table 5.Statement of Heritage Impact

Development	Discussion
What aspects of the proposal respect or enhance the heritage significance of the study area and nearby heritage items?	The proposal has been developed with consideration given to minimising the direct impact on heritage items. The proposal would not result in any direct physical impact to the State listed 'Old Mans Valley Cemetery' (SHR 01764), or locally listed items within the study area including the 'Old Mans Valley Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located' heritage item (LEP A55). Neutral impacts are anticipated for heritage items located adjacent to the study area. The overall project, by improving safety and accessibility of the site, would ultimately allow for enhanced community visitation and engagement with the heritage items located within this historic precinct, and provide opportunities for greater understanding of their significant values and associations. The areas identified as having archaeological potential would be avoided in the proposal.

Development	Discussion
What aspects of the proposal could have a detrimental impact on the heritage significance of the study area and nearby heritage items?	The proposal would result in direct physical impacts within the locally listed curtilage of the 'Diatreme Hornsby Quarry and surrounding vegetation' heritage item. However, the proposal has mitigated the potential impact upon the site through the replacement of the existing stormwater drainage system, rather than the introduction of a new system within another section of the site which would potentially generate an impact upon areas of archaeological potential or additional listed heritage items. Two areas of archaeological potential have been identified. However, neither of these areas of archaeological potential would be impacted upon by these proposed works.
Have more sympathetic options been considered and discounted?	It is understood that alternative solutions including a 'do nothing' approach were explored prior to the existing proposal. However, alternative solutions would have generated a greater impact upon vegetation and the final design was seen to ensure that further works would not be required in the immediate future. The 'do nothing' approach was deemed inappropriate as it would require costly ongoing maintenance and negative environmental impacts. The upgrades will ensure future infrastructure built within the void are protected from water inundation.

Conclusions

This report has determined that the proposed works would occur within the curtilage of the following heritage items:

- 'Diatreme Hornsby Quarry and surrounding vegetation' (Hornsby LEP 2013 Item No. 538 and A54)

The proposed works would also occur within the vicinity of the curtilage (around 125m away) of the following heritage item:

- Old Mans Valley Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located (State Heritage Register, Item 01764, and Hornsby LEP 2013 Item No. A55)

This assessment has made the following conclusions:

- The proposed works would not impact upon any known areas of archaeological potential and mitigation measures have been introduced in order to minimise the overall impact of the works on listed heritage items
- The proposal would generate a **minor** physical and visual impact upon the 'Diatreme Hornsby Quarry and surrounding vegetation' (Hornsby LEP 2013 Item No. 538 and A54)
- The proposal would generate a **neutral** physical and visual impact upon the 'Old Mans Valley Cemetery, including Higgins' Family Cemetery, sandstone receptacle, cool room and site of Higgins homestead on which the Higgins Family Memorial is located' (State Heritage Register, Item 01764, and Hornsby LEP 2013 Item No. A55)
- The proposal would ensure the public use of the item following the site rehabilitation works
- The proposal would require the removal of vegetation, with additional vegetation to be introduced following the completion of works therefore mitigating visual impacts

Recommendations

The recommendations set out below will aid in mitigating the impact to the study area, and other heritage items in the vicinity. The recommendations are designed to enable the proponent to determine the most appropriate mitigation, based on other advice and the design of the proposed works. This follows the tenants of the Burra Charter, where avoidance of impact, followed by mitigation of impact, and recording of impact are advised.

The following recommendations regarding the study area are based on consideration of:

- Statutory requirements under the *NSW Heritage Act 1977* and the Hornsby LEP 2013;
- The results of background research, site survey and assessment;
- The likely impacts of the proposed development;
- The "Hornsby Quarry Rehabilitation Works Heritage Management Plan."[26] and
- The "Hornsby Quarry Photographic Archival Recording."[27]

Vegetation

Additional vegetation would need to be introduced within the site, following the removal of the vegetation required per this proposal. A suitably qualified arborist and ecologist would need to provide guidance regarding appropriate vegetation for introduction.

Unexpected Archaeological Finds Procedure

An Unexpected Archaeological Finds Procedure would be prepared prior to works commencing and be put in place for the entirety of the works program. This would manage an area of low archaeological potential to contain historical archaeological remains of local significance as identified in the ARD for the previously approved Rehabilitation project.

If Unexpected Archaeological Finds are encountered during the excavation, works must cease immediately, and a suitably qualified archaeologist be contacted to assess the find and recommend next steps. Works should not recommence until approved by the archaeologist.

Additional approvals

Should unexpected historical archaeological 'relics' be identified during the construction program, there would be a requirement to notify the Heritage Council under s146 of the Heritage Act 1977. Additional management, permits or approvals from Heritage NSW, DPC may be required before significant 'relics' can be impacted.

Human remains

If human remains are uncovered during the works, all works would cease in the vicinity of the material/find and a qualified heritage consultant and NSW Police would be contacted immediately. Works in the vicinity of the find would not re-commence until clearance has been received from the qualified heritage consultant in consultation with NSW Police.

[26] Artefact Heritage, 2021 "Hornsby Quarry Rehabilitation Works: Stage 2," 37.
[27] Artefact Heritage, 2021 "Hornsby Quarry Photographic Archival Recording."

Aboriginal archaeology

Should any Aboriginal 'objects' be uncovered by the work, excavation or disturbance of the area is to stop immediately. Works affecting Aboriginal 'objects' on the site must not continue until Heritage, Department of Premier and Cabinet has been informed in accordance with Section 89A of the National Parks and Wildlife Act 1974 (as amended). Aboriginal 'objects' must be managed in accordance with the *National Parks and Wildlife Act 1974.*

Kind Regards,

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APPENDIX H :
Tests of Significance

H.1. Introduction

This appendix presents formal Tests of Significance required under Section 7.3 of the BC Act, that have been prepared in accordance with the *Threatened Species Test of Significance Guidelines* (NSW Government 2018). The Test of Significance provides a means by which to gauge the significance of predicted impacts to threatened species and communities listed under the BC Act.

Both direct and indirect impacts are considered within these assessments. Direct impacts have been quantified within the assessments and are represented by the development footprint boundary. Whilst it is acknowledged that indirect impacts can potentially be significant for a variety of species, such impacts cannot be mapped or accurately calculated in advance.

Each component of the test of significance is provided in italicised text below, and a response supplied beneath in plain text.

H.2. Threatened Entities

Threatened ecological communities and species present within the subject land, or with the potential to be impacted directly or indirectly by the proposal include:

- Threatened Ecological Communities:
    - Blue Gum High Forest
- Threatened Fauna species:
    - Powerful Owl (*Ninox strenua*);
    - Varied Sittella (Daphoenositta chrysoptera);
    - Grey-headed Flying-fox (*Pteropus poliocephalus*);
    - Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
    - Little Bent-winged Bat (*Miniopterus australis*);
    - Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
    - Greater Broad-nosed Bat (*Scoteanax rueppellii*); and
    - Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

Tests of Significance for these entities is provided in separate subsections below.

H.3. Blue Gum High Forest

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

A total of 15.75 ha of Blue Gum High Forest has previously been mapped within the Site. The local occurrence of this community is considered to extend beyond the boundary of the Site. The proposal will remove or modify approximately 0.34 ha of Blue Gum High Forest. Approximately 14.73 ha of Blue Gum High Forest will remain within the Site following vegetation clearing associated with the proposal and approved project. Therefore the proposal is not considered to have an adverse effect on the extent of the community such that its local occurrence is placed at risk of extinction.

Previous land uses has resulted in a modification of the composition of the Blue Gum High Forest within the Site. Within the development footprint, this community is highly modified and comprises remnant canopy trees above an exotic dominated understorey. The proposal will result in the loss of a highly modified form of the community and may potentially indirectly impact retained remnants. However, these impacts are likely to be localised, and are not likely to substantially and adversely modify the composition of the community. The modification of vegetation through direct and indirect impacts is not considered to place the local occurrence of the community at risk of extinction.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The proposal will remove or modify approximately 0.34 ha of Blue Gum High Forest. Approximately 14.73 ha of Blue Gum High Forest will remain within the Site following vegetation clearing associated with the proposal and approved project. The potential changes to the retained extent of this community resulting from indirect

impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of the community.

The proposal is not considered to significantly increase fragmentation of Blue Gum High Forest within the Site. The removal of a small area of Blue Gum High Forest is unlikely to result in the fragmentation of this community as the vegetation to be removed is located directly adjacent to the existing quarry which borders the subject site to the south and west. Accordingly, although the proposal will remove some existing Blue Gum High Forest, it will not isolate it or fragment it into smaller parts.

Previous land uses have resulted in the modification of the composition of the community throughout the Site. Within the development footprint, the community has been reduced to remnant canopy trees above an exotic dominated understorey. At some locations, the canopy trees present are situated on fill material. The habitat to be removed and modified is of low importance to the long-term survival of the community in the locality as it represents a very small area in comparison to the large areas of Blue Gum High Forest remaining within the Site and locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The development footprint is not located within or in proximity to any declared area of outstanding biodiversity value. Therefore, the proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposal will result in the following key threatening process:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

The proposal may also result in the following key threatening processes:

- 'Invasion and establishment of exotic vines and scramblers' as they can dominate and suppress native flora species; and
- 'Invasion of native plant communities by exotic perennial grasses' as they can dominate and suppress native flora species.

Whilst the proposal may result in the aforementioned key threatening processes, the increase in impacts of these processes is considered to be minor. Many of these key threatened processes are already occurring within the development footprint, and Site. No significant impacts resulting from key threatened processes are considered to occur as a result of the proposal.

Conclusion

A total of 0.34 ha of Blue Gum High Forest will be removed within the development footprint. Within the development footprint, this community is highly modified and comprises remnant canopy trees above an exotic dominated understorey. The area to be removed is located directly adjacent to the existing quarry void.

Approximately 14.73 ha of Blue Gum High Forest will remain within the Site following vegetation clearing associated with the proposal and approved project. These areas are expected to remain viable in the long term and provide highly secure areas of habitat for this community.

The direct and indirect impacts of the proposal are not considered likely to result in a significant impact to Blue Gum High Forest.

H.4. Powerful Owl

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Powerful Owl has previously been recorded within the Site, outside of the development footprint. The local population of this species is considered to extend beyond the development footprint and has been assessed as viable.

The Powerful Owl will primarily be impacted by the proposal through direct removal of foraging habitat within the development footprint. No breeding habitat has been recorded within the development footprint in the form of large hollow-bearing trees. Breeding habitat for the Powerful Owl has been recorded approximately 200m north of the development footprint. The proposal will remove or modify approximately 0.62 ha of woody vegetation forming potential habitat for this species. Approximately 38.35 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. Therefore the proposal is not considered to have an adverse effect on the extent of the habitat for the Powerful Owl such that its local occurrence is placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The proposal will remove or modify approximately 0.62 ha of potential foraging habitat for the Powerful Owl. No breeding habitat is proposed to be removed, however the proposal may indirectly impact breeding habitat that is known to occur in proximity to the development footprint Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. The potential changes to the retained extent of habitat resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of habitat for this species.

The proposal is not considered to significantly increase fragmentation of habitat for the Powerful Owl within the Site. The removal of a small area of habitat is unlikely to result in the fragmentation as the vegetation to be removed is located directly adjacent to the existing quarry which borders the subject site to the south and west. The species is also highly mobile, and able to move between patches of habitat. Accordingly, although the proposal will remove some habitat for the Powerful Owl, it will not isolate it or fragment it into smaller parts.

Previous land uses have resulted in the modification of the composition of the habitat throughout the Site. The habitat to be removed and modified is of low importance to the long-term survival of the species in the locality as it represents a very small area in comparison to the large areas of habitat remaining within the Site and locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The development footprint is not located within or in proximity to any declared area of outstanding biodiversity value. Therefore, the proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposal will result in the following key threatening processes:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities; and
- 'Removal of dead wood and dead trees' as this reduces the area of habitat available for the species that may utilise these habitat features.

Whilst the project may result in the aforementioned key threatening processes, the increase in impacts of these processes is considered to be minor. No significant impacts resulting from key threatening processes are considered to occur as a result of the proposal.

Conclusion

A total of 0.62 ha of potential foraging habitat for the Powerful Owl will be removed within the development footprint. Within the development footprint, the habitat has been modified as a result of previous land use activities. The area of habitat to be removed is located directly adjacent to the existing quarry void. The local population of this species is unlikely to depend on the limited resources contained within the development footprint for its survival.

Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. These areas are expected to remain viable in the long term and provide highly secure areas of habitat for this species. The Powerful Owl is expected to be able to move between areas of remaining habitat within the immediate vicinity of the Site.

The direct and indirect impacts of the proposal are not considered likely to result in a significant impact to the Powerful Owl.

H.5. Varied Sitella

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Varied Sittella has previously been recorded within the Site, outside of the development footprint. The local population of this species is considered to extend beyond the development footprint and has been assessed as viable.

The Varied Sittella will primarily be impacted by the proposal through direct removal of breeding and foraging habitat within the development footprint. The proposal will remove or modify approximately 0.62 ha of woody vegetation forming potential habitat for this species. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. Therefore the proposal is not considered to have an adverse effect on the extent of the habitat for the Varied Sittella such that its local occurrence is placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The proposal will remove or modify approximately 0.62 ha of potential foraging and breeding habitat for the Varied Sittella. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. The potential changes to the retained extent of habitat resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of habitat for this species.

The proposal is not considered to significantly increase fragmentation of habitat for the Varied Sittella within the Site. The removal of a small area of habitat is unlikely to result in the fragmentation as the vegetation to be removed is located directly adjacent to the existing quarry which borders the subject site to the south and west. Furthermore, the Varied Sitella is able to fly over disturbed areas to access other areas of habitat. Accordingly, although the proposal will remove some habitat for the Varied Sittella, it will not isolate it or fragment it into smaller parts.

Previous land uses have resulted in the modification of the composition of the habitat throughout the Site. The habitat to be removed and modified is of low importance to the long-term survival of the species in the locality as it represents a very small area in comparison to the large areas of habitat remaining within the Site and locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The development footprint is not located within or in proximity to any declared area of outstanding biodiversity value. Therefore, the proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposal will result in the following key threatening processes:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities; and
- 'Removal of dead wood and dead trees' as this reduces the area of habitat available for the species that may utilise these habitat features.

Whilst the proposal may result in the aforementioned key threatening processes, the increase in impacts of these processes is considered to be minor. No significant impacts resulting from key threatening processes are considered to occur as a result of the proposal.

Conclusion

A total of 0.62 ha of potential foraging and breeding habitat for the Varied Sittella will be removed within the development footprint. Within the development footprint, the habitat has been modified as a result of previous land use activities. The area of habitat to be removed is located directly adjacent to the existing quarry void. The local population of this species is unlikely to depend on the limited resources contained within the development footprint for its survival.

Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. These areas are expected to remain viable in the long term and provide highly secure areas of habitat for this species. The Varied Sitella is expected to be able to move between areas of remaining habitat within the immediate vicinity of the Site.

The direct and indirect impacts of the proposal are not considered likely to result in a significant impact to the Varied Sittella.

H.6. Grey-headed Flying-fox

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Grey-headed Flying-fox has previously been recorded within the Site, outside of the development footprint. No breeding camps of the Grey-headed Flying-fox have been recorded within the Site. The local population of this species is considered to extend beyond the development footprint and has been assessed as viable.

The Grey-headed Flying-fox will primarily be impacted by the proposal through direct removal of foraging habitat within the development footprint. The proposal will remove or modify approximately 0.62 ha of woody vegetation forming potential foraging habitat for this species. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. Therefore, the proposal is not considered to have an adverse effect on the extent of the habitat for the Grey-headed Flying-fox such that its local occurrence is placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The proposal will remove or modify approximately 0.62 ha of potential foraging habitat for the Grey-headed Flying-fox. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. The potential changes to the retained extent of habitat resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of habitat for this species.

The proposal is not considered to significantly increase fragmentation of habitat for the Grey-headed Flying-fox within the Site. The removal of a small area of habitat is unlikely to result in the fragmentation as the vegetation to be removed is located directly adjacent to the existing quarry which borders the subject site to the south and west. Furthermore, this species is highly mobile, and accesses resources over a large area and is able to fly over disturbed areas to access widely disparate habitats. Accordingly, although the proposal will remove some habitat for the Grey-headed Flying-fox, it will not isolate it or fragment it into smaller parts.

Previous land uses have resulted in the modification of the composition of the habitat throughout the Site. The habitat to be removed and modified is of low importance to the long-term survival of the species in the locality as it represents a very small area in comparison to the large areas of habitat remaining within the Site and locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The development footprint is not located within or in proximity to any declared area of outstanding biodiversity value. Therefore, the proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposal will result in the following key threatening process:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities.

Whilst the proposal may result in the aforementioned key threatening process, the increase in impacts of this process is considered to be minor. No significant impacts resulting from key threatened processes are considered to occur as a result of the proposal.

Conclusion

A total of 0.62 ha of potential foraging habitat for the Grey-headed Flying-fox will be removed within the development footprint. Within the development footprint, the habitat has been modified as a result of previous land use activities. The area of habitat to be removed is located directly adjacent to the existing quarry void. The local population of this species is unlikely to depend on the limited resources contained within the development footprint for its survival.

Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. These areas are expected to remain viable in the long term and provide highly secure areas of habitat for this species. The Grey-headed Flying-fox is expected to be able to move between areas of remaining habitat within the immediate vicinity of the Site.

The direct and indirect impacts of the proposal are not considered likely to result in a significant impact to the Grey-headed Flying-fox.

H.7. Microchiropteran Bats

The following microchiropteran bats have been assessed collectively in the following Test of Significance:

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*); and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Eastern Coastal Free-tailed Bat, Little Bent-winged Bat, Large Bent-winged Bat and Greater Broad-nosed Bat have previously been recorded within the Site, outside of the development footprint. The Yellow-bellied Sheathtail-bat has been assessed as having a moderate likelihood of occurrence within the development footprint. The local populations of these species are considered to extend beyond the development footprint and are assessed as viable.

The microchiropteran bats will primarily be impacted by the proposal through direct removal of foraging habitat within the development footprint. Potential breeding habitat in the form of hollow-bearing trees for the Eastern Coastal Free-tailed Bat, Little Bent-winged Bat, Greater Broad-nosed Bat and Yellow-bellied

Sheathtail-bat may also be impacted by the proposal. Due to the modified nature of existing drainage infrastructure within the development footprint, these features are not considered to comprise breeding habitat for the Little Bent-winged Bat or Large Bent-winged Bat.

The proposal will remove or modify approximately 0.62 ha of woody vegetation forming potential foraging and/or breeding habitat for these species. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. Therefore the proposal is not considered to have an adverse effect on the extent of the habitat for microchiropteran bats that their local occurrence is placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

The proposal will remove or modify approximately 0.62 ha of potential foraging and/or breeding habitat for microchiropteran bats. Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. The potential changes to the retained extent of habitat resulting from indirect impacts are expected to be localised and overall are not considered to cause a substantial change in the extent of habitat for these species.

The proposal is not considered to significantly increase fragmentation of habitat for microchiropteran bats within the Site. The removal of a small area of habitat is unlikely to result in the fragmentation as the vegetation to be removed is located directly adjacent to the existing quarry which borders the subject site to the south and west. Furthermore, these species are highly mobile which accesses resources over a large area and are able to fly over disturbed areas to access widely disparate habitats. Accordingly, although the proposal will remove some habitat for the microchiropteran bats, it will not isolate it or fragment it into smaller parts.

Previous land uses have resulted in the modification of the composition of the habitat throughout the Site. The habitat to be removed and modified is of low importance to the long-term survival of these species in the

locality as it represents a very small area in comparison to the large areas of habitat remaining within the Site and locality.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

The development footprint is not located within or in proximity to any declared area of outstanding biodiversity value. Therefore, the proposal is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process

The proposal will result in the following key threatening processes:

- 'Clearing of native vegetation', as this reduces the area of habitat available for threatened species and communities; and
- 'Loss of hollow-bearing trees' as this reduces the area of habitat available for the species that may utilise these habitat features; and
- 'Removal of dead wood and dead trees' as this reduces the area of habitat available for the species that may utilise these habitat features.

Whilst the proposal may result in the aforementioned key threatening process, the increase in impacts of this process is considered to be minor. No significant impacts resulting from key threatened processes are considered to occur as a result of the proposal.

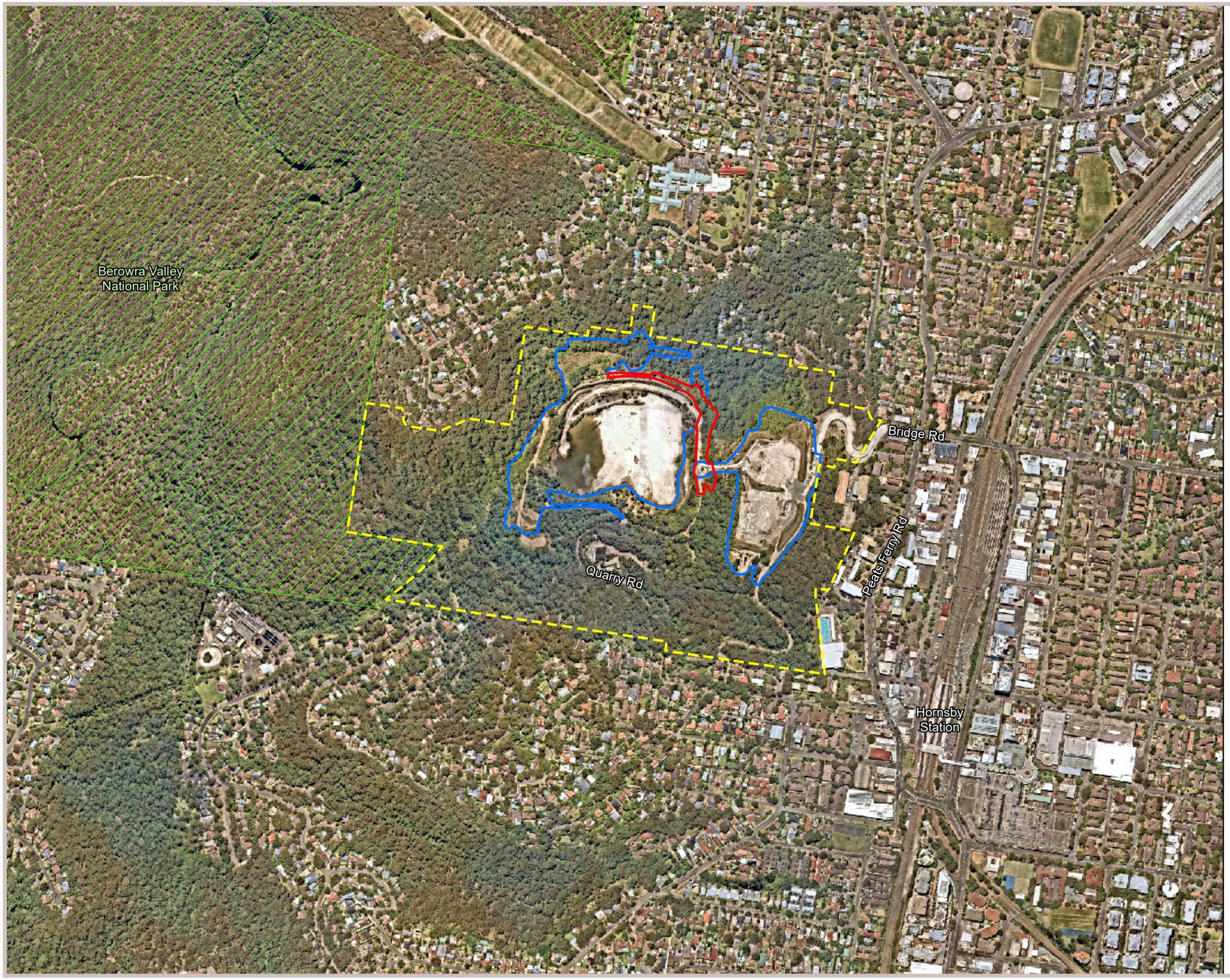
Conclusion

A total of 0.62 ha of potential foraging and/or breeding habitat for the microchiropteran bats will be removed within the development footprint. Within the development footprint, the habitat has been modified as a result of previous land use activities. The area of habitat to be removed is located directly adjacent to the existing quarry void. The local populations of these species is unlikely to depend on the limited resources contained within the development footprint for its survival.

Approximately 38.69 ha of woody vegetation will remain within the Site following vegetation clearing associated with the proposal and approved project. These areas are expected to remain viable in the long term and provide highly secure areas of habitat for these species. The microchiropteran bats are expected to be able to move between areas of remaining habitat within the immediate vicinity of the Site.

The direct and indirect impacts of the proposal are not considered likely to result in a significant impact to the Eastern Coastal Free-tailed Bat, Little Bent-winged Bat, Large Bent-winged Bat, Greater Broad-nosed Bat and Yellow-bellied Sheathtail-bat.

FIGURES



Legend

- Site
- DA101/2019 Impact Area
- Development Footprint
- NPWS Estate

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 75 150 225 300 m

I:\...\21129\Figures\RP1\20210929\Figure 1. Location of the Site

Figure 1. Location of the Site

Legend

- Site
- DA101/2019 Impact Area
- Development Footprint
- DA Overlap Area
- Development Layout

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)

Coordinate System: MGA Zone 56 (GDA 94)

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0 75 150 m

I:\...\21129\Figures\RP1\20210929\Figure 2. Location_Development Footprint

Figure 2. Location of the development footprint

Legend

- Site
- DA101/2019 Impact Area
- DA Overlap Area

Concept Plan

- Open Channel Additional Impact Area

Proposal

- Development Footprint
- Development Layout

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)

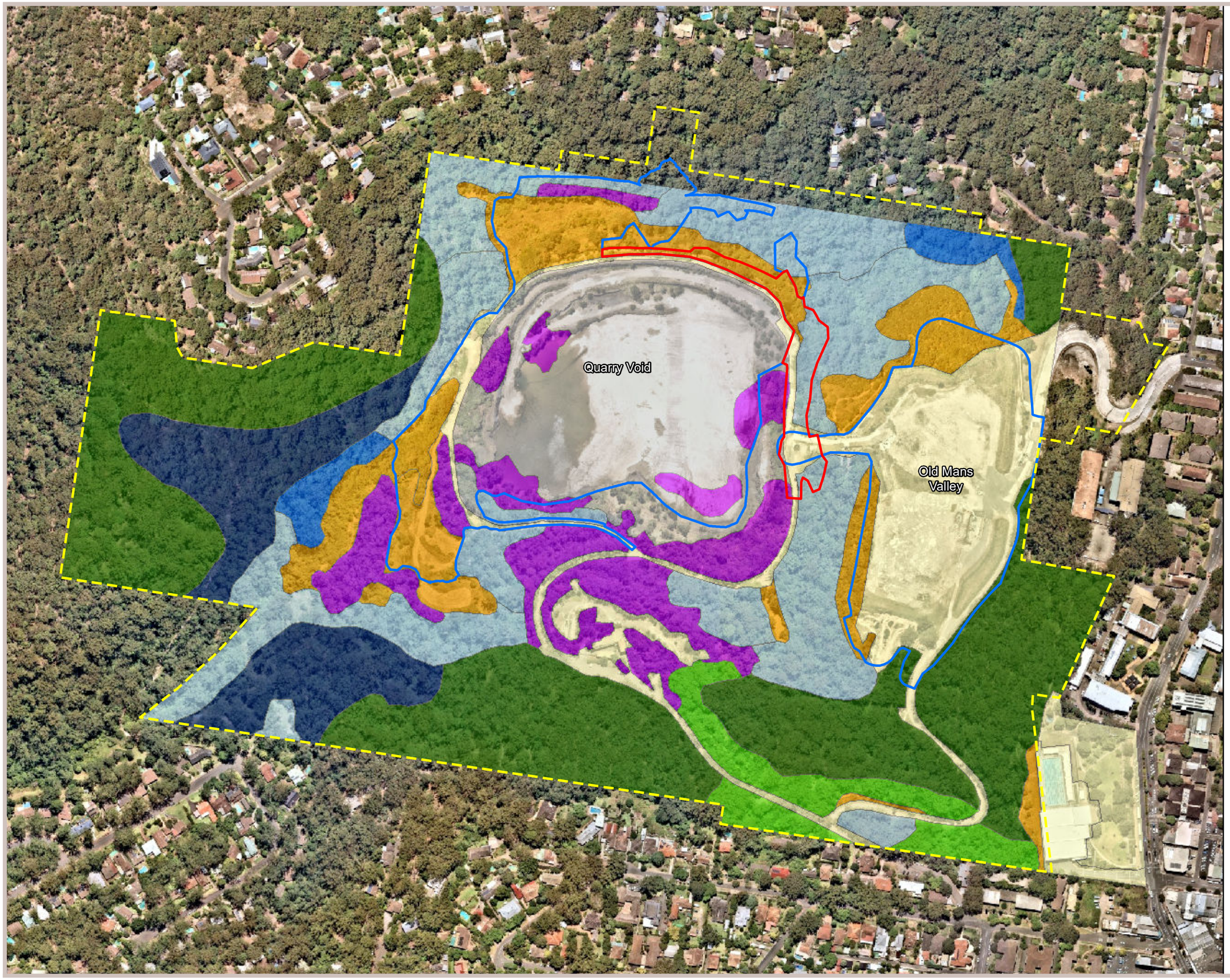
Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 40 m

I:\...\21129\Figures\RP1\20211001\Figure 3. Concept Plan Footprint Comparison

Figure 3. Concept Plan development footprint compared to proposal development footprint



Legend

- Site
- Development Footprint
- DA101/2019 Impact Area

Vegetation Community (Kleinfelder 2017)

- Blackbutt Gully Forest (moderate-good_high)
- Blackbutt Gully Forest (moderate-good_poor)
- Blue Gum Diatreme Forest (moderate-good_high) (CEEC)
- Blue Gum Diatreme Forest (moderate-good_medium) (CEEC)
- Blue Gum Diatreme Forest (moderate-good_poor) (CEEC)
- Native Rehabilitation / Regeneration
- Exotic Vegetation
- Quarry Void
- Excluded

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)
Kleinfelder (2017)

Coordinate System: MGA Zone 56 (GDA 94)

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0 75 150 m

I:\...\21129\Figures\RP1\20211001\Figure 4. Vegetation Communities_Kleinfelder 2017

Figure 4. Vegetation communities within the Site (Kleinfelder, 2017)

Legend

- Site
- Development Footprint
- DA101/2019 Impact Area

Vegetation Community (GHD 2019)

- BBGF
- BBGF_Regrowth
- BGDF

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)
GHD (2018)

Coordinate System: MGA Zone 56 (GDA 94)

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I:\...\21129\Figures\RP1\20210930\Figure 5. Vegetation Communities_GHD 2018

Figure 5. Vegetation communities within the Site (GHD, 2018)

Legend

- Site
- Development Footprint
- DA101/2019 Impact Area

Vegetation Community

- BBGF
- BBGF_Regrowth
- BGDF

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)
GHD (2019)

Coordinate System: MGA Zone 56 (GDA 94)

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0 40 m

I:\...\21129\Figures\RP1\20210930\Figure 6. Vegetation Communities_Amended

Figure 6. Amended vegetation community mapping within the development footprint

Legend

- Site
- Development Footprint
- DA101/2019 Impact Area
- Landscape Item 538

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)
Kleinfelder (2017)

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 75 150 m

I:\...\21129\Figures\RP1\20211001\Figure 7. Diatreme Hornsby Quarry

Figure 7. Diatreme Hornsby Quarry and surrounding vegetation/Hornsby Diatreme Area within the Site

Legend

- Development Footprint
- DA101/2019 Impact Area

Tree Outcome

- Retain (11)
- Remove (35)
- Conditional Remove (1)

Image Source:
Image © Nearmap (2021)
Dated: 25/01/2021

Data Source:
Hornsby Council (2021)

Coordinate System: MGA Zone 56 (GDA 94)

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0 50 m

I:\...\21129\Figures\RP1\20211001\Figure 8. Tree Retention_Removal_Development Footprint

Figure 8. Tree retention and removal within the development footprint