Rehabilitation

Strategy

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CONTENTS

DOCUMENT CONTROL

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Document Owner: Vicki Hood

AMENDMENTS

Rev.	Revision Date	Developed By	Issued to	Approved by	Approval Date
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APPROVAL

Revision No.	Approval Date	Signature
1	12/6/2020	
		Merrilyn Tinsley

1.0 INTRODUCTION

Cadia is a gold/copper mining and processing complex in central west NSW near the town of Orange. The complex comprises the Cadia East mine, minerals processing facilities and associated infrastructure. Mining commenced in 1998, with current approvals taking the project through to 2031. The project mines and processes up to 32Mtpa of ore to produce a copper concentrate and gold Dore'. This document outlines the approach to site rehabilitation and associated activities.

The Rehabilitation Strategy aims to meet all commitments and requirements from the Cadia East Project Approval and describes how rehabilitation of the site links with wider environmental objectives across Newcrest owned land and where relevant on a regional basis. The strategy will provide an overview of the strategic rehabilitation objectives, guiding principles and commitments relating to the rehabilitation of mine disturbed areas.

2.0 PURPOSE

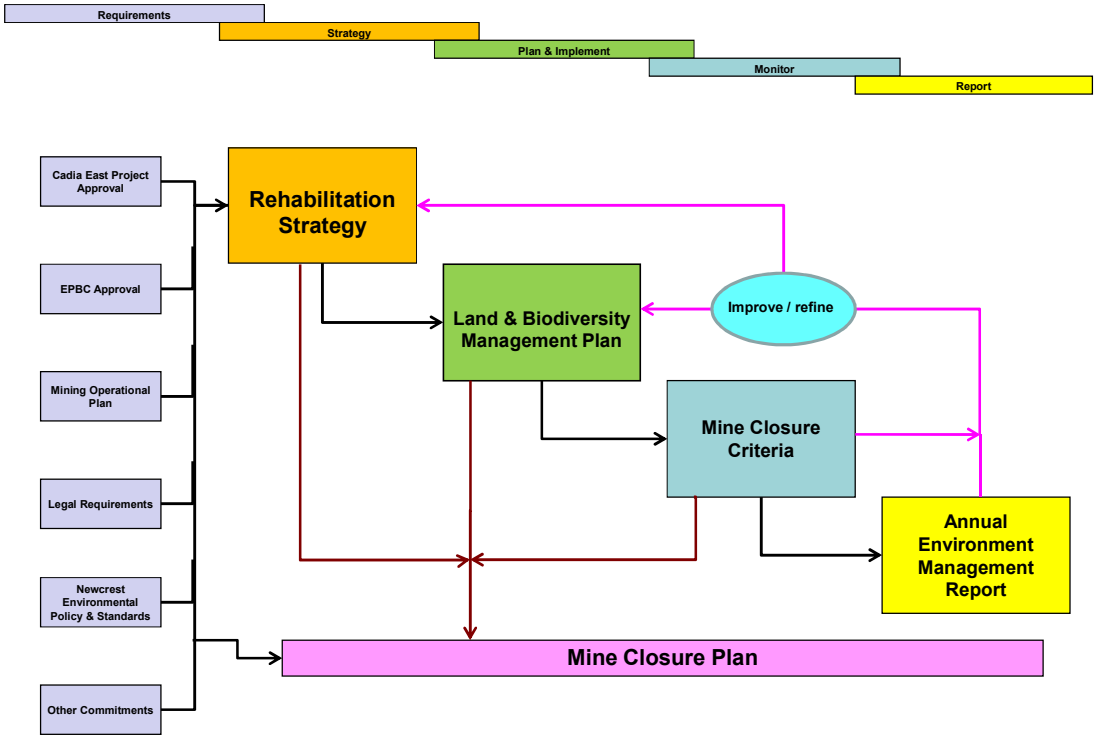
The purpose of this document is to provide an overview of the approach to site rehabilitation at Cadia. The Rehabilitation Strategy has been developed to meet the broad rehabilitation commitments made in the Cadia East Environmental Assessment and the Cadia East Project Approval.

3.0 STRATEGY RELATIONSHIPS

The rehabilitation strategy interprets and applies the rehabilitation concepts, requirements and commitments (from the Cadia East approvals, environment assessment etc) into management commitments which then feed directly into the Land and Biodiversity Management (Landscape) Plan to achieve rehabilitation of the site. The strategy defines the overarching rehabilitation goals, final land-uses and mine closure benchmarks that will be achieved through Cadia's rehabilitation works. The relationship between the Rehabilitation Strategy and other documents is summarised in Figure 1.

Commitments outlined in Section 5.2 of this strategy feed into the Land and Biodiversity Management (Landscape) Plan, where actions are defined and become (in effect) 'an action plan' for implementation. Performance against the Rehabilitation Strategy and the Land and Biodiversity Management (Landscape) Plan are reported through the Annual Environmental Management Report (Annual Review). Areas requiring refining or improvement are identified through this process and fed back through revisions of the Strategy and / or the Land and Biodiversity Management (Landscape) Plan. Refer to Figure 1

Figure 1 Relationship between Rehabilitation Strategy and other documents.



4.0 REHABILITATION REQUIREMENTS

The following sections provide a summary of Cadia's current rehabilitation requirements and commitments. The relevant approvals that relate to CVO include:

- Cadia East Project Approval (including Modifications)
- Cadia East Commitments (as stated in the Cadia East Environmental Assessment)
- Mine Lease Conditions (ML1405, ML1449, ML1472, ML1481, ML1689, ML1690)

4.1 CADIA EAST PROJECT APPROVAL

Project Approval for the Cadia East Project was granted by the NSW Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 6 January 2010. The Cadia East Project is described in Schedule 1 of the Project Approval as including the Cadia East underground mine, the Cadia Hill open cut mine, the Ridgeway underground mine, the Blayney and CVO Dewatering Facilities, and ancillary infrastructure. These components are collectively known as Cadia. The following is a summary of rehabilitation requirements contained in the Cadia East Project Approval (NSW Government, Department of Planning (2010)). Table 4-1 provides a summary of consent conditions, as they relate to the development of this strategy and the relevant section of the Strategy where the requirements are addressed.

Rehabilitation

By the end of 2010, the Proponent shall prepare a Rehabilitation Strategy for the project to the satisfaction of the Secretary. This strategy must:

- *be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Secretary;*
- *be prepared in consultation with relevant stakeholders, including the RR, DRG, BCD, DPIE Water, Councils and the CCC;*
- *investigate options for the future use of disturbed areas including voids upon the completion of mining;*
- *describe and justify the proposed rehabilitation strategy for the site, including the post-mining landform and use;*
- *define the rehabilitation objectives for the site, as well as the proposed completion criteria for this rehabilitation; and*
- *be prepared in accordance with the relevant RR Guideline.*

Note: The strategy should build on the concept strategy depicted in Appendix 6 (Cadia East Environmental Assessment).

The Proponent shall:

- *carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance; and*
- *achieve the rehabilitation objectives in the Rehabilitation Strategy (see condition 36), to the satisfaction of the RR.*

Land and Biodiversity Management Plan

The Proponent shall prepare and implement a Land and Biodiversity Management Plan for the project to the satisfaction of the Secretary. This plan must:

- *be prepared in consultation with BCD, DPIE Water, RR and the Councils, and be submitted to the Secretary within 18 months of the date of this approval;*

include:

- *the rehabilitation objectives for the site and offset areas;*
- *a description of the short, medium, and long term measures that would be implemented to:*
  - *rehabilitate the site in accordance with the Rehabilitation Strategy (see condition 36);*
  - *implement the offset strategy; and*
  - *manage the remnant vegetation and habitat on the site and in the offset areas;*
- *detailed performance and completion criteria for the site rehabilitation and implementation of the offset strategy;*

- *a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:*
  - *progressively rehabilitating disturbed areas;*
  - *implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata;*
  - *investigating ways to salvage and beneficially use resources in areas subject to subsidence (including timber, fauna habitat, seed and soil resources);*
  - *protecting vegetation and soil outside the disturbance areas;*
  - *rehabilitating creeks and drainage lines on the site (both inside and outside the disturbance areas);*
  - *managing potential acid forming material (including ensuring effective isolation of potential acid forming material in rock dumps);*
  - *managing salinity;*
  - *conserving and reusing topsoil;*
  - *undertaking pre-clearance surveys;*
  - *managing impacts on terrestrial and aquatic fauna (including a Squirrel Glider conservation strategy);*
  - *landscaping the site to minimise visual impacts;*
  - *collecting and propagating seed for rehabilitation works;*
  - *salvaging and reusing material from the site for habitat enhancement;*
  - *controlling weeds and feral pests, including terrestrial and aquatic species;*
  - *managing grazing and agriculture on site;*
  - *controlling access;*
  - *bushfire management;*
  - *managing and minimising any potential adverse impacts associated with the final voids; and*
  - *managing and minimising any adverse socio-economic effects associated with mine closure;*
- *a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;*
- *a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks;*
- *details of who would be responsible for monitoring, reviewing, and implementing the plan; and*
- *a Threatened Species Management Protocol, which outlines management strategies to protect any threatened flora and fauna species during construction, operation and post-mining.*

4.2 MINING LEASE CONDITIONS

The following requirements are contained in the Mining Lease conditions for CVO and relate to the rehabilitation of the site:

- *Any topsoil that is removed in the course of operations is to be set aside for replacement at a later date. Other soil, rock and residues are to be used to fill abandoned shafts and excavations and are to be covered by topsoil previously removed.*
- *The land over which operations have been carried on:*
    - *Is to be appropriately restored and landscaped, to the satisfaction of the Regional Inspector of Mines, to ensure that the land is properly drained and protected from soil erosion; and*
    - *Is to be planted with vegetation appropriate to the area and at a density acceptable to the Regional Inspector of Mines. Where the agreed final land use is to include native vegetation, indigenous species must be used in all revegetation programs, unless otherwise directed.*
- *The lease holder must comply with any reasonable direction given by the Regional Inspector of Mines regarding the stabilisation and revegetation of any mine residue, tailings or overburden dumps associated with the mining operation.*
- *On completion of operations the lease holder must rehabilitate all areas disturbed as a result of operations having been carried out within the subject area and must ensure that such areas are adequately maintained for such a period as is necessary to satisfy the Minister that long term rehabilitation standards and environmental safeguards have been fulfilled.*
- *The lease holder must observe any instructions given by any responsible authority with a view to the eradication of noxious weeds. The lease holder must make all reasonable efforts to prevent the introduction and establishment of noxious weeds.*
- *Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director General and in accordance with the Mining Operations Plan so that:-*
    - *There is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion.*
    - *The state of the land is compatible with the surrounding land and land use requirements.*
    - *The landforms, soil, hydrology and flora require no greater maintenance that that in the surrounding land.*
    - *In cases where revegetation is required and native vegetation has been removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density.*
    - *The land does not pose a threat to public safety.*
- *Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director General.*
- *The lease holder shall prepare a Mine Closure Plan at least two years prior to the cessation of mining operations to the satisfaction of the Director General.*
- *Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director General*

Table 4-1 Compliance summary

Consent Condition	Section of Strategy
By the end of 2010, the Proponent shall prepare a Rehabilitation Strategy for the project to the satisfaction of the Secretary. This strategy must:	Version 1 of the Strategy submitted – 17 December 2010
be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Secretary;	Section 11.2
be prepared in consultation with relevant stakeholders, including the RR, DRG, BCD, DPIE Water, Councils and the CCC;	Section 11.2
investigate options for the future use of disturbed areas including voids upon the completion of mining;	Section 5.2 and 9.0
describe and justify the proposed rehabilitation strategy for the site, including the post-mining landform and use;	Section 5.2
define the rehabilitation objectives for the site, as well as the proposed completion criteria for this rehabilitation; and	Section 5.2 and 9.0
be prepared in accordance with the relevant RR Guideline.	N/A – There are no applicable guidelines.

4.3 CADIA EAST ENVIRONMENTAL ASSESSMENT

The following is a brief summary of rehabilitation commitments contained in the Cadia East Environmental Assessment (CHPL 2009). For more information and a full description of rehabilitation concepts refer to the Cadia East Environmental Assessment - Appendix P.

North Waste Rock Dump

- The North Waste Rock Dump would have maximum batter slopes of 1:3, with 15 to 20 metre (m) wide, step-back, reverse graded berms and rock lined drains.
- PAF material contained in the dump would be encapsulated by covering with 0.5 m of clay followed by 2 to 3 m of non-acid forming (NAF) material.
- This would be covered by 20 to 30 centimetres (cm) of topsoil. Drainage control structures would be installed where necessary.
- The North Waste Rock Dump would be revegetated with native woodland plant species

Rehabilitation of the North Waste Rock Dump was completed in 2013

South Waste Rock Dump (SWRD)

- Selective encapsulation of PAF waste rock with a low permeability seal followed by NAF material and topsoil;
- Grading the final surface of the dump to blend in with the natural topography of the area, with an overall outer batter slope of 1:4 comprising 1:3 outer slopes and 15 to 20 m wide, step-back, reverse graded berms;
- Installation of rock lined drains and detention ponds to channel runoff safely to constructed outlet areas; and
- Progressive rehabilitation of outer batters.

SWRD Interaction with the Northern Tailings Storage Facility

- A clay capping layer will be installed along the southern face of the South Waste Rock Dump to minimise the potential for tailings seepage into the SWRD. The clay layer would be keyed into the *in-situ* ground surface at the toe of the dump.

SWRD Water Management

- The top surface of the South Waste Rock Dump would be designed with a slight dish shape that would generally drain towards the north. Rock lined channels would be installed along the northern edge of the top surface to provide a stable means for surface water runoff to drain from the top of the SWRD.
- On the batters of the dump, surface water runoff would flow perpendicularly down the slope to the toe of each batter where it would be re-directed by the 15 to 20 m wide reverse graded berms. The water would gradually flow short distances along the berms to rock lined channels which would be constructed at regular intervals down the faces of the batters. These channels would enable water from one berm to be channelled in a controlled manner down the face of the batter to the next berm and ultimately to the base of the dump.
- Rock lined channels would be used at the base of the dump to direct runoff into natural creek lines, the surface of the NTSF, or the Rodds Creek Water Holding Dam.
- The existing sediment ponds and leachate collection ponds downstream of the dump would be retained until the revegetated surface of the dump is stable and the runoff water quality is acceptable.

Revegetation

- The revegetation objective for the South Waste Rock Dump is to provide scattered trees and pasture on the dump surface, and to provide woodland on the batters.
- The woodland areas on the batters would be linked to other conservation areas in the Cadia Valley through the vegetation corridor programme.
- Trials would be conducted by CHPL on native species, grass species and soil treatments suitable for use on the dump.

Tailings Storage facility

- Each upstream lift would be approximately 4 m in height, constructed at slopes of 1:2 and, following the completion of tailings deposition, would be stabilised with the application of topsoil and direct seeded and/or planted with endemic tree and shrub species and grasses.
- The final surface of the tailings storage facilities would be rehabilitated through the application of topsoil (approximately 20 to 30 cm deep) and/or other growth medium such as biosolids and would be direct seeded and/or planted with a mixture of locally occurring trees, shrubs and/or introduced pasture species.
- A layer of NAF waste rock may be used, if required, to line the decant area to allow access for machinery during rehabilitation. This would be assessed at the time of rehabilitation.
- Drainage channels would be constructed on the surface of the tailings storage facilities to manage runoff and minimise ponding. Each channel would be seeded with a thick band (nominally 100 m wide) of woodland species with a final land use of conservation.
- These bands of vegetation are intended to provide long-term surface stabilisation to drainage lines, a 'filter' for surface water, shelter belts for grazed areas and a link to the regional vegetation corridor programme. The central part of each channel would be rock lined to minimise erosion potential.
- The remainder of the surface of the tailings storage facilities would be seeded with pasture species with a final land use of occasional/opportunistic and controlled grazing.
- Drainage from the top surface of the tailings storage facilities down the batters would be managed via engineered structures. These structures could involve, but are not necessarily restricted to, concrete channels, rock gabions or rock lined channels. The structures would direct the runoff to sediment stilling dams, and possibly through a constructed wetland (if required to achieve appropriate water quality), prior to release.

Ridgeway Subsidence Zone

- The rehabilitation concept involves construction of a bund and fence around the void to restrict stock and human access. The subsidence zone would be partitioned from the remainder of the 'Tunbridge Wells' property and surrounded by planted native woodland to provide visual screening.
- It is predicted that a water body would eventually form at the base of the Ridgeway subsidence zone and it would take approximately 150 years for a water body to reach equilibrium in the subsidence zone.

Cadia East Subsidence Zone

- It is not proposed to clear the native vegetation communities from this area prior to subsidence occurring, although some native seed collection would be undertaken, and fauna habitat resources (such as tree hollows) would be salvaged where practicable for use within rehabilitation areas or other fauna habitat enhancement areas.
- Stripping of soils from the cleared agricultural lands within the subsidence zone would be undertaken if the soils from these areas are suitable, and they are required for rehabilitation of the South Waste Rock Dump or other Project landforms.

- After mining and mine dewatering cease the final void created by the Cadia East subsidence zone would be allowed to fill with water.
- The subsidence zone and zone of influence would not be sufficiently stable to safely allow human or stock access, therefore a bund and fence would be erected around the zone of influence to restrict access.
- A native woodland screen would be planted around the fence to provide a visual barrier and delineation of the zone to assist in future land use planning. Where possible the native woodland screen would be used as a link in the vegetation corridor programme.

Cadia Hill Pit

- After mining the final void created by the Cadia Hill open pit would be filled with tailings to an approved level. The remaining volume within the pit shell will be allowed to fill with water.
- A fence, bund and vegetation screen (native trees and shrubs) would be established around the open pit. The vegetation screen would provide a link as per the vegetation corridor programme.

Cadia Extended Pit

- The waste rock in Cadia Extended would be re-profiled to create a stable final land surface and blend in with the natural topography of the area.
- The final surface would have maximum batter slopes of 1:3, plateau slopes of 1:100 and water management drains, bunds and sediment dams would be constructed. A low permeability cover would be installed to minimise infiltration into the waste rock.
- Following the application of 2 to 3 m of NAF material and topsoil (approximately 20 to 30 cm), the batters would be revegetated with native endemic species while improved pasture would be established on the plateau.

Infrastructure

- Dismantle and remove fixed equipment and infrastructure for removal from site and re-use at another location, if possible, or recycling.
- Non-salvageable/non-recyclable and non-contaminated surface infrastructure would potentially be disposed of in the underground workings, or at suitable off-site disposal areas.
- Once all the equipment and infrastructure components have been removed from an area it would be topsoiled, deep ripped and seeded. Land contamination assessments would be conducted as required and contaminated soil would be remediated in accordance with the relevant guidelines.
- Some concrete hardstands, site access roads, sheds, buildings and sediment dams may be retained for alternate post-mining uses.
- Electricity transmission infrastructure would be retained for future use by landholders unless it is no longer required, in which case it would be decommissioned and removed.

Declines, Portals and Underground Workings

- At the completion of mining, all recyclable and re-usable underground infrastructures would be removed, and the Ridgeway mine dewatering programme would cease operation.
- Portals would be sealed with a concrete plug, the box cut backfilled and shaped to be consistent with natural topography and seeded. Bunding would also be constructed around the portals as described in the Mine Closure Plan.
- Surface ventilation infrastructure (e.g. fans, vents and electrical substations [except the concrete collars]) would be removed.
- The sealing/capping procedure for ventilation rises would be determined in consultation with the relevant regulatory authorities and other stakeholders, but would include appropriate geotechnical investigations, design work, capping and topsoil placement over the cap with the area revegetated with pasture species.

Roads

- Some of the site roads would be retained for use by landholders following the cessation of mining, other roads would be ripped, topsoiled and sown to pasture or woodland species.

Water Management Infrastructure

- In consultation with the regulatory authorities and the community, and considering future regional water infrastructure needs, site water dams (i.e. Rodds Creek Water Holding Dam, Cadiangullong Dam), weirs (i.e. Flyers Creek and Cadia Creek), the Belubula River water pipeline, Blayney concentrate/return water pipelines and the Orange effluent pipeline may be retained for future use.
- If a future use of the Belubula River water pipeline, Blayney concentrate/return water pipeline and the Orange effluent pipeline cannot be established the concentrate pipeline would be flushed clean, all pipes left in place, capped and surface infrastructure removed.
- Sediment dams would remain pending long-term acceptable water quality and may be kept for stock water if suitable.
- The site runoff pond and the process water pond would be cleaned out if necessary and temporary fencing would be installed if required. Once water quality meets regulatory discharge criteria through the process of ongoing water quality monitoring, the dams would be emptied, high-density polyethylene (HDPE) liners removed, contaminated soils removed, clean fill placed, topsoiled and seeded to pasture species.

Heritage Sites

- The long-term future of heritage sites would be decided following consultation with regulatory authorities and the community. Options may include:
    - Transfer of sites to the care and control of heritage conservation bodies such as NSW Department of Environment and Heritage or the National Trust.
    - Care and maintenance agreement with local government (Cabonne or Blayney Shire Councils), or specific interest / conservation groups.

Blayney Dewatering Facility

- Decommissioning of the Blayney Dewatering Facility and CVO Dewatering Facility would involve the removal of tanks, pumps, plant and infrastructure.
- Concentrate and dewatering lines would be flushed with clean water, capped and left *in-situ*. However, consideration would first be given to their possible use within a regional water management scheme as per Cadia Hill Development Consent.
- Following the removal of infrastructure, attempts may be made to sell the site to another industrial user who can make use of the concrete pad and shed. If such a user is not identified, the shed would be demolished, and the concrete pad left in place. The decision would be made in consultation with the regulatory authorities and stakeholders.
- A final land contamination assessment would be undertaken, and amelioration measures implemented if required.

Note: Section 5.2, Page 24 provides updated and current information regarding the closure, demolition and remediation of the Blayney Dewatering Facility.

Plant Species Selection

- Suitable endemic plant species for revegetation of mine landforms and disturbance areas would be determined in consultation with the regulatory authorities and landholders.
- Species would be selected on a site by site basis depending on nearby remnant vegetation associations, soil types, aspect and site conditions.
- Species selection for revegetation would also be based on vegetation lists obtained from the Cadia Hill and Ridgeway EISs, Off-site Rehabilitation Plan, species recorded within the Project area and surrounds (Appendix B of the EA) and results from relevant trials and studies.
- Unless otherwise required (e.g. tall trees for screening purposes) all areas would attempt to maximise habitat value by considering structural and species diversity.
- At suitable locations (and where available), regionally significant species and communities would be incorporated into revegetation activities.
- Under some circumstances, non-endemic native species may be selected to allow the revegetation and stabilisation of site gardens and difficult landforms.
- Where the agreed final land use for an area includes improved pasture (grazing), non-native pasture species may be planted / sown.
- In consultation with regulatory authorities and landholders, additional species may be included over time as rehabilitation progresses and the results of ongoing rehabilitation trials become available.

4.4 OTHER APPLICABLE LEGAL REQUIREMENTS

The following Acts and associated regulations may be applicable to the rehabilitation of the Project:

- *Mining Act 1992*
- *Environmental Panning and Assessment Act 1979*
- *Protection of the Environment Operations Act 1997 (and associated regulations)*
- *NSW Biodiversity Conservation Act 2016 (and associated regulations)*
- *NSW Fisheries Management Act 1994*
- *NSW Local Land Services Act 2013 (and associated regulations)*
- *NSW Biosecurity Act 2015*
- *Contaminated Lands Management Act 1997*
- *National Parks and Wildlife Act 1974*
- *Rural Fires Act 1997*
- *The Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

4.5 STATE ENVIRONMENTAL PLANNING POLICIES

The following State Environmental Planning Policies (SEPPs) are relevant to the Project:

- SEPP - *Major Projects (2005)*;
- SEPP - *Mining, Petroleum Production and Extractive Industries (2007);*
- SEPP *Koala Habitat Protection (2019)* , and
- SEPP 55 - *Remediation of Land*.

4.6 NEWCREST ENVIRONMENTAL POLICY

The Newcrest Environmental Policy (NML 2017) states the intentions and principles for environmental performance across all of its operations including Cadia. The policy states;

> *"Newcrest is committed to excellence in environmental performance to maintain and enhance our licence to operate".*

From a rehabilitation perspective, the policy also states that;

Newcrest will:

- *Comply with applicable environmental laws, regulations and voluntary commitments to which the organisation subscribes, as a minimum*
- *Ensure that integrated approaches to land use planning and environmental management are implemented in areas where we operate and/or manage that contribute to the conservation of biodiversity;*
- *Integrate mine closure and progressive rehabilitation into the life-cycle of our operations to minimise our environmental legacies;*

4.7 NEWCREST BIODIVERSITY POLICY

The Newcrest Biodiversity Policy (NML 2019) states the intentions and principles for managing biodiversity values across the organisation including Cadia. The policy states;

"Newcrest is committed to protecting and managing biodiversity values".

Newcrest commits to the protection and management of biodiversity values and across the organisation, Newcrest will:

- *Not explore and mine in areas designated as World Heritage Sites*
- *Respect the requirements of legally designated protected areas*
- *Apply the mitigation hierarchy to reduce impacts of new projects on biodiversity and ecosystem service values through assessment of biodiversity risks, avoidance, mitigation and offsetting (if required)*
- *Assess and manage critical habitats and natural habitats on land under our control or influence*
- *Achieve no-net-loss of biodiversity values in relation to impacts to natural habitats and critical habitats following application of the mitigation hierarchy for new projects*
- *Assess and maintain ecosystem services for new projects*
- *Comply with relevant laws and apply best practices when assessing and managing biodiversity across our operations*
- *Adopt practical biodiversity management practices that integrate biodiversity management and development for all our operations*
- *Prepare Biodiversity Action Plans (BAPs) for all operations that impact biodiversity values*
- *Raise awareness of employees of the importance of protecting and managing biodiversity*
- *Work with local communities and key stakeholders to assess, manage and restore biodiversity values on land* under our control or influence

4.8 NEWCREST ENVIRONMENTAL STANDARDS

A number of Newcrest Environmental Standards have been developed to guide the site's approach to managing key environmental risks. A summary of the key requirements, as they apply to the rehabilitation of the site are presented below.

4.8.1 EN-ST01 – Acid Mine Drainage

The closure of facilities with potential AMD risk must ensure geotechnical and geochemical stability, the control of infiltration and seepage and eliminate where possible the need for ongoing treatment and management.

The full standard can be found in Appendix A

4.8.2 EN-ST03 Biodiversity

Biodiversity aspects shall be managed to ensure compliance with relevant regulatory permits and approvals and any voluntary standards or codes of which Newcrest is a signatory. Where risk assessment identifies significant sensitive environmental biodiversity receptors that are not adequately protected by regulatory permit conditions, site based monitoring and environmental management systems shall be applied to complement regulatory requirements.

Integrate Biodiversity Management into project planning and decision making through the complete project life-cycle, facilitating the design projects that avoid potential significant impacts on Biodiversity and identify opportunities to protect and enhance Biodiversity.

The full standard can be found in Appendix B

4.8.3 EN-ST07 Land Use and Disturbance Management

Land use and disturbance must be managed in accordance with relevant regulatory requirements and permit conditions. Where risk assessment identifies significant sensitive environmental receptors that are not adequately protected by regulatory permit conditions, site based monitoring and environmental management systems shall be applied to complement regulatory requirements.

Map land use domains across the operation that define the permitted land use and constraints in each area. Ensure land use domains have been developed with regard to the interests of key stakeholders and rehabilitation and closure objectives.

Develop, implement and maintain a Land Use Management Plan that must include as a minimum:

- Protected areas or limitations on land use;
- Objectives and targets relating to use and management of land which are consistent with the closure plan including annual targets for progressive rehabilitation

Develop and implement operational procedures for land management including inspections and monitoring programs for the following areas:

- Land clearance and vegetation removal authorisation;
- Sediment and erosion control;
- Top soil management;
- Land access and stakeholder engagement;
- Management of soil contamination and remediation

The full standard can be found in Appendix C

4.9 ENVIRONMENTAL MANAGEMENT PLANS

At the time of revising this strategy, there were two primary documents that relate to rehabilitation and closure of the mine site. Both documents are fully aligned with this overarching Rehabilitation Strategy:

1. Mining Operations Plan (MOP). The MOP is a requirement of Cadia's Mine lease Conditions and is consistent with both the Rehabilitation Strategy and the Land and Biodiversity Management Plan (LBMP). The plan contains duplicate information to the Rehabilitation Strategy including; the overarching rehabilitation strategy, final landform description, final land-use descriptions, mine closure criteria etc. The plan is developed in consultation with and approved by Resource Regulator and is also consistent with the Cadia East Environment Assessment. Following Mod 13, the MOP was updated and approved in March 2020.
2. The Land and Biodiversity Management Plan (LBMP) is a requirement of the Cadia East Project Approval and is consistent with this strategy, the Mining Operations Plan and the Cadia East Environment Assessment. The plan provides specific information and detailed actions for the implementation of the Rehabilitation Strategy. The LBMP is currently under review and will be submitted for approval prior to the end of the 2020 calendar year.

5.0 REHABILITATION STRATEGY

The overall rehabilitation goal is to generate enduring land value, including both ecological value (e.g. biological diversity and other environmental values) and agricultural value (i.e. the ability to produce agricultural goods).

Rehabilitation activities at the Cadia Valley Operations would aim to generate safe and sustainable landforms at the mine site, CHPL-owned land and the region as a whole by rehabilitating mine disturbed lands to:

- add value to the current vegetation corridor programme (ecological value);
- allow for the future land use of grazing where appropriate and sustainable (agricultural value);
- retain areas that may be important for future industry and infrastructure needs; and
- provide safe and stable landforms and minimise any adverse potential impacts so that there is no future liability for Newcrest or the community.

CHPL would aim to provide a balanced rehabilitation outcome, recognising the alternative land uses that exist in the region and aiming to establish a combination of grazing land and indigenous woodland on final landforms.

Rehabilitation programmes would be adjusted over the life of the Project as necessary, based on the outcomes of research trials, community and regulatory consultation, regional infrastructure requirements and industry knowledge.

Progressive rehabilitation would be undertaken throughout the life of the Project, where practicable.

5.1 GUIDING PRINCIPALS

- The vision of how Cadia will fit into the regional landscape should drive the site rehabilitation concepts and actions.
- Accommodate social, ecological and economic values while minimising Cadia's risk exposure in the future.
- Future land uses are to be based on an assessment of landscape capabilities in terms of social and ecological values.
- Ultimate rehabilitation outcomes should be to optimise social, production and nature conservation objectives within Cadia owned lands.
- Allow for future industrial use of site infrastructure and resources where appropriate – based on social and community needs.
- Wherever possible restoration strategies should seek to create sustainable ecological and if applicable, production ecosystems.
- There is a need to distinguish between amenity landscapes (eg shelter belt plantings, narrow linear corridors) in contrast to recreating sustainable native woodlands ecosystems.
- The agricultural capability of rehabilitated lands needs to be rigorously assessed. Mine disturbed areas with a future land use for agriculture / grazing need to be sustainable and not expose the landscape to degradation (such as erosion, weed invasion etc). Future rehabilitation therefore may need to focus more on conservation outcomes in much of the disturbance footprint.
- Riparian system restoration and incorporation of 'chain of ponds' concepts should be a high priority.

- There may be better long term outcomes and prospects for the on-selling of agricultural land (with the consequent relinquishment of management responsibility) with greater emphasis on ecological restoration (Carbon, biodiversity credits, Bush Heritage etc)
- Undertake a broader comprehensive biodiversity study of all CVO properties (flora, fauna and aquatic species) to assist landscape planning and management objectives. It is imperative to determine what vegetation communities, habitats, species/viable populations are present, as well as their status and condition, across the agricultural landscape (outside mine disturbed areas) (eg 60% of non-threatened vertebrate species have been identified as being regionally endangered in the Lachlan and Central West Catchments and are not formally recognised under state and federal legislation. The evidence of the continuing decline of the woodland birds is testament to the need for intervention at an earlier time).
- Consider alternate land uses as community needs and expectations change.
- As one of the largest landholders in the Central West, CVO has the opportunity to create a production and conservation landscape on a scale presently unobtainable in such highly modified landscapes.

5.2 STRATEGY AND COMMITMENTS

The following strategy and commitments (Table 5-1) have been developed by the approved expert panel (refer to Section 11) to provide overarching direction for the rehabilitation and closure of the site. Each of the commitments outlined in column 3 are expanded into actions in the Land and Biodiversity (Landscape) Management Plan to essentially form an 'implementation plan'. Performance indicators have been suggested and will be reported against in the AEMR.

For the major mine landforms, a description of the final landform and final land use have been stated. These are consistent with the Mining Operations Plan and the Cadia East Environmental Assessment. A visual representation of the final land-uses is shown in Figure 2 and is generally consistent with Appendix 6 of the Project Approval.

The process of determining the final land-uses for major landforms has involved the following:

- Development of final land-uses as part of the Cadia East Environmental Assessment. Information was drawn from the Cadia Hill EIS and the Ridgeway EIS as well as input from staff to propose a balance between pre-mining land-uses (pasture agriculture vs woodland/ bushland / conservation).
- This has been further refined by the expert panel who have proposed additional areas be returned to woodland / bushland / conservation as it was considered to provide the most stable and sustainable landform in the long term. These conservation areas also add to the biodiversity assets of the region and contribute to the vegetation corridor program which is consistent with the goals of this strategy.
- The expert panel have considered the future industrial uses of the site as well as the potential use of CVO's water management infrastructure within a regional context. As the future needs of the region and community are likely to change (over the next 20 years) the panel have made suggestions (based on current knowledge) as to the potential use of the site and infrastructure and the eventual fate of Newcrest owned land, however they have suggested detailed consultation with stakeholders is required closer to mine closure to fully define the final closure scenario for these areas. As such the strategy for these areas has been left reasonably flexible pending further consultation closer to mine closure. As further information is gathered, the strategy will be updated accordingly.

Table 5-1 Site Rehabilitation

Landform	Strategy	Commitment	Performance Indicators	Supporting info
Subsidence zones (Ridgeway, Cadia East)	Retain subsidence voids for future water storage. . <u>Final Landform</u> Subsidence zone – deeply incised edges of a deep open void. <u>Final Land use</u> Water Body Total exclusion	Maximise the recovery and use of habitat resources from remnant areas to be cleared. Identify and consider the relocation / replanting or regionally uncommon species from within remnant areas to be cleared (complete). Select areas (based on clearing and subsidence profiles / schedules) where additional topsoil and timber resources can be recovered and utilised. Relocate Cadia East waste rock to the southern waste rock dump (complete). Construct human proof fencing and bunds within 'safe' distance around the subsidence voids (initial fencing complete, a wider exclusion fence is now being constructed). Fence to allow for animal escape from the zone. Plant native trees and shrubs to provide a visual screen that will assist the area to blend in with surrounding vegetation and provide additional biodiversity outcomes. Develop a water quality monitoring program for open voids (pending safe access).	Site effectively excludes humans, allows animal escape and poses no risk or harm into the future Water quality monitoring (if safe access is available) (5 years post closure) 5 years prior to mine closure – undertake assessment as to whether any future industrial and / or water uses of subsidence voids is possible. <u>Closure Criteria</u> 100% human exclusion Water quality consistent with modelling. Compliance with detailed criteria (Section 9)	Cadia East Project Environmental Assessment (CHPL April 2009) Ridgeway Environmental Impact Statement (CHPL 2000).
Cadia Hill Open pit void	Use the Cadia Hill pit void as a tailings storage facility to an approved height (to be determined via respective approval processes). Remainder of void allowed to fill with water / water storage. <u>Final Landform</u> Open void (pit shell) – filled with tailings under a lens of saline water <u>Final Land use</u> Tailings storage / upper level water body for possible future industrial / regional use. Total exclusion	Construct human proof fencing and bunds within 'safe' distance around the open voids, controlled entry points for water sampling access. Plant native trees and shrubs to provide a visual screen that will assist the area to blend in with surrounding vegetation and provide additional biodiversity outcomes. Develop a water quality monitoring program for open voids (pending safe access).	Site effectively excludes humans and poses no risk or harm into the future Monitor water quality (if safe access is available) (5 years post closure) <u>Closure Criteria</u> 5 years prior to mine closure – undertake assessment as to whether any future industrial uses of pit water is possible. 100% exclusion (with the exception of water quality sampling) 5 years prior to mine closure undertake a detailed hydrogeological analysis and risk assessment. Water quality suitable for industrial / regional use. Potentially part of regional water supply network Compliance with detailed criteria (Section 9)	Cadia East Project Environmental Assessment (CHPL April 2009) Cadia Hill Environmental Impact Statement (CHPL 1995)

Table 5-1 Site Rehabilitation (Continued)

Landform	Strategy	Commitment	Performance Indicators	Supporting info
Northern and Southern Tailings Dams	Rehabilitate with *E. albens – E.melliodora – E. blakelyi – E. bridgesiana* woodland communities (1a, 2a, 2b) <u>Final Landform</u> Large flat expanses of woodland with formal stabilised drainage channels throughout. <u>Final Landuse</u> Woodland Conservation (subjected to occasional strategic grazing (short term periodic) for management purposes and biodiversity outcomes pending the outcomes of the land capability assessments).	Repair NTSF Embankment. Recover topsoil and clay prior to inundation by tailings Respread native topsoil immediately onto new designated revegetation areas (where practicable). Investigate methods for altering the physical and chemical properties of tailings material prior to release within the tailings dam (final deposition layer prior to rehabilitation). Continue to undertake rehabilitation trials (scaled up version if possible). Understand any long term ore body geochemical changes that may alter / affect proven rehabilitation methods (proven as part of completed research) Confirm detailed drainage and rehabilitation plans Create desired landform via selective placement of tailings Install erosion control structures Construct chains-of-ponds (wetlands) to assist clean water drainage from the area and increase habitat and ecological function Prepare appropriate substrate using topsoil or other suitable growth medium (as per outcomes of the trials) Undertake rehabilitation of woodland and native grassland communities (as per outcomes of the trials) Revegetation using locally collected seed of similar forest community species including grasses and other native forbs and appropriate local native wetland plants Creation of additional habitat using cleared trees from areas (described above) and the installation of nesting boxes and salvaged hollows, targeting threatened and declining woodland species Retain existing install sediment ponds until water quality is acceptable. During operational phases, consistent with the Cadia Environment Protection Licence (EPL5590), the tailings dams may be used for the disposal of liquid / slurry wastes such as drill cuttings from Newcrest's exploration activities.	The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation (reference sites) of similar community composition and final land use (refer to section 9). Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met. Conduct fauna surveys (Birds, bats, reptiles, mammals etc) at periodic intervals. Undertake periodic water quality testing (5 years post closure) within wetland systems to ensure water quality is acceptable for release (ANZECC livestock guidelines). <u>Closure Criteria</u> Woodland criteria (refer to section 9). Progress reported in AEMR / Annual Review (once rehabilitation commenced)	Rehabilitation monitoring methodology and determination of completion criteria (DnA Environmental 2008). Cadia East Project Environmental Assessment (CHPL April 2009)
North Waste Rock Dump	Rehabilitate with *E. macrorhyncha – E. goniocalyx – E. polyanthemos* Woodland community (3a, 3b) <u>Final Landform</u> Flat plateaus intersected by 3:1 batters and reverse graded berms. Formal stabilised drainage channels throughout. <u>Final Landuse</u> Woodland Conservation	Re-profiling of dump surface (complete) Placement of clay / HDPE low permeability cover (complete) Placement of NAF material cover (complete) Construction of chains-of-ponds (wetlands) in the south west area to assist clean water drainage from the area and increase habitat and ecological function Revegetation using locally collected seed of similar forest community species including grasses and other native forbs and appropriate local native wetland plants (complete) Creation of additional habitat using cleared trees from areas (described above) and the installation of nesting boxes and salvaged hollows, targeting threatened species and declining woodland species Undertake additional rehabilitation works should performance indicators not be met, such as ripping, re-seeding, supplementary planting, erosion control etc.	The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation of similar community composition and final land use. (refer to section 9). Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met Conduct fauna surveys (Birds, bats, reptiles, mammals etc) at periodic intervals. Undertake periodic water quality testing (5 years post closure) within wetland systems to ensure water quality is acceptable for release. (ANZECC livestock guidelines). <u>Closure Criteria</u> Woodland criteria (refer to section 9). Progress reported in AEMR	Rehabilitation monitoring methodology and determination of completion criteria (DnA Environmental 2008). Cadia East Project Environmental Assessment (CHPL April 2009) North Waste Rock Dump Rehabilitation Plan 2011 - 2013 Mining Operations Plan (CHPL 2011)

Table 5-1 Site Rehabilitation (Continued)

Landform	Strategy	Commitment	Performance Indicators	Supporting info
South Waste Rock Dump (SWRD)	Rehabilitate a with *E. albens – E. melliodora – E. blakelyi – E. bridgesiana* woodland communities (1a, 2a, 2b) Final Landform Flat plateaus intersected by 3:1 batters and reverse graded berms. Formal stabilised drainage channels throughout. Final Landuse Woodland Conservation (subjected to occasional strategic grazing for management purposes and biodiversity outcomes)	Re-profiling of dump surface Encapsulate PAF materials Placement of NAF material cover Clay capping and rock armouring at the toe of the NTSF interface Topsoil placement using appropriate topsoil (few introduced species) Consider ways to improve soil organic matter if required. Construction of chains-of-ponds (wetlands) to assist clean water drainage from the area and increase habitat and ecological function Revegetation using locally collected seed of similar woodland community species including grasses and other native forbs and appropriate local wetland plants. Creation of habitat using trees and logs cleared from other areas and the installation of nesting boxes and salvaged hollows, targeting threatened species and declining woodland species Undertake a series of rehabilitation trials focussing on methods of revegetating the native grassy understorey component. Retain existing sediment ponds until water quality is acceptable. Undertake additional rehabilitation works should performance indicators not be met, such as ripping, re-seeding, supplementary planting, erosion control etc. Consistent with the Cadia Environment Protection Licence (EPL5590), during operational and closure phases of the mine site, the SWRD will be utilised for the disposal of benign waste products such as general demolition, construction and building waste, contaminated soil, damaged equipment, waste concrete, rubber lined steel pipe, untreated timber, heavy vehicle tyres and geological wastes where there is no viable recycling alternative.	The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation of similar community composition and final land use. (refer to section 9). Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met Conduct fauna surveys (Birds, bats, reptiles, mammals etc) at periodic intervals. Undertake periodic water quality testing (5 years post closure) within wetland systems to ensure water quality is acceptable for release (ANZECC livestock guidelines). Closure Criteria Woodland criteria (refer to section 9). Progress reported in AEMR.	Rehabilitation monitoring methodology and determination of completion criteria (DnA Environmental 2008). Cadia East Project Environmental Assessment (CHPL April 2009) 2011-2013 Mining Operations Plan (CHPL 2011) 2016-2019 Mining Operations Plan (CHPL 2016)
Waste Rock Cadia: extended open pit	Rehabilitate with *E. macrorhyncha – E. goniocalyx – E. polyanthemos* Woodland community (3a, 3b) Final Landform Tie in with existing headland, 3:1 batters leading to a floodplain adjacent to Cadiangullong Creek. Formal stabilised drainage channels throughout. Final Landuse Woodland Conservation	Re-profiling of in-situ material / surface area Placement of NAF material cover to achieve final landform to blend into eastern slopes / floodplain (pending assessment of standing water level within the pit shell) Topsoil placement using appropriate topsoil (few introduced species) and from similar bushland community (3b) Consider ways to improve soil organic matter if required. Construction of chains-of-ponds (wetlands) in the south west area to assist clean water drainage from the area and increase habitat and ecological function Revegetation using locally collected seed of similar forest community species including grasses and other native forbs and appropriate local wetland plants Creation of habitat using cleared trees from areas (described above) and the installation of nesting boxes or salvaged tree hollows, targeting threatened species and declining woodland species	The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation of similar community composition and final land use. Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met. Conduct fauna surveys (Birds, bats, reptiles, mammals etc) at periodic intervals. Undertake periodic water quality testing (5 years post closure) within wetland systems to ensure water quality is acceptable for release (ANZECC livestock guidelines). Closure Criteria Woodland criteria (refer to section 9). Progress reported in AEMR.	Rehabilitation monitoring methodology and determination of completion criteria (DnA Environmental 2008). Cadia East Project Environmental Assessment (CHPL April 2009) Cadia Extended Rehabilitation Plan (CHPL 2009c)
Declines portals and underground workings	Retained but excluded from access Final Landform Blend in with natural adjacent topography. Final Landuse Pasture Conservative grazing	Sealed with a concrete plug Boxcut backfilled, bunded and shaped Seeded with native vegetation or introduced pastures During closure phases of the mine, underground workings may be utilised for the disposal of benign waste products such as general demolition, construction and building waste, conveyor belt, damaged equipment, waste concrete etc where there is no viable recycling alternative.	Site effectively excludes humans and animals and poses no risk or harm into the future. Closure Criteria Pasture criteria (refer to section 9). Progress reported in AEMR. 100% secure – no access Minimal leakage of groundwater from portal.	Cadia East Project Environmental Assessment (CHPL April 2009) Ridgeway Environmental Impact Statement (CHPL 2000).

Table 5-1 Site Rehabilitation (Continued)

Landform	Strategy	Commitment	Performance Indicators	Supporting info
Surface infrastructure (based at the Cadia site)	Possible future industrial use of the site Otherwise dismantle & remove all services, fixed infrastructure and concrete foundations. <u>Final Landform</u> Undulating slopes similar to underlying topography. <u>Final Landuse</u> Possible future industrial use Pasture Conservative grazing	Possible future industrial use of the site and retention of infrastructure as required. Re-use, recycle where possible Possible disposal of other material (non- contaminated) in U/G workings or suitable off-site facility Undertake contaminated land assessment and remediation as required. Seeded with native vegetation or introduced pastures	5 years prior to the completion of mining, commence consultation with local, state and federal authorities and industries regarding potential future industrial uses of the site. To have in place by 30 June 2031 an agreement with relevant regulatory agencies and industry for the future industrial use of the site Should no future industrial use be identified The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation of similar community composition and final land use. Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met Conduct fauna surveys (Birds, bats, reptiles, mammals etc) at periodic intervals. <u>Closure Criteria</u> Pasture criteria (refer to section 9). Progress reported in AEMR. Site safe and free of hazards and residual contamination.	Cadia East Project Environmental Assessment (CHPL April 2009)
Heritage sites Cadia engine house and chimney Relocated Cadia cemetery Old school yard	Retain as sites of heritage significance <u>Final Landuse</u> Heritage conservation	As per Cadia East Project Environmental Assessment (CHPL April 2009) Transfer management and control to a suitable conservation management agency.	As per Cadia East Project Environmental Assessment (CHPL April 2009)	Cadia East Project Environmental Assessment (CHPL April 2009)

Table 5-1 Hydrology

Objective	Strategy	Commitment	Performance Indicators	Supporting info
To have in place at the end of current approval (2031) a surface water management system that will: • effectively manage the movement of surface water through and off the CVO site to ensure the land is properly drained and protected from erosion; and • ensure the quality of surface water moving through and off the CVO site is fit for agricultural purposes.	Effective placement and encapsulation of potential acid forming (PAF) material in the North Waste Rock Dump (NWRD) and South Waste Rock Dump (SWRD).	Waste rock placement in accordance with the Mining Operations Plan (MOP) and EA commitments. PAF material encapsulated by covering with 0.5 m of clay followed by 2 metres of non-acid forming (NAF) material. Cover NAF with 20 to 30 cm of topsoil and revegetate with native woodland and grass species. Installation of drainage control structures to maintain integrity of waste rock cover. Inspection and maintenance of surface water drainage systems. Progressive rehabilitation of outside batters. Installation of a clay capping layer on the southern face of the SWRD to minimise potential for tailings seepage into the SWRD. Surface water monitoring.	Adherence with the MOP for waste rock placement. Waste rock dump capping stable and not eroding. Surface water systems effective and non-scouring. Effective vegetation establishment (as per closure criteria section 9). Water quality monitoring confirms drainage from waste rock dumps meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation). Water sampling 5 years post closure	ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* CVO Mining Operations Plan. Cadia East Project Environmental Assessment (CHPL April 2009).
	Effective surface water management on waste rock dumps.	Waste rock placement in accordance with the Mining Operations Plan and EA commitments. Construct waste rock dumps with maximum batter slopes of 1:3, with 15 to 20 m wide step-back, reverse graded berms, to provide an overall outer batter slope of 1:4. Installation of rock lined drains to safely convey water from the top of the waste rock dump to stable outlet points. Discharge of surface water to sediment ponds downstream of the waste rock dumps. Progressive rehabilitation of outside batters. Final rehabilitation in accordance with revegetation strategy. Inspection and maintenance of surface water systems. Surface water monitoring.	Adherence with the MOP for waste rock placement. Waste rock dump capping stable and not eroding. Surface water systems effective and non-scouring. Effective vegetation establishment. (as per closure criteria section 9). Water quality monitoring confirms drainage from waste rock dumps meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation). Water sampling 5 years post closure	CVO Mining Operations Plan. Cadia East Project Environmental Assessment (CHPL April 2009).

Table 5-1 Hydrology (Continued)

Objective	Strategy	Commitment	Performance Indicators	Supporting info
To have in place at the end of current approval (2031) a surface water management system that will: • effectively manage the movement of surface water through and off the CVO site to ensure the land is properly drained and protected from erosion; and • ensure the quality of surface water moving through and off the CVO site is fit for agricultural purposes.	Effective surface water management on the tailings storage facilities.	Tailings placement in accordance with the Mining Operations Plan and EA commitments. Adoption and design of a final surface water management strategy (i.e. adoption of either Option 1 or Option 2 as presented in the EA). Construction of drainage channels across the surface of the tailings storage facilities to manage runoff and minimise ponding. Revegetation of the tailings storage facilities in accordance with revegetation strategies and EA commitments or as determined through on-site trials. Design and construction of engineered structures to transfer surface water from the surface of the tailings storage facilities to stable discharge points. Design and construction of surface water management ponds (sediment basins, constructed wetlands) to manage surface water from the tailings storage facilities prior to off-site discharge. Surface water monitoring.	Adherence with the MOP for tailings placement. Surface of the tailings storage facility stable and not eroding. Surface water systems effective and non-scouring. Minimal ponding on rehabilitated surface. Effective vegetation establishment. (as per closure criteria section 9). Water quality monitoring confirms drainage from tailings storage facilities meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation). Water sampling 5 years post closure	ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* CVO Mining Operations Plan. Cadia East Project Environmental Assessment (CHPL April 2009)
	Retain sediment dams and water management ponds to provide on-site water resources for future agricultural activities.	Inspect and maintain all sediment dams and ponds throughout the mine operation to ensure structural integrity and capacity are maintained. At the end of the current approval (2031) remove all sediment from sediment basins. At the end of the current approval (2031) rehabilitate the site runoff pond and process water pond in accordance with EA commitments. Undertake analysis of sediment removed from all sediment dams and water management ponds to determine appropriate disposal technique.	Remediation of dams/contaminated sites so that they are fit for agricultural / conservation purposes. Site remediation in accordance with relevant guidelines made or approved by the NSW DEH / EPA and relevant national standards such as the National Environment Protection Measures (NEPM) (site contamination). These documents are typically revised on a 5 to 10 year cycle. Those current at the time should be used. Sediment managed and disposed of in accordance with contaminant grading. All retained dams and ponds stable and revegetated. Water quality monitoring confirms stored water meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation). Water sampling 5 years post closure	ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Relevant DECCW and NEPM guidelines for site contamination assessment.
	Use constructed 'natural' systems where possible to improve water quality prior to off-site discharge.	Undertake trials to investigate the effectiveness of wetlands for pollutant uptake from waste rock leachate drainage. Incorporate findings of the wetland trial into the final design of the surface water management system. Incorporate riparian planting along drainage lines to act as filter strips. Design surface water systems to take advantage of natural topography and existing drainage patterns as much as possible.	Water quality monitoring confirms drainage from waste rock dumps meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation). Wetland research undertaken and reported through AEMR. Water sampling 5 years post closure	ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Table 5-1 Linkages with Surrounding Areas

Landform	Strategy	Commitment	Performance Indicators	Supporting info
Vegetation corridor enhancement areas	Increase connectivity and linkages across the landscape Increase the area and quality of flora and fauna habitat Improve movement of genetic material between flora and fauna populations Increase the sustainability and biodiversity of CHPL owned property Sustain and enhance the agricultural value of the land	Ensure revegetation areas are of sufficient size (>5ha and/or > 100m wide) where possible to maximise sustainability and biodiversity outcomes; Improve functionality of drainage lines and riparian ecosystems Ensure sustainable grazing management practices are maintained which aim to increase organic matter, diversity and perenniality (ie. function); Manage areas of native grasslands for future seed harvesting; Increase the condition and extent of EEC box gum woodlands via best practice revegetation/rehabilitation where possible; Increase habitat via introduction of nesting boxes, logs, rock and wetlands etc into areas where possible, targeting threatened and declining woodland species habitat requirements. Investigate and where possible work with neighbours, landcare groups etc to extend vegetation corridors beyond Newcrest owned land to provide regional linkages / ecological benefits.	The function, structure and composition of the site is comparable with or trending towards that of the local remnant vegetation of similar community composition and final land use. . (as per closure criteria section 9). Annual monitoring and comparison against closure criteria for the first 5 years followed by every three years until closure criteria have been met Native grass seed harvesting for rehabilitation commenced. Conduct fauna surveys (Birds, bats, reptiles, insects and soil macro organisms) at periodic intervals. Undertake periodic water quality testing within wetland systems to ensure water quality is acceptable for release. Water sampling 5 years post closure	Rehabilitation monitoring methodology and determination of completion criteria (DnA Environmental 2008). Cadia East Project Environmental Assessment (CHPL April 2009)
Roads	Retain some roads for use by local landholders after consultation	Consider the future needs of the community	5 years prior to mine closure – roads that are to remain are identified in consultation with stakeholders.	Cadia East Project Environmental Assessment (CHPL April 2009)

Table 5-1 Future Industrial Use

Landform	Strategy	Commitment	Performance Indicators	Supporting info

Blayney Dewatering Facility. (Leased)	Removal of all buildings and concrete foundations.
	
	Return to landholder in a suitable and accepted condition for future industrial use.
	
	Termination of lease.
	
	Minimal residual liability from contamination.
		Closure and remediation of the site will occur in two distinct phases:
		<u>Phase 1 – Demolition</u>.
		Following the full transfer of return water pumping capabilities to the new Cadia Dewatering Facility (CDWF) on Newbridge Road, Blayney the following will occur:
		• Residual concentrate (and contaminated waters) transported (trucked) to Cadia for disposal.
		• Pressure cleaning the entire building / plant to remove and capture any contaminants. Waters captured in existing containment systems and pumped or transported to Cadia.
		• Termination and isolation of services including water, return water systems, communications (including fibre optic), electricity, fire water, sewage, Blayney Shire Council treated effluent etc.
		• Hazardous materials will be formally identified (such as asbestos, radiation devices, etc.) and removed in accordance with industry standards prior to handing over the site to the successful demolition tenderer.
		• The area will be fenced to prevent any unauthorised entry.
		• Any remaining concentrate, return water and liquids will be removed (by vacuum truck) and transported to Cadia or the CDWF and blended with existing materials (Note: written approval from DPIE to transport concentrate by truck).
		• Surface infrastructure will be carefully demolished in a controlled and safe manner by a professional and experienced demolition contractor in accordance with AS 2601-2001.
		• The successful tenderer will:
		  ○ Remove all materials and maximise the salvage, re-use and recycling of materials; all materials will be pressure cleaned and inspected (by an independent person) prior to leaving site.
		  ○ Excavate all concrete slabs and foundations, materials will be crushed on site and stockpiled for base fill material following remediation works.
		• Buried pipelines will be flushed with clean water, cut off below ground (nominally >900mm depth) capped and left in situ. Exact location of termination to be surveyed.
		
		<u>Phase 2 – Remediation</u>
		A detailed contamination assessment has been completed, identifying copper contamination in the vicinity of the plant, asphalt apron, drainage lines and Abattoir Creek (sediments). The remediation process is as followed:
		• Complete a detailed Remediation Action Plan, suitable to guide the successful tenderer / contractor (complete (GHD 2020) attached as Appendix E).
		• Identify buried services in the proposed excavation areas. Isolate / obtain the necessary approvals to excavate.
		• Remove / excavate contaminated material and transport to Cadia for encapsulation in the South Waste Rock Dump (PAF Cell).
		• Undertake progressing testing to ensure contamination established thresholds are achieved (NEPM, SEPP55)
		• Complete a validation report, verifying that contamination materials have been thoroughly and successfully removed and that no residual liability remains (above established thresholds).
		• Import clean fill material, sourced from a local quarry or equivalent source that meets definitions of VENM (Virgin Excavated Natural Material) or ENM (Excavated Natural Material) as accepted by the land owner, Pacific National.
		• Compact, shape and 'finish' the material suitable for post occupation land uses as accepted by the land owner, Pacific National
		• Provide remediation action plans and validation reports to stakeholders as required.
		• Relinquish Lease
		
		The following environment and community risks have been identified. Proposed controls are
			Demolition and removal of infrastructure, site left in a suitable condition for future industrial use and accepted by the landowner.
			
			Contamination assessments conducted in accordance with SEPP55 and regulatory guidelines. Any contaminated soils or material is excavated and removed from the site. Site is tested and confirmed to meet future industrial land use guidelines. Condition of site accepted by landowner.
			
			No community complaints
			
			No exceedances of Cadia East Project Approval Criteria.
			
			Consultation undertaken prior and during works with key stakeholders (local residents, Blayney Shire Council and Regulatory Authorities)
				Cadia East Project Environmental Assessment (CHPL April 2009)
				
				SEPP 55 – Remediation of Land
				
				NEPM Guidelines.
				
				Australian Standard 2601-2001 The Demolition of Structures.
				
				Contaminated Land Management Act 1997
				
				Environment Protection Licence 5590
				
				EPA Waste Classification Guidelines
				
				Protection of the Environment Operations Act and Associated Regulations
				
				Envirowest Consulting 2017. Contamination Investigation – Blayney Dewatering Facility
				
				GHD 2020. Blayney Dewatering Facility Remedial Action Plan.
				
				GHD 2017. Abattoir Creek Aquatic Ecology Survey.

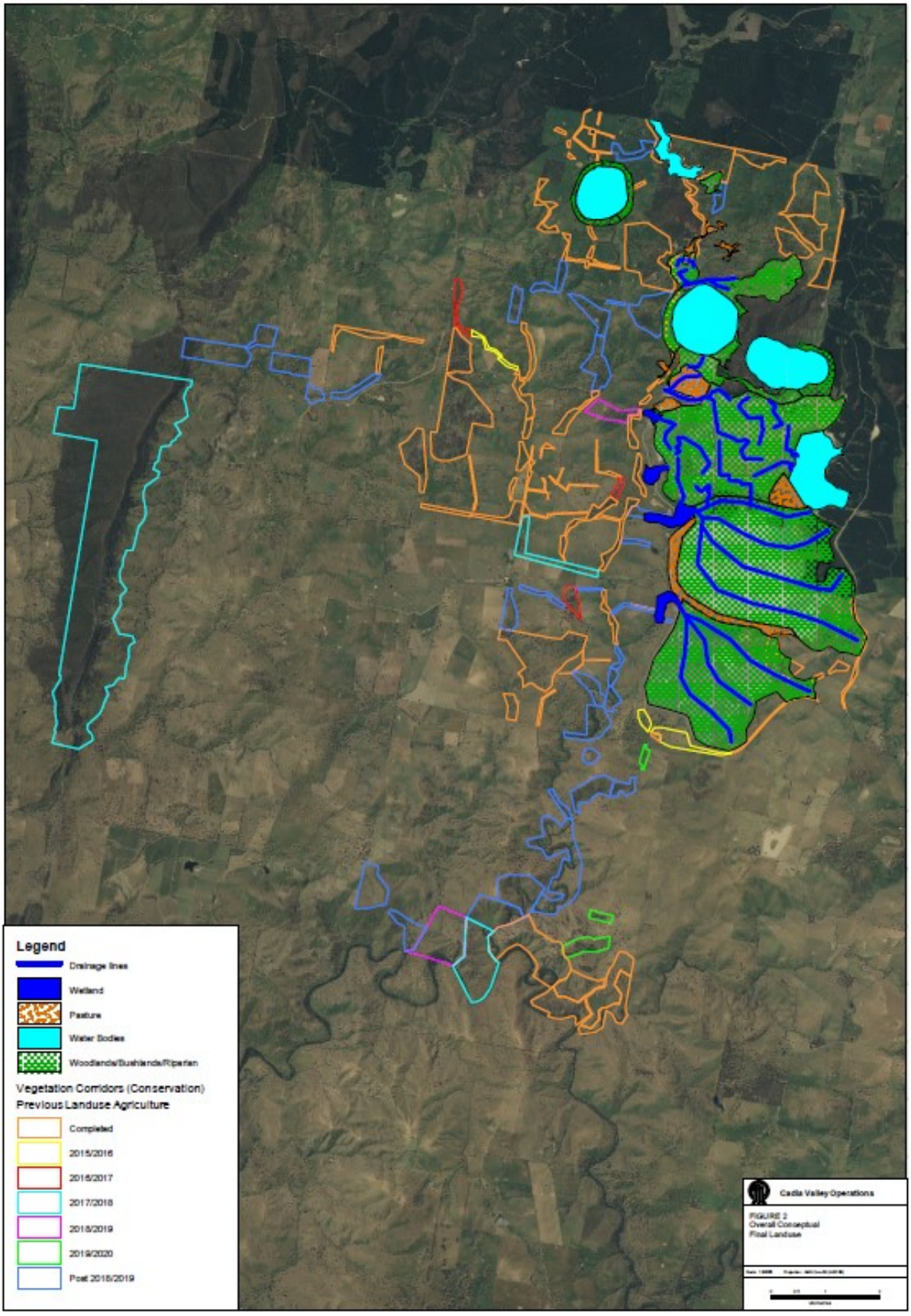
Landform	Strategy	Commitment	Performance Indicators	Supporting info
		also listed: Stakeholder Consultation. A stakeholder engagement plan has been completed and guides the initial and ongoing consultation with key stakeholder including local residents, Blayney Shire Council, Pacific National, LinFox, EPA , CCC etc. Consultation with Blayney Shire Council, CCC, Pacific National, LinFox and EPA has commenced. Stakeholders will be provided with Cadia's Community Complaints Hotline number to raise any concerns during the proposed works. Noise. All demolition and remediation works will be conducted during "day time construction hours" as defined by the Cadia East Project Approval. Periodic noise monitoring (attended) will be conducted to ensure noise criteria (as defined by the Cadia East Project Approval and EPL5590 are being met. Air Quality. Dust emissions from the site will be controlled and managed via the use of sprayers during demolition and concrete slab excavation in accordance with industry practices. Dust gauges will be installed prior to demolition works and remain in place until the completion of works. Waste. All materials removed from site will be pressure cleaned and inspected prior to leaving site. Contaminated soils will be transported to Cadia for encapsulation in the South Waste Rock Dump. Other waste materials will be disposed of in a licenced waste facility suitable and appropriately licenced for that material. Traffic. All traffic movement to and from the facility will occur via the Blayney Industrial area (Marshalls Lane and Gerty Street). Heavy vehicle movements will be strictly restricted to "day time construction hours" as defined by the Cadia East Project Approval. Noise generated by loading and unloading of heavy vehicles will be monitored on a periodic basis by Cadia Staff as described above. Water Resources. Prior to the commencement of works, the successful tenderer(s) will be required to submit an erosion and sediment control plan to be reviewed and approved by Cadia personnel after checking for consistency with relevant approvals. At all times during demolition and remediation, containment will be in place aimed at containing a 1:20 ARI rainfall event to prevent sediment and contaminated materials from exiting the site. Following any rainfall events, accumulated water will be removed by vacuum truck and transported to the Cadia Dewatering Facility and blended with other contained waters which will be pumped to Cadia for re-use. As part of the initial contamination sampling, several groundwater wells were installed these will be sampled prior and monthly for the duration of the works program. Any identified contamination of groundwater will be reported to regulatory bodies in accordance with current practices. Post closure monitoring. Post closure monitoring will include : Abattoir Creek water quality (as per the approved Water Management Plan), groundwater sampling and assessment of the installed piezometers, visual inspection of the post closure landform.		
Cadia Dewatering Facility (CDWF)	Retain for future regional water network / industrial use.	Consultation with Council, community groups or future industrial user groups Update of the approved landscape plan during 2019 to allow the completion of drainage improvement works (As described in the Water Management Plan and the CDWF Environmental Management Plan). Works due to commence during September 2019. Revised landscape plan attached – Appendix D Actions may include the removal of tanks, Flushing pipelines, pumps, surface infrastructure, concrete foundations etc (pending negotiations with potential buyers of the property) Contamination assessment and remediation Sale of land Should there be no future industrial use identified, full demolition of all surface infrastructure, concrete foundations and ancillary infrastructure (town water supplies, electricity services	5 years prior to mine closure – agreed post mining use of these facilities is agreed in consultation with stakeholders.	Cadia East Project Environmental Assessment (CHPL April 2009)

Landform	Strategy	Commitment	Performance Indicators	Supporting info
		and fibre optics may be fully retained, or at least to the property boundary) . Underground pipelines will be disconnected, flushed clean and capped. Contamination assessment and remediation Sale of land		
Retain major water infrastructure (Cadiangullong Dam, Rodds Creek Water Holding Dam, Flyers Creek weir, Cadia Creek weir, the Belubula River pipeline, Blayney concentrate/return water pipeline and Orange effluent pipeline) to ensure that at the end of current approval (2031) it could be available for potential regional water solutions.	Maintain ongoing liaison with local water authorities and relevant regulatory agencies. Retain on site sediment ponds and farm dams for agricultural and conservation purposes Optimise shore lines of Cadiangullong and Rodds Creek for water birds and waders.	Consider the future needs of the community Participate in 5 year reviews of Orange City Council's Integrated Water Cycle Management Strategy. Participate in reviews of the CENTROC regional water security study as required. Commence consultation with local water authorities and relevant regulatory agencies five (5) years prior to the end of the current approval to identify the role of major water infrastructure for regional water solutions. Prepare a water infrastructure strategy that identifies key infrastructure to be retained. Remediate and rehabilitate onsite water storages and sedimentation ponds/dams. Determine water quality within voids / subsidence zones and potential use within regional water management network or alternate (industrial) use.	To have in place by 30 June 2031 an agreement with relevant regulatory agencies and local water authorities for the use of the major water infrastructure. Water sampling 5 years post closure Shore lines of Cadiangullong and Rodds Creek rehabilitated and meeting requirements of 'riparian closure criteria (Section 9)	Orange City Council's Integrated Water Cycle Management Strategy (currently being finalised). CENTROC Water Security Study. Cadia East Project Environmental Assessment (CHPL April 2009)
Retain key industrial infrastructure (including but not limited to access roads, power supply, sheds/concrete pads, hard stand areas) to ensure that at the end of current approval (2031) it could be available for industrial purposes.	Liaise with local planning authorities with regards to demand for industrial land and potential uses for the site.	Participate in 5 year reviews of the Councils of Blayney, Cabonne and Orange City Sub-Regional Rural and Industrial Land Use Strategy. Commence consultation with local planning authorities five (5) years prior to the end of the current approval to identify possible industrial uses for the site. Prepare an industrial land use strategy that identifies key infrastructure to be retained.	To have in place by 30 June 2031 an industrial land use strategy prepared in consultation with local planning authorities and other stakeholders.	Councils of Blayney, Cabonne and Orange City Sub-Regional Rural and Industrial Land Use Strategy (GHD, 2008). Cadia East Project Environmental Assessment (CHPL April 2009)
	Ensure all industrial areas to be retained are fit for purpose.	At the end of the current approval (2031) complete land contamination assessment and remediation (as required) to ensure sites are fit for purpose.	Site remediation in accordance with relevant guidelines made or approved by the NSW DECCW and relevant national standards such as the National Environment Protection Measures (NEPM) (site contamination). These documents are typically revised on a 5 to 10 year cycle. Those current at the time should be used.	Relevant DEH / EPA and NEPM guidelines for site contamination assessment. Cadia East Project Environmental Assessment (CHPL April 2009)

Table 5-1 Future Non-industrial Land Use Options

Landform	*Strategy*	Commitment	Performance Indicators	Supporting info
Surface infrastructure	*Due to the longevity of the mine operation, several additional strategies have been proposed. These have taken into account potential changing community needs, future resource requirements and NRM expectations*	Retain discussions with Council, community groups or future user groups re possible future land use options	5 years prior to mine closure – consultation is undertaken with stakeholders regarding final land uses and mine closure options.	Cadia East Project rehabilitation and landscape management Plan (CHPL April 2009)
	Strategy 1 Potential rural residential area (eg. "Cadia Heights" Camping reserve; Community study centre.	Retain structures of future heritage significance (ie crusher foundations, primary access roads, main power supply) Rehabilitate into native woodland and/or grazing pastures. Retain and/or rehabilitate water storages (sediment ponds, farm dams) Incorporate amenity and aesthetic values (ie amenity) plantings Retain discussions with Council, community groups or future user groups re possible future land use options	To be determined	
	Strategy 2 Conservation reserve developed into a broader conservation reserve that encompasses CVO LMP across the landscape. Some buildings, access roads, power could be retained for ongoing management	Removal of all buildings and structure other than those needed for ongoing management Investigate potential project partners or managers for the long term. Investigate other options for transfer of ownership that ensure the conservation objectives are met	To be determined.	

Figure 2 Conceptual Final land uses



6.0 KEY DOCUMENTS

Key Environment Management System documents are controlled on the Newcrest intranet site (Cadia Document Management System) so they are electronically distributed and readily accessible across the organisation. The key documents relating to site rehabilitation will include:

- Cadia East Project Approval
- Cadia East Environmental Assessment
- Newcrest Environmental Policy and Standards.
- Rehabilitation Strategy
- Environmental Management Strategy
- Land and Biodiversity Management Plan
- Mine Closure Plan
- Mining Operations Plan
- Annual Environmental Management Report

7.0 ROLES AND RESPONSIBILITIES

The General Manager is responsible for the overall environmental performance of Cadia. The Operational Managers have direct environmental responsibility for their areas of control. The Environment Department provides direction and advice to ensure site environmental compliance is maintained.

Several operational managers hold a key role with the implementation of rehabilitation plans, these are outlined below:

<u>Manager Responsible for Cadia Hill Pit / Waste Rock Dumps</u>

Responsible for:

- Planning and implementation of bulk earthworks (as per MOP schedule) during mining including:
  - Shaping of waste rock dumps to the approved profile and other areas as planned
  - Encapsulation of PAF waste rock
  - Spreading of topsoil
  - Major drainage works

<u>Manager Responsible for Tailings Storage Facilities</u>

Responsible for:

- Tailings deposition to achieve a final surface profile requiring minimal earthworks.

<u>Manager Responsible for Environment</u>

Responsible for:

- Preparation of rehabilitation plans, mine closure plan, mine closure estimates etc
- Final surface drainage, seeding, maintenance and monitoring of rehabilitated landforms
- Quality control of rehabilitation outcomes
- Mine closure co-ordination, planning and implementation

Manager Responsible for Projects

Responsible for:

- Planning and executing the demolition and remediation of the Blayney Dewatering Facility.

8.0 REHABILITATION MONITORING

Rehabilitation monitoring is undertaken on an annual basis by an independent qualified ecologist. Results from rehabilitation monitoring are compared against closure criteria, which are based on compatible final land uses and have been developed from a series of reference sites (see Section 9.0).

Reporting of rehabilitation results and comparison against closure criteria is undertaken through the Annual Environmental Management Report (AEMR) and is produced on an annual (financial year) basis.

Ongoing monitoring and maintenance of rehabilitation would be conducted to assess:

- progression of rehabilitated land (against closure criteria); and
- effectiveness of rehabilitation techniques used (including soil erosion controls, water quality within and outside the mining lease areas and revegetation methods).

9.0 MINE CLOSURE CRITERIA

9.1 REHABILITATION

Since 2007-08 Cadia have been developing and assessing rehabilitation monitoring outcomes against mine closure criteria. The methodology adopted by Cadia involves the selection and monitoring of a series of reference sites that reflect the final end land uses proposed for site rehabilitation (such as pasture / grazing, woodland / conservation etc). Rehabilitation monitoring is then compared against the reference sites with the compatible final end land use. For example, a rehabilitation site with a proposed final end land use of pasture is compared against pasture reference sites. A detailed methodology for monitoring against closure criteria is contained in the 2007-08 AEMR (CHPL 2008a)

The monitoring techniques and parameters for reference sites and rehabilitation sites is identical allowing the robust and repeatable comparison of rehabilitation success against closure criteria. Reference sites and rehabilitation sites are both assessed annually at the same time of the year to allow for seasonal influences.

Selecting suitable reference sites is essential as it will ultimately set the benchmark for rehabilitation targets and the criteria to be met for closure. Reference sites chosen for Cadia essentially include the best that could be found within the local context, and as such are a true representation of the pre-mining landscape. The reference sites were spread out where possible to maximise the spatial distribution and subsequent variations in community composition across the local landscape and are not necessarily located on Cadia property. It is acknowledged that reference sites chosen, while they are the best that could be found in a local context are still subject to impact and change due to (for example) occasional grazing, fire, drought, physical disturbance etc. The location of current reference and monitoring sites is contained in Figure 3.

Reference sites have been selected based on the following final land uses:

- Woodland / conservation (currently 3 reference sites are monitored)
- Riparian / conservation (currently 2 reference sites are monitored)

- Pasture / grazing (currently 2 reference sites established)

Parameters measured are identical for reference and rehabilitation sites and represent 5 steps of ecological succession.

Rehabilitation closure criteria (as at 2019) are presented in the following table (Table 9-1). Each parameter measured has a desirable range (based on the minimum and maximum determined from reference sites). Rehabilitation sites have met the closure criteria parameter if the measurement falls within or exceeds this range.

Closure criteria are dynamic and will change from year to year based on annual monitoring, therefore the relevant closure criteria at any time will be contained in the most recent AEMR.

**Within the following tables no/area refers to the following :*

- *Woodland sites – number / 20 x 50m quadrat*
- *Riparian Sites -- number / 20 x 50m quadrat*
- *Pasture sites – number / 20 x 50m quadrat*

Figure 3 Location of reference and monitoring sites (as at July 2019)

Table 9-1 Summary of Mine Closure Criteria

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
Phase 2: Landform establishment and stability	**Landform slope, gradient**	Landform suitable for final land use and generally compatible with surrounding topography	Slope	Landform is generally compatible within the context of the local topography and final landform design.	< Degrees (18°)	**10**	**14**	10	14	9	10
	Active erosion	Areas of active erosion are limited	No. Rills/Gullies	Provides an assessment of the number of gullies or rills occurring in a 50m transect and that these are limited and stabilising	No.	**0**	**0**	**0**	**0**	0	0
			Cross-sectional area of rills	Provides an assessment of the extent of soil loss due to gully and rill erosion and that it is limited and/or is stabilising	m2	**0**	**0**	**0**	**0**	0	0
Phase 3: Growth medium development	**Soil chemical, physical properties and amelioration**	Soil properties are suitable for the establishment and maintenance of selected vegetation species	pH	pH is typical of that of the surrounding landscape or falls within desirable ranges provided by the agricultural industry	pH (5.6-7.3)	**5.7**	**6.6**	**6.2**	**6.5**		
			EC	Electrical Conductivity is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	< dS/m (<0.150)	**0.039**	**0.109**	**0.060**	**0.055**		
			Organic Matter	Organic Carbon levels are typical of that of the surrounding landscape, increasing or fall within desirable ranges provided by the agricultural industry	% (>4.5)	**4.9**	**8.8**	**5.0**	**6.0**		
			Phosphorous	Available Phosphorus is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	mg/kg (50)	**17.4**	**45.3**	**16.7**	**18.7**		
			Nitrate	Nitrate levels are typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	mg/kg (>12.5)	**6.6**	**15.5**	**7.4**	**4.9**		

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			CEC	Cation Exchange Capacity is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	Cmol+/kg (>14)	**7.7**	**25.1**	**12.5**	**20.1**		
			ESP	Exchangeable Sodium Percentage (a measure of sodicity) is typical of that of the surrounding landscape or fall within desirable ranges provided by the agricultural industry	% (<5)	**0.3**	**1.0**	**0.9**	**0.2**		
Phase 4: Ecosystem & Landuse Establishment	**Landscape Function Analysis (LFA): Landform stability and organisation**	Landform is stable and performing as it was designed to do	LFA Stability	Based on key physical, biological and chemical characteristics the LFA stability index provides an indication of the sites stability and that it is comparable to or trending towards that of the local remnant vegetation	%	**66.1**	**73.8**	**75.8**	**76**	63.9	68.4
			LFA Landscape organisation	The Landscape Organisation Index provides a measure of the ability of the site to retain resources and that it is comparable to that of the local remnant vegetation	%	**91**	**100**	**95**	**100**	100	100
	Vegetation diversity	Vegetation contains a diversity of species comparable to that of the local remnant vegetation	Diversity of shrubs and juvenile trees	The diversity of shrubs and juvenile trees with a stem diameter less than 5cm is comparable to that of the local remnant vegetation.	species/ area	**0**	**6**	**5**	**7**		
				The percentage of shrubs and juvenile trees with a stem diameter less than 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	% population	**0**	**100**	**46**	**46**		
			Total species richness	The total number of live plant species provides an indication of the floristic diversity of the site and is comparable to the local remnant vegetation	No./area	**21**	**44**	**45**	**56**		

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			Native species richness	The total number of live native plant species provides an indication of the native plant diversity of the site and that it is greater than or comparable to the local remnant vegetation	>No./area	**8**	**34**	**14**	**31**	0.1	1.5
			Exotic species richness	The total number of live exotic plant species provides an indication of the exotic plant diversity of the site and that it is less than or comparable to the local remnant vegetation	<No./area	**10**	**13**	**25**	**31**	**3.8**	7.6
			Ratio of native to exotic species	The ratio of live native species compared to live exotic plant species provides an indication of the relative native species richness of the site and that it is more than or comparable to the local remnant vegetation	>	**0.6**	**3.4**	**0.5**	**1**		
	Vegetation density	Vegetation contains a density of species comparable to that of the local remnant vegetation	Density of shrubs and juvenile trees	The density of shrubs or juvenile trees with a stem diameter < 5cm is comparable to that of the local remnant vegetation	No./area	**1**	**100**	**6**	**135**	N/A	N/A
	Ecosystem composition	The vegetation is comprised by a range of growth forms comparable to that of the local remnant vegetation	Trees	The number of tree species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**1**	**4**	**3**	**6**	0	0.7
			Shrubs	The number of shrub species regardless of age comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**0**	**6**	**6**	**8**	0	0.3

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			Sub-shrubs	The number of sub-shrub species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**1**		
			Herbs	The number of herbs or forb species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**11**	**25**	**22**	**31**	**10.7**	21
			Grasses	The number of grass species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**4**	**8**	**10**	**12**	**6.3**	11.7
			Reeds	The number of reed, sedge or rush species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**1**	**2**	**1**	**3**	0.3	0.7
			Vines	The number of vines or climbing species comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**1**	0	0
			Ferns	The number of ferns comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**1**	0	0
			Aquatic	The number of ferns comprising the vegetation community is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**0**	0	0
Phase 5: Ecosystem & Landuse Development	**Landscape Function Analysis (LFA): Landform function and ecological performance**	Landform is ecologically functional and performing as it was designed to do	LFA Infiltration	Based on key physical, biological and chemical characteristics the LFA infiltration index provides an indication of the sites infiltration capacity and that it is comparable to or trending towards that of the local remnant vegetation	%	**57.3**	**63.9**	**55.4**	**61.2**	41.7	**47.2**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			LFA Nutrient recycling	Based on key physical, biological and chemical characteristics the LFA nutrient recycling index provides an indication of the sites ability to recycle nutrient and that it is comparable to or trending towards that of the local remnant vegetation	%	**52.8**	**61.2**	**51.4**	**59.8**	35.5	**43.6**
	Protective ground cover	Ground layer contains protective ground cover and habitat structure comparable with the local remnant vegetation	Litter cover	Percent ground cover provided by dead plant material is comparable to that of the local remnant vegetation	%	**55.5**	**90.0**	**46**	**54.5**	47	**67.2**
			Annual plants	Percent ground cover provided by live annual plants is comparable to that of the local remnant vegetation	<%	**0**	**12.5**	**1**	**4**		
			Cryptogam cover	Percent ground cover provided by cryptogams (eg mosses, lichens) is comparable to that of the local remnant vegetation	%	**0**	**0**	**0**	**0.5**	0	0
			Rock	Percent ground cover provided by stones or rocks (> 5cm diameter) is comparable to that of the local remnant vegetation	%	**0**	**1.5**	**0.5**	**5.5**	**0.2**	13
			Log	Percent ground cover provided by fallen branches and logs (>5cm) is comparable to that of the local remnant vegetation	%	**0**	**1.5**	**0**	**11**		
			Bare ground	Percentage of bare ground is less than or comparable to that of the local remnant vegetation	< %	**0.5**	**5**	**1.5**	**6**	0	**1.2**
			Perennial plant cover (< 0.5m)	Percent ground cover provided by live perennial vegetation (less than 50cm in height) is comparable to that of the local remnant vegetation	%	**2.5**	**22**	**28.5**	**41**	23	51
			Total Ground Cover	Total groundcover is the sum of protective ground cover components (as described above) and that it is comparable to that of the local remnant vegetation	%	**95**	**99.5**	**94**	**98.5**	43.7	**97**

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
	Ground cover diversity	Vegetation contains a diversity of species per square meter comparable to that of the local remnant vegetation	Native understorey abundance	The abundance of native species per square metre averaged across the site provides an indication of the heterogeneity of the site and that it is has more than or an equal number of native species as the local remnant vegetation	> species/m^2	**0.2**	**4**	**1.0**	**6.2**	4	8
			Exotic understorey abundance	The abundance of exotic species per square metre averaged across the site provides an indication of the heterogeneity of the site and that it is has less than or an equal number of native species as the local remnant vegetation	< species/m^2	**1.2**	**2.8**	**1.6**	**4.8**	**13**	23
	Native ground cover abundance	Native ground cover abundance is comparable to that of the local remnant vegetation	Percent ground cover provided by native vegetation <0.5m tall	The percent ground cover abundance of native species (<0.5m) compared to exotic species is comparable to that of the local remnant vegetation	%	**3.2**	**77.4**	**18.3**	**83.6**		
	Ecosystem growth and natural recruitment	The vegetation is maturing and/or natural recruitment is occurring at rates similar to those of the local remnant vegetation	shrubs and juvenile trees 0 - 0.5m in height	The number of shrubs or juvenile trees less than 0.5m in height provides an indication of establishment success and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	**0**	**105**	**5**	**231**	n/a	n/a
			shrubs and juvenile trees 0.5 - 1m in height	The number of shrubs or juvenile trees 0.5-1m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	**0**	**4**	**5**	**62**	n/a	n/a
			shrubs and juvenile trees 1 - 1.5m in height	The number of shrubs or juvenile trees 1-1.5m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**0**	n/a	n/a

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range		2019 Riparian ecosystem range		2009 Pasture ecosystem range	
Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			shrubs and juvenile trees 1.5 - 2m in height	The number of shrubs or juvenile trees less than 1.5-2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	**0**	**0**	**0**	**1**	n/a	n/a
			shrubs and juvenile trees >2m in height	The number of shrubs or juvenile trees less than 2m in height provides an indication of establishment success, growth and/or natural ecosystem recruitment and that it is comparable to that of the local remnant vegetation	No./area	**0**	**1**	**0**	**3**	n/a	n/a
	Ecosystem structure	The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation	Foliage cover 0.5 - 2 m	Projected foliage cover provided by perennial plants in the 0.5 - 2m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	**0**	**0**	**0**	**0**	0	0
			Foliage cover 2 - 4m	Projected foliage cover provided by perennial plants in the 2 - 4m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	**0**	**0**	**0**	**6**	0	2.3*
			Foliage cover 4 - 6m	Projected foliage cover provided by perennial plants in the 4 -6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	**5**	**7**	**9**	**22**	0	0
			Foliage cover >6m	Projected foliage cover provided by perennial plants greater than 6m vertical height stratum indicates the community structure is comparable to that of the local remnant vegetation	% cover	**43**	**52**	**47**	**49**	0	0

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range	2019 Riparian ecosystem range	2009 Pasture ecosystem range

Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						Lower KPI	Upper KPI	Lower KPI	Upper KPI	Lower KPI	Upper KPI
	Tree diversity	Vegetation contains a diversity of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree diversity	The diversity of trees or shrubs with a stem diameter greater than 5cm is comparable to the local remnant vegetation	species/area	**1**	**5**	**4**	**5**		
				The percentage of maturing trees and shrubs with a stem diameter greater than 5cm dbh which are local endemic species and these percentages are comparable to the local remnant vegetation	%	**100**	**100**	**100**	**100**		
	Tree density	Vegetation contains a density of maturing tree and shrubs species comparable to that of the local remnant vegetation	Tree density	The density of shrubs or trees with a stem diameter > 5cm is comparable to that of the local remnant vegetation	No./area	**9**	**48**	**8**	**28**		
			Average dbh	Average tree diameter of the tree population provides a measure of age, (height) and growth rate and that it is trending towards that of the local remnant vegetation.	cm	**25**	**68**	**32**	**62**	n/a	n/a
	Ecosystem health	The vegetation is in a condition comparable to that of the local remnant vegetation.	Live trees	The percentage of the tree population which are live individuals and that the percentage is comparable to the local remnant vegetation	% population	**88.9**	**95.8**	**86**	**88**	n/a	n/a
			Healthy trees	The percentage of the tree population which are in healthy condition and that the percentage is comparable to the local remnant vegetation	% population	**16.7**	**62.5**	**25**	**32**	n/a	n/a
			Medium health	The percentage of the tree population which are in a medium health condition and that the percentage is comparable to the local remnant vegetation	% population	**25**	**50**	**46**	**63**	n/a	n/a
			Advanced dieback	The percentage of the tree population which are in a state of advanced dieback and that the percentage is comparable to the local remnant vegetation	% population	**0**	**22.9**	**0**	**7**	n/a	n/a

Rehabilitation Phase	Aspect or ecosystem component	Completion criteria	Performance Indicators	Description of performance indicators	Unit of measurement	2019 Woodland ecosystem range	2019 Riparian ecosystem range	2009 Pasture ecosystem range

Performance indicators are quantified by the range of values obtained from replicated reference sites assessed in 2015						**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**	**Lower KPI**	**Upper KPI**
			Dead Trees	The percentage of the tree population which are dead (stags) and that the percentage is comparable to the local remnant vegetation	% population	**4.2**	**11.1**	**13**	**14**	n/a	n/a
			Mistletoe	The percentage of the tree population which have mistletoe provides an indication of community health and habitat value and that the percentage is comparable to the local remnant vegetation	% population	**0**	**0**	**0**	**0**		
			Flowers/fruit: Trees	The presence of reproductive structures such as buds, flowers or fruit provides evidence that the ecosystem is maturing, capable of recruitment and can provide habitat resources comparable to that of the local remnant vegetation	% population	**41.7**	**88.9**	**50**	**54**		
			Hollows	The presence of hollows provides evidence that the ecosystem is maturing, and can provide habitat resources comparable to that of the local remnant vegetation	% population	**0**	**44.4**	**4**	**25**		

9.2 VOIDS

The following broad criteria have been developed for the closure of the Ridgeway and Cadia East subsidence zones and the upper remaining portion of the Cadia Hill Pit.

- Voids are safe with minimal risk to the public, native fauna and livestock.
- 100% Access is restricted to subsidence zone areas
- Access is restricted to the Cadia Hill Pit, with the exception of undertaking water sampling (if safely accessible)
- Water quality is consistent with modelling predictions
- Undertake hydro geochemistry assessment of Cadia Hill Pit water body to determine long term risks.
- There is no impact on wider groundwater quality.
- 5 years from mine closure investigate future possible industrial use of the void and / or water from the Cadia Hill Pit or the role of the water body in a regional water use scheme.
- Water quality is suitable for industrial use or use within a regional water management scheme.
- Undertake water sampling (access pending) 5 years post closure.

9.3 SITE INFRASTRUCTURE

The following broad criteria have been developed for the closure and rehabilitation of surface infrastructure areas (excluding revegetation which is addressed in section 9.1)

- 5 years prior to the completion of mining, commence consultation with local, state and federal authorities and industries regarding potential future industrial uses of the site.
- To have in place by 30 June 2031 an agreement with relevant regulatory agencies and industry for the future industrial use of the site
- Should no future industrial use be identified, demolish and remove site surface infrastructure and rehabilitate to pasture (refer to closure criteria for pasture section 9.1)
- Some selected infrastructure may be retained for future ‘general land use’ such as electricity services, water services, sheds.
- The area is safe with minimal risk to the public, native fauna and livestock
- There is no adverse environmental effect outside the disturbed area and that the area is properly drained and protected from erosion.
- There is no residual soil contamination in the area,
- There is minimal risk to surface and groundwater quality
- Undertake water sampling (access pending) 5 years post closure.

9.4 WATER INFRASTRUCTURE

The following broad criteria have been developed for the closure and rehabilitation of water infrastructure assets

- 5 years prior to the completion of mining, commence consultation with local, state and federal authorities and industries regarding potential future uses of water management assets at the site.
- To have in place by 30 June 2031 an agreement with relevant regulatory agencies and local water authorities for the use of the major water infrastructure.

- Remediation of dams/contaminated sites so that they are fit for agricultural / conservation purposes.
- The area is safe with minimal risk to the public, native fauna and livestock
- There is no adverse environmental effect outside the disturbed area and that the area is properly drained and protected from erosion.
- There is no residual soil contamination in the area,
- There is minimal risk to surface and groundwater quality
- Water quality monitoring confirms stored water meets ANZECC (2000) guidelines for agricultural purposes (livestock drinking water, short and long term irrigation).
- Water sampling 5 years post closure

10.0 REPORTING

10.1 ANNUAL ENVIRONMENTAL MANAGEMENT REPORT

CVO will prepare an Annual Environmental Report (AEMR) to:

- Fulfil the requirements of the Cadia East project Approval, Environment Protection Licence 5590, Mine Lease Conditions and the requirements of the Environment Protection and Biodiversity Conservation Act Approval
- Report on the status of approvals, leases, licences, environmental risk management and environmental control strategies.
- Provide a summary of community relations and liaison, mine development and rehabilitation in relation to the Mine Operations Plan (MOP).
- Outline any proposed improvements in relation to environmental monitoring and management systems and environmental performance.
- Specify environmental and rehabilitation targets to be achieved during the ensuing 12 month period.

10.2 WEBSITE

Information is available through the Cadia Valley Operations website www.cadiavalley.com.au.

The website contains:

- Cadia East Environmental Assessment;
- Cadia East Project Approval and other statutory requirements;
- Current Management Plans, Monitoring Programs and Performance Reports
- Key environmental performance indicators;
- Details of complaints

11.0 REVIEW

11.1 REVIEW OF STRATEGY

This Rehabilitation Strategy will be reviewed every five years, or as required, to ensure the currency and usefulness of the document. The review will include an assessment of the effectiveness of the established systems and its performance against the objectives and targets.

11.2 CONSULTATION

As per project approval requirements, CVO has consulted with an approved* expert panel during the preparation of this strategy. The expert panel comprised the following members:

- Dr David Goldney
- Dr Donna Johnston
- Martin Haege
- Dr Guy Fitzhardinge

In addition, CVO has consulted with the members of the Community Consultative Committee (CCC) which contains a range of members including representatives of local government and residents. Summary of feedback received is contained in the following table (Table 11-1). The CCC is chaired by an independent chair-person and meets on a quarterly basis. The CCC will also be consulted following any reviews of this strategy.

* The expert panel was approved by the Director General – NSW Department of Planning and Infrastructure on the 28th of October 2010

Table 11-1 Summary of comments received through consultation and CVO's response

Issue Raised	Response
Why can't the pit, subsidence depressions, underground roads and infrastructure be interconnected into a water storage system.	Strategy allows for this under "future potential industrial use of site"
There is mention of wildlife corridors being developed but are these being co-ordinated with surrounding landholders and Land care Groups.	Strategy was modified to include this initiative under "vegetation corridor enhancement areas"
Pest species, weeds, bushfire concerns	Discussion had with CCC member explaining high level of strategy and further detail will be provided in the Land and Biodiversity Management Plan regarding these issues.
Consideration of use of tailings storage facilities for forage crops (like Lucerne)	Expert panel considered high risk (erosion / degradation) and not sustainable in the long term. Also offering little biodiversity benefit.
Use of voids for waste disposal	Strategy allows for this under "future potential industrial use of site"
Rehabilitation of historic mining disturbance in State Listed Heritage Area	Discussion had with CCC member explaining high level of strategy and further detail will be provided in the Land and Biodiversity Management Plan. Heritage Act issues and restrictions may affect ability to undertake suggested works.
Caution regarding the rehabilitation of mine disturbed areas and the balance of conservation vs agriculture.	Expert panel considered returning mine disturbed landscapes back to agriculture high risk (erosion / degradation) and not sustainable in the long term.

11.2.1 Consultation Regarding the Demolition and Remediation of the Blayney Dewatering Facility site

Revision 2 of the Rehabilitation Strategy included detailed information on the demolition of the Blayney Dewatering Facility and the remediation of the site including the removal of contaminated soils, import of clean fill material and relinquishment of the lease. Prior to the commencement of demolition works in early 2020, detailed consultation was undertaken both with the Environment Protection Authority (EPA) and Blayney Shire Council (BSC). The following table (Table 11-2) provides a summary of consultation undertaken.

Table 11-2 Summary consultation for the demolition of the Blayney Dewatering Facility

Date	Consulted	Consultation
31/8/2017	EPA	Provision of contamination assessment report
15/9/2017	BSC (Mayor, General Manager, Director - Planning and Environmental Services)	Presentation of initial contamination assessment findings
3/11/17	EPA	Provision of Abattoir Creek Ecological Assessment Report
13/11/17	BSC and CCC	Overview Update provided at CCC Meeting
12/12/17	EPA & BSC	Overview Update provided at AEMR Meeting
12/2/18	BSC and CCC	Overview Update provided at CCC Meeting
18/8/2018	BSC (Mayor, Councillors, General Manager and Directors)	Presentation of contamination assessment findings and remedial plans
11/12/18	EPA & BSC	Overview Update provided at AEMR Meeting
25/3/19	EPA	Cadia site meeting and update on demolition and remedial plans. Hard copy of remedial Action Plan provided
21/1/2020	BSC (Director - Planning and Environmental Services)	Update on commencement of demolition works and remedial plans.
1/6/20	EPA	Provided final Remedial Action Plan as part of EPL variation application.

11.2.2 Consultation with the NSW Resource Regulator

As stated in Section 4.9, the Mining Operations Plan (required by Mine Lease Conditions) is consistent with the content of this Rehabilitation Strategy and contains identical information on the overarching rehabilitation strategy, final landforms, final land-uses and mine closure criteria etc. The MOP is reviewed and assessed (against MOP guidelines) and approved by the NSW Resource Regulator. The MOP has recently been updated and approved by the Resource Regulator in March 2020.

12.0 REFERENCES

Cadia Holdings Pty Limited (1995) *Cadia Project Environmental Impact Statement.* Report prepared by Woodward Clyde.

Cadia Holdings Pty Limited (2000) *Ridgeway Project Environmental Impact Statement*. Report prepared by Resource Strategies.

Cadia Holdings Pty Limited (CHPL) (2006) *Cadia Valley Operations Off-Site Rehabilitation Management Plan.*

Cadia Holdings Pty Limited (CHPL) (2008) North waste Rock Dump Rehabilitation Plan.

Cadia Holdings Pty Limited (CHPL) (2008a) 2007-08 Annual Environmental Management Report (September 2008)

Cadia Holdings Pty Limited (CHPL) (2009) *Cadia East Environmental Assessment. Prepared by Resource Strategies for Cadia Holdings Pty. Ltd.*

Cadia Holdings Pty Limited (CHPL) (2009a) *Cadia Valley Operations Land Management Plan.*

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Cadia Holdings Pty Limited (CHPL) (2010b) *Mine Closure Plan.*

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Cadia Holdings Pty Limited (CHPL) (2010d) *2009-10 Annual Environmental Management Report.*

Cadia Holdings Pty Limited (CHPL) DRAFT (2010e) *Historical Heritage Management Plan.*

Cadia Holdings Pty Limited (CHPL) (2011) 2011-2013 *Mining Operations Plan*

Cadia Holdings Pty Limited (CHPL) (2011a) *2010-11 Annual Environmental Management Report.*

Cadia Holdings Pty Ltd (CHPL 2011) 2011 - 2013 Mining Operations Plan

Cadia Holdings Pty Ltd (CHPL 2016) 2016 - 2019 Mining Operations Plan

Envirowest Consulting 2017. Contamination Investigation – Blayney Dewatering Facility

GHD 2017. Abattoir Creek Aquatic Ecology Survey.

GHD 2020. Blayney Dewatering Facility Remedial Action Plan. Newcrest Mining Limited (NML) (2002) Group Environmental Standard – Mine Closure.

Newcrest Mining Limited (NML) (2009) *Newcrest Environmental Policy.*

NSW Government, Department of Planning (2010) *Cadia East Project Approval Part 3A of the EP&A Act 1979.*

13.0 APPENDIX A – ACID MINE DRAINAGE STANDARD

EN ST01 Acid and Metalliferous Drainage Management Standard

1. INTENT

1.1. This Standard details the requirements for management of acid and metalliferous drainage (AMD) at Newcrest operations.

2. APPLICATION

2.1. This standard shall apply to all managed Newcrest sites throughout the entire lifecycle, including exploration, construction, development and closure.

2.2. The standard shall apply to all Newcrest employees, contractors, sub-contractors and visitors.

2.3. No work shall be performed by any employee, contractor, sub-contractor or visitor unless they are trained, verified as competent and authorised to start that work by an authorised Newcrest person.

3. PERFORMANCE REQUIREMENTS

3.1. Planning

3.1.1. Acid and metalliferous drainage must have clear accountability and be managed in compliance with relevant permits and regulatory requirements. Where risk assessment identifies significant sensitive environmental receptors that are not adequately protected by regulatory permit conditions, site based monitoring and environmental management systems shall be applied to complement regulatory requirements.

3.1.2. Baseline characterisation and sampling must be undertaken which identifies and documents the geological setting and the potential for acid and metalliferous drainage

3.1.3. Prepare and maintain risk assessments relating to acid and metalliferous drainage and apply controls to manage risks. Update risks assessments prior to significant operational or project changes relevant to AMD management.

3.2. Implement and Operate

3.2.1. All sites and projects with potential to generate AMD must develop, implement and maintain an AMD Management Plan to manage potential releases and environmental impacts.

3.2.2. Maintain an inventory specifying the quantity, location and characteristics of materials with potential to generate or mitigate AMD.

3.2.3. Develop and implement operational procedures to manage and mitigate risks relating to AMD.

ENS01 Acid and Metalliferous Drainage Management 8/12/2017 Page 3 of 31

Uncontrolled if printed. See Intranet for the latest version.

3.2.4. All facilities with potential AMD risk shall be closed in accordance with the Mine Closure Plan to mitigate risks.

3.2.5. The closure of facilities with potential AMD risk must ensure geotechnical and geochemical stability, the control of infiltration and seepage and eliminate where possible the need for ongoing treatment and management.

4. PERFORMANCE MEASURES

4.1. Monitor

4.1.1. Each site with potential AMD risk shall maintain a monitoring program appropriate to the potential for AMD impacts.

14.0 APPENDIX B – BIODIVERSITY STANDARD

EN ST03	Biodiversity Management	Standard

1. INTENT

1.1. This Standard details the requirements for management of biodiversity influenced by Newcrest activities.

2. APPLICATION

2.1. This standard shall apply to all managed Newcrest sites throughout the entire lifecycle, including exploration, construction, development and closure.

2.2. The standard shall apply to all Newcrest employees, contractors, sub-contractors and visitors.

2.3. No work shall be performed by any employee, contractor, sub-contractor or visitor unless they are trained, verified as competent and authorised to start that work by an authorised Newcrest person.

3. PERFORMANCE REQUIREMENTS

3.1. Planning

3.1.1. Biodiversity aspects shall be managed to ensure compliance with relevant regulatory permits and approvals and any voluntary standards or codes of which Newcrest is a signatory. Where risk assessment identifies significant sensitive environmental biodiversity receptors that are not adequately protected by regulatory permit conditions, site based monitoring and environmental management systems shall be applied to complement regulatory requirements.

3.1.2. A documented knowledge base must be developed and maintained of regional biodiversity features and their significance.

3.1.3. The risks and potential impacts to biodiversity due to Newcrest activities shall be identified and assessed prior to disturbance of new land areas.

3.1.4. Integrate Biodiversity Management into project planning and decision making through the complete project life-cycle, facilitating the design projects that avoid potential significant impacts on Biodiversity and identify opportunities to protect and enhance Biodiversity.

3.2. Implement and Operate

3.2.1. Develop and maintain a Biodiversity Management Plan that will include the following as a minimum:

3.2.1.1. An overview of the knowledge base;

3.2.1.2. A summary of the biodiversity values assessment;

3.2.1.3. Legal obligations and commitments relating to biodiversity protection;

3.2.1.4. The application of a mitigation hierarchy of avoid, minimize, mitigate and offset for potential impacts in agreement with regulatory bodies; and,

3.2.1.5. Improvement objectives, targets and actions for integration into relevant mine or project plans e.g. Environmental Management Plan, Land Use Management Plan and Closure Plan.

4. PERFORMANCE MEASURES

4.1. Monitor

4.1.1. Develop and implement processes to track implementation of the Biodiversity Management Plan objectives including monitoring in accordance with the Plan or as required by regulatory conditions.

15.0 APPENDIX C LAND USE AND DISTURBANCE MANAGEMENT STANDARD

EN ST07 | Land Use and Disturbance Management | Standard

1. INTENT

1.1. This Standard details the requirements for management of Land Use and Disturbance associated with Newcrest activities.

2. APPLICATION

2.1. This standard shall apply to all managed Newcrest sites throughout the entire lifecycle, including exploration, construction, development and closure.

2.2. The standard shall apply to all Newcrest employees, contractors, sub-contractors and visitors.

2.3. No work shall be performed by any employee, contractor, sub-contractor or visitor unless they are trained, verified as competent and authorised to start that work by an authorised Newcrest person

3. PERFORMANCE REQUIREMENTS

3.1. Planning

3.1.1. Land use and disturbance must be managed in accordance with relevant regulatory requirements and permit conditions. Where risk assessment identifies significant sensitive environmental receptors that are not adequately protected by regulatory permit conditions, site based monitoring and environmental management systems shall be applied to complement regulatory requirements.

3.1.2. Document and maintain risk assessments relating to land management including identified controls for significant risks.

3.1.3. A register of tenure information must be maintained for all land where Newcrest activities are undertaken.

3.1.4. Map land use domains across the operation that define the permitted land use and constraints in each area. Ensure land use domains have been developed with regard to the interests of key stakeholders and rehabilitation and closure objectives.

3.2. Implement and Operate

3.2.1. Develop, implement and maintain a Land Use Management Plan that must include as a minimum:

3.2.1.1. A summary of the tenure, customary/traditional land ownership, physical and social setting;

3.2.1.2. Protected areas or limitations on land use;

3.2.1.3. Objectives and targets relating to use and management of land

ENS07 Land use and Disturbance Management 8/12/2017 Page 16 of 31

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which are consistent with the closure plan including annual targets for progressive rehabilitation;

3.2.1.4. Responsibilities and accountabilities for land-use management;

3.2.1.5. Obligations and commitments related to land use management;

3.2.1.6. Stakeholder engagement processes relating to land management and land access;

3.2.1.7. A summary of the risk assessment and key controls;

3.2.1.8. A register of contaminated sites with coordinates and remediation plans;

3.2.1.9. Procedures for monitoring and maintenance; and

3.2.1.10. Emergency preparedness and response measures for land related events.

3.2.2. Develop and implement operational procedures for land management including inspections and monitoring programs for the following areas:

3.2.2.1. Land clearance and vegetation removal authorisation;

3.2.2.2. Sediment and erosion control;

3.2.2.3. Top soil management;

3.2.2.4. Land access and stakeholder engagement;

3.2.2.5. Management of soil contamination and remediation.

4. PERFORMANCE MEASURES

4.1. Monitor

4.1.1. The coordinates of all disturbed land shall be recorded in a land disturbance register or equivalent system.

16.0 APPENDIX D – REVISED CADIA DEWATERING FACILITY LANDSCAPE PLAN

PROPOSED DETENTION BASIN

REFER TO PLANS BY NEWCREST MINING LIMITED

EXISTING DETENTION BASIN TO BE REMOVED

EXISTING EARTH MOUND TO BE RETAINED ~27m

EXISTING EARTH MOUND TO BE REMOVED (IN PART) REMOVED MATERIAL SHALL BE USED TO EXTEND WESTERN MOUND AS INDICATED

EXISTING EARTH MOUND

END OF EXISTING MOUND

6m Spacing

6m To Boundary

8m To Boundary

5m Spacing

5m Spacing

8m Spacing

EXISTING RETURN WATER POND

EXISTING SLURRY POND

LOAD OUT APRON

DEWATERING PLANT ADMIN & AMENITIES

PLANT

SHED

TANK

EXISTING BYPASS DRAIN (NO SURVEY)

GREAT WESTERN RAIL SIDING

LOT 102 DP 1161062

LOAD OUT APRON

RAILWAY

LOT 106 DP 1161062

EXISTING ACCESS (NO SURVEY)

EXISTING DETENTION BASIN TO BE REMOVED

EXISTING BYPASS DRAIN (NO SURVEY)

EXISTING DETENTION BASIN

EXISTING DRAIN (NO SURVEY)

EXISTING EARTH MOUND

EXISTING DWELLING APPROXIMATE LOCATION

APPROXIMATELY 215m

NEWBRIDGE TO BLAYNEY

EXISTING ENTRANCE (NO SURVEY)

EXISTING WINDBREAK / SCREEN PLANTINGS ON ADJOINING PROPERTY

ROAD

40.245 40.245 54.655 84.295 27.0 158.85 120.185 263.2 217.675 49.3 60.43 45.62 60.37 45.195 60.37 45.68 166.025 103.24 46.59 100 502 100.0 102.31

PLANT SCHEDULE

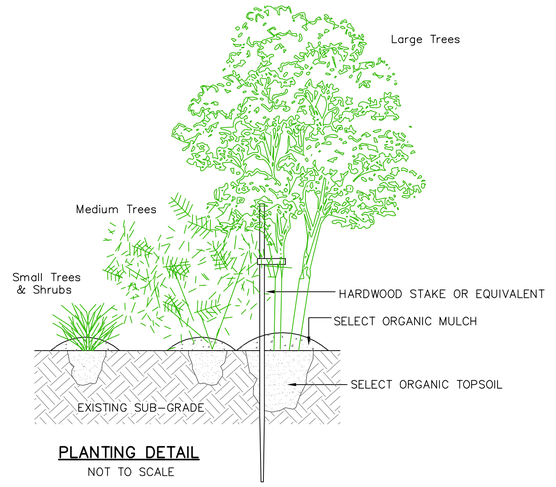
PLANTING SYMBOL	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	POT SIZE	APPROXIMATE QUANTITY	PLANT SPACING (m)
Large Trees Eucalyptus	blakelyi bridgesiana dalrympleana dives goniocalyx ovata pauciflora rubida stelluliata viminalis	Red Gum Apple Mountain Gum Broad leaf Peppermint Long leaf Box Swamp Gum Snow Gum Candlebark Gum Black Sally Ribbon Gum	16m 15m 30m 25m 15m 12m 12m 20m 10m 20m	Tube Stock or Verti Cell at planting	100	15
Medium Trees Acacia	dealbata implexa melanoxylon pravissima rubida vestita	Silver Wattle Hickory Wattle Blackwood Ovens Wattle Red Stern Wattle Hairy Wattle	12m 12m 20m 6m 3m 4m	Tube Stock or Verti Cell at planting	100	3–5
Small Trees / Shrubs Callistemon	citrinus paludosus	Red Bottlebrush River Bottlebrush	2m 4 – 10m	Tube Stock or Verti Cell at planting	100	3–5

NORTH

NOTES:

- CONTRACTOR SHALL REFER TO BLAYNEY SHIRE COUNCIL'S "STREET & OPEN SPACE TREE MANAGEMENT GUIDLINES" FOR ADDITIONAL INFORMATION
- TREE PLANTINGS TO BE STAKED AT PLANTING WITH HARDWOOD STAKES & PLANTED IN HOLES PARTIALLY BACKFILLED WITH SELECT ORGANIC MATERIAL & FERTILISER TO ASSIST INITIAL GROWTH
- TREE PLANTINGS SHOWN APPROXIMATE MATURE SIZE

DENOTES PROPOSED EARTH MOUND 3m HIGH AS ADDITIONAL NOISE & VISUAL SCREEN



PLANTING DETAIL

NOT TO SCALE

AMENDMENT	DATE	DETAILS
INITIAL	2.09.19	PRELIMINARY ISSUE ONLY

SERVICES SHOWN ON THIS PLAN HAVE BEEN DETERMINED BY SURFACE INSPECTION ONLY. OTHER SERVICES MAY EXIST WITHIN THE SITE. SERVICE AUTHORITIES MUST BE CONTACTED PRIOR TO THE COMMENCEMENT OF ANY SITE WORKS TO DETERMINE THE EXACT LOCATION OF SUCH SERVICES.

THIS PLAN DOES NOT DEFINE BOUNDARIES

CONTOUR INTERVAL 0.5m and 0.1m

DIAL BEFORE YOU DIG www.1100.com.au

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IMPORTANT NOTES

- THIS PLAN HAS BEEN PREPARED FOR DEVELOPMENT APPLICATION PURPOSES ONLY
- ALL DIMENSIONS AND AREAS SHOWN ARE SUBJECT TO SURVEY
- DO NOT RELY ON THIS PLAN FOR THE LOCATION & TYPE OF EASEMENTS THAT MAY AFFECT THE LAND. THESE SHOULD BE ASSERTAINED BY SURVEY SEARCH AND/OR FIELD SURVEY.
- FUTURE EASEMENTS MAY BE REQUIRED FOR SERVICING OR OTHER REASONS, & AS SUCH ARE SUBJECT TO FINAL SURVEY AND/OR ENGINEERING DESIGN.

SCALE

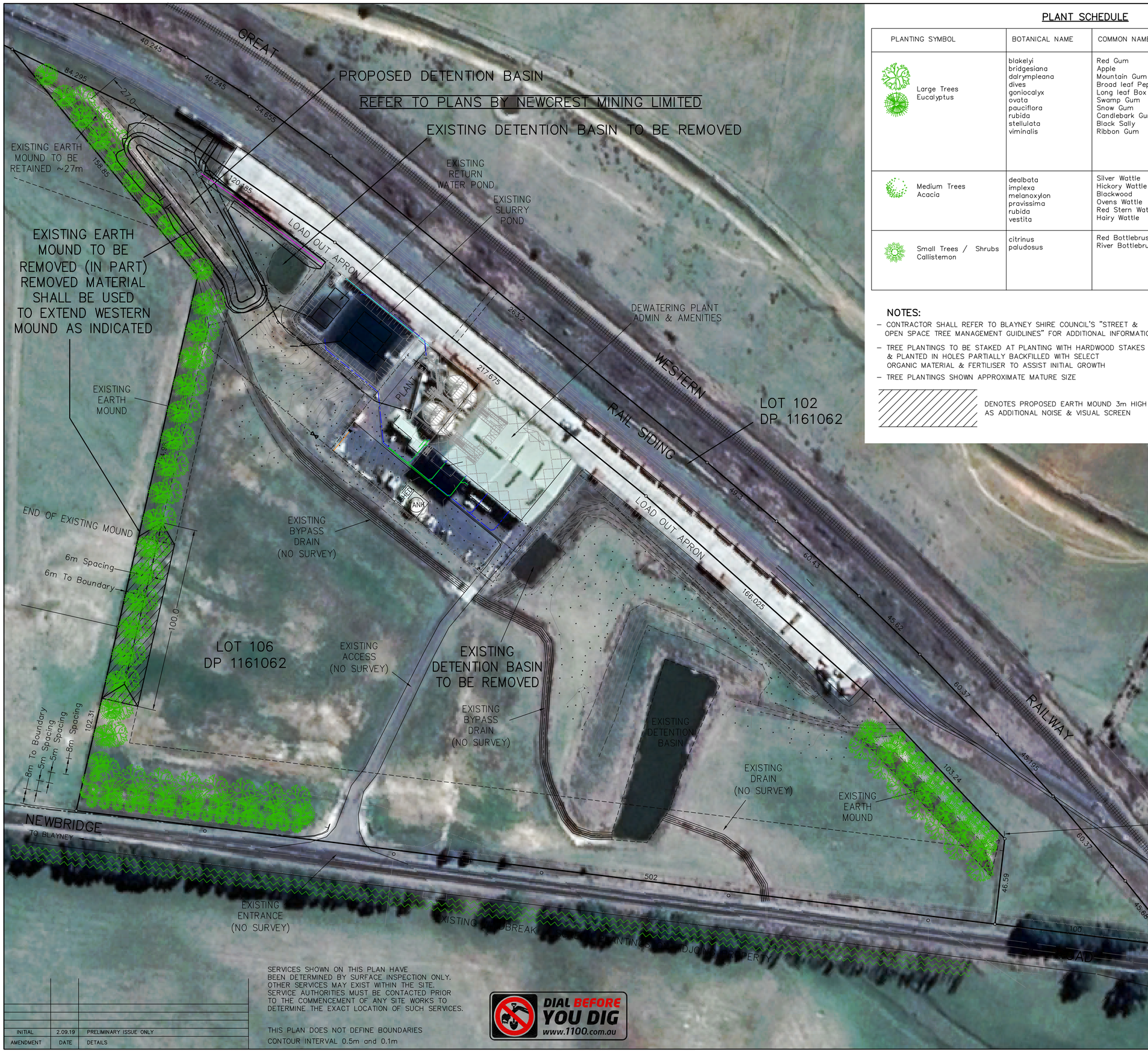
0 12.5 25 37.5 50m

PLAN 1 : 1000 A1

CADIA VALLEY OPERATIONS – SEALINK CONCENTRATE FILTRATION & HANDLING FACILTY – NEWBRIDGE ROAD – BLAYNEY

FIGURE 2 – PROPOSED LANDSCAPING PLAN

DATE: 2.09.2019 | REFERENCE: 2014-071 | SHEET: 2 OF 2



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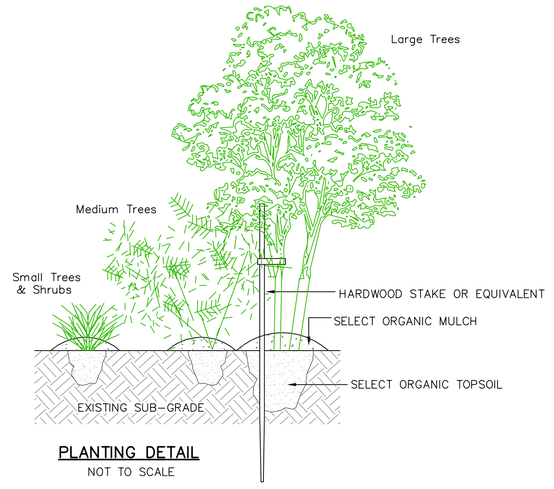
DENOTES PROPOSED EARTH MOUND 3m HIGH AS ADDITIONAL NOISE & VISUAL SCREEN



PLANTING DETAIL
NOT TO SCALE

AMENDMENT	DATE	DETAILS
INITIAL	2.09.19	PRELIMINARY ISSUE ONLY

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THIS PLAN DOES NOT DEFINE BOUNDARIES
CONTOUR INTERVAL 0.5m and 0.1m

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SCALE
0 12.5 25 37.5 50m
PLAN
1 : 1000 A1

CADIA VALLEY OPERATIONS – SEALINK CONCENTRATE FILTRATION & HANDLING FACILTY – NEWBRIDGE ROAD – BLAYNEY
FIGURE 2 – PROPOSED LANDSCAPING PLAN

DATE:	REFERENCE:	SHEET:
2.09.2019	2014-071	2 OF 2

17.0 APPENDIX E. BLAYNEY DEWATERING FACILITY REMEDIAL ACTION PLAN

Newcrest Mining Limited

Blayney Dewatering Facility

90 Gerty Street, Blayney, NSW 2799

Remedial Action Plan

January 2020

Executive summary

GHD Pty Ltd (GHD) was engaged by Newcrest Mining Limited (Newcrest) to provide environmental consultancy services related to copper contamination identified at the former Blayney Dewatering Facility, located at 90 Gerty Street, Blayney, NSW 2799, including preparation of this remedial action plan (RAP). The objectives of the RAP are to:

- Delineate the vertical and horizontal extent of contamination requiring remediation at the site and in the adjacent Abattoir Creek and unnamed drainage channel (the drainage channel)
- Undertake data gap assessment and risk assessment of the copper impacted sediments in sediments and surface water in adjacent Abattoir Creek to the north
- To present a strategy for remediation of the copper impacted soils at the site, and the adjacent drainage channel to the east.
- To provide a framework for validating the remedial activities at the site

Based on the site use history as a dewatering facility for copper ore concentrate, the primary contaminant of potential concern was identified as copper. Concentrations of copper were identified in soil, sediment, and surface water samples at above the adopted ecological health assessment criteria, both onsite and offsite within the adjacent drainage channel and Abattoir Creek in a number of samples. Concentrations of copper in all samples were below the adopted human health assessment criteria. Concentrations of copper were below the laboratory limit of reporting and/or adopted assessment criteria in all groundwater samples collected from the site.

The objective of the remedial strategy presented within this RAP is to enable the Newcrest lease to be terminated in accordance with the lease conditions in such a manner that:

- No ongoing contamination liability exists for the site as a result of dewatering activities at the site
- No environmental management plan is required to manage contamination at the site
- No environmental management plan is required to manage contamination located offsite in either Abattoir Creek or offsite within the adjacent drainage channel.

The proposed remediation methodology will facilitate removal of source material on the site, and the adjacent drainage channel, followed by reinstatement with imported fill (where required). This is expected to result in reduction in potential contaminant load in surface and stormwater runoff from the site into Abattoir Creek, and to preclude the requirement for ongoing management. The proposed methodology is as follows:

- Demolition of existing site infrastructure and buildings
- Data gap assessment to address data gaps on the site and refinement of remedial extent (where required)
- Ecological risk assessment of Abattoir Creek and refinement of remedial extent (where required)
- Excavation of hardstand and soil in the nominated onsite and offsite remedial areas
- Transport of excavated material to Cadia Operations site for disposal
- Validation sampling of excavation areas

- Reinstatement of excavations with imported virgin excavated natural material (VENM), excavated natural material (ENM), suitable quarry material, or potential reuse of crushed concrete won from demolition works at the site (where appropriate)
- Preparation of a validation report

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the report.

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1. Introduction

1.1 Background

GHD Pty Ltd (GHD) was engaged by Newcrest Mining Limited (Newcrest) to provide environmental consultancy services related to copper contamination identified at the former Blayney Dewatering Facility, located at 90 Gerty Street, Blayney, NSW 2799 (partial Lot 1 of DP 1006860, and partial Lot 299 of DP 1004555), as identified in Figure 1 of Appendix A (the site).

Newcrest leases the site, and operated a mining ore dewatering facility processing copper sulphide concentrate from 1997 until decommissioning in August 2016. Previous investigations have identified concentrations of copper above the adopted ecological health assessment criteria in soil at the site, and in soil and sediment within the adjacent Abattoir Creek and an unnamed drainage channel (the drainage channel). Remediation and/or management of the contamination is required to enable transferal of the site to the nominated owner, Pacific National (NSW) Pty Ltd.

A remedial action plan (RAP) was previously prepared by Envirowest Consulting Pty Ltd (Envirowest) (2018b), which proposed excavation of impacted soil at the site, lining of excavation with geomembrane material, and capping with imported material. In addition to this, Envirowest stated the residual contamination at the site, and contamination identified offsite, would be managed via an Environmental Management Plan (EMP). It is understood however, that Newcrest are to return the site to the site owner as the lease is being terminated, and adoption of an EMP is not considered a suitable long-term solution.

GHD was engaged by Newcrest therefore, to undertake a review of historical environmental reports for the site, and to prepare a suitable and technically feasible RAP that does not require implementation of an EMP.

1.2 Objectives

The objectives of the RAP were:

- Delineate the vertical and horizontal extent of contamination requiring remediation at the site and in Abattoir Creek and the unnamed drainage channel (the drainage channel) originating at the site
- To present a strategy for remediation of the copper impacted soils at the site, and sediment, soil and surface water in Abattoir Creek and the drainage channel
- To provide a framework for validating the remedial activities at the site

1.3 Scope

To meet the objectives described in Section 1.2, GHD undertook the following scope of works:

- Reviewed previous contamination reports for the site, including Envirowest (2018b) *Remediation Action Plan: Blayney Dewatering Facility* prepared for the site
- Undertook a site inspection on 26 November 2019
- Preparation of this RAP

1.4 Limitations

The limitations are described in Section 13 of this report.

1.5 Assumptions

GHD prepared this RAP in consideration of the following assumptions:

- The zoning will be unchanged following the remedial works, and land use will continue to be commercial/industrial
- The site falls within the premises defined in NSW Environment Protection Authority (2018) *Environment Protection Licence 5590.* In addition, offsite contamination identified within Abattoir Creek and the drainage channel is considered to have originated from the site, and is able to be managed in an identical manner to material originating from the site, in relation to disposal purposes.
- Access to offsite locations Abattoir Creek and the drainage channel will be granted by the landowner for the purposes of remediation.
- Due to the designation of Cadia Valley Operations (which includes the site) as a State Significant Development, a development approval is not required for remedial activities at the site
- Site infrastructure will be demolished, identified data gaps assessed, and remedial extents refined prior to commencement of remedial works
- No bulking factor has been applied to soil and sediment located insitu, and volumes described within this report are estimates only
- A minimum compression standard has not been specified for backfill materials. This should be agreed upon by the site owner prior to commencement of remedial works.

2. Site summary

2.1 General

A summary of the site identification details is provided in Table 1

Table 1 Site identification

Information	Details
Site address	90 Gerty Street, Blayney, NSW 2799
Lot and DP	(partial) Lot 1 in DP 1006860 (partial) Lot 299 in DP 1004555
Tennant	Newcrest Pty Ltd
Owner	Pacific National (NSW) Pty Ltd
Local government area	Blayney Shire Council
Zoning	IN2 – light industrial
Area	Approximately 1.6 hectares
Approximate grid coordinates	-33.526038, 149.251752

2.1 Site history

The site is leased by Newcrest from Pacific National and operated as a dewatering facility for the Cadia Valley Operations located at Cadia Road, Cadia, NSW 2800 (the Cadia site) between 1997 and August 2016. During this time, ore concentrate was piped from the Cadia site and dewatered before being loaded for rail transport. The water was then returned to the mine. Decommissioning of the dewatering facility occurred between August and December 2016, with a replacement dewatering facility constructed to the east of Blayney. Since 2016, the site has continued to operate as a pumping station, pumping return water from the replacement facility to the Cadia site.

Envirowest (2017a) undertook a review of the 1988 topographical map which indicated that the site contained livestock yards on the northern side of the rail siding, and was likely a holding pen associated with the former abattoir located nearby. Prior to its use as a dewatering facility, the site is expected to have been vacant land, or associated with the rail sidings and railway yards for uses such as storage of shipping containers and associated machinery (Envirowest, 2017a). It is noted that a historical title search and/or description of historical aerial imagery have not been undertaken for the site to date.

No documented spills have been recorded for the site, and dewatering and loading into containers occurred within a concrete floored building onsite. Copper ore concentrate was typically stored within shipping containers to the east of the site buildings. No underground or above-ground tanks for fuel storage were known to be located at the site, however sumps to the south of the dewatering plant were observed by Envirowest (2017a) for storage of residual material from wash-down activities.

Site infrastructure included a road easement, dewatering pond, dewatering infrastructure, rail siding, and loading apron. Although decommissioned for dewatering purposes between August and December 2016, the site continues to be used as a pumping station for return water processed from the replacement dewatering facility and as such, some infrastructure currently remains operational.

The *Blayney Local Environment Plan 2012* (BLEP 2012) (NSW Government, 2019) identified that the site is zoned as IN2, light industrial. Re-zoning of the site is not proposed, and the current IN2 zoning, as described in BLEP 2012 (NSW Government, 2019) allows for a number of uses, the most sensitive of which include neighbourhood shops, take away food and drink

premises, and other similar commercial/industrial land uses. Child-care facilities, educational establishments, and residential accommodation are prohibited uses for the site (NSW Government, 2019).

It is likely that the site will continue to be utilised for commercial/industrial purposes based on its current site use, proximity to rail facilities, site owner and the current commercial and industrial uses of adjacent properties.

2.2 Surrounding site use

Surrounding site use is summarised in Table 2.

Table 2 Summary of surrounding land use

Direction from site	Distance from site	Description
South / east	0 m	The property to the south and east of the site is utilised for storage of shipping containers (owned and operated by Pacific National Pty Ltd). A site office and warehouse are also located at the site. Most of the ground surface appears sealed (concrete and asphalt).
South-east	120 m	Blayney train station
South	90 m	Low-density residential buildings with grass/soil access.
South-west	0 m	Rail lines
South-west	90 m	Blayney Preschool
West	90 m	Low-density residential properties beyond rail line, rail corridor, and Doust Street.
North-west	120 m	ICR Engineering (industrial site).
North-east	300 m	St Joseph's Primary School
North and north-east	From 0 m	Maria Street W is immediately adjacent to the site, with Abattoir Creek adjacent to and 30 m north of the site. Industrial/commercial properties and farmland lie beyond.

2.3 Previous investigations

GHD undertook a review of reports from previous investigations undertaken at the site to facilitate development of this RAP. A summary of these is provided below.

2.3.1 Envirowest Consulting Pty Ltd (2017a) *Contamination Investigation: Blayney Dewatering Facility (Ref: R7794c2.4)*

Objective

To identify past potentially contaminating activities, identify potential contamination types, discuss the site condition, provide a preliminary assessment of the site contamination and assess the need for further investigation or remediation.

Scope of work

Site inspections were undertaken by Envirowest on 9 and 13 February 2017, 14 and 21 July 2017. Envirowest undertook sampling at the site using a systematic 25 m grid-based sampling pattern, resulting in 35 sampling locations as indicated in Figure 3 of Appendix A. Investigation locations included:

- Installation and groundwater sampling of four monitoring wells (MW1-MW4) in each of the north, east, south, and west of the site, to a maximum constructed depth of nine metres
- Sediment sampling within Abattoir Creek at locations 37-42 to a maximum depth of 0.10 mbgl
- Surface water sampling within Abattoir Creek at locations 43-47
- Soil sampling in locations 1-9, 11, 15-19, and 21-35 at depths ranging between 0.1 and 1.2 mbgl, and in locations 10, 12, 13, 14, 20 at depths between 0.1 and 3.0 mbgl

Soil samples were generally analysed for heavy metals, benzene, toluene, ethylbenzene, xylenes (BTEX), naphthalene, and total recoverable hydrocarbons (TRH). Surface water and sediment samples were analysed for copper only.

Results

Soil samples were assessed against NEPC (2013) commercial/industrial criteria for human and ecological health for the analytes described above. Concentrations of copper in soil samples collected from the site were below the NEPC (2013) assessment criteria for human health, but exceeded the ecological assessment criteria in a number of locations.

Sediment samples were assessed against the interim sediment quality guideline (ISQG) for highly disturbed ecosystems (ANZECC, 2000), with a number of samples shown to exceed this criterion.

Surface water samples were assessed against a hardness modified freshwater aquatic ecosystem trigger value for protection of 95% of species (ANZECC, 2000), which was exceeded in one location (45). However, GHD observes that it is now recommended that copper toxicity data and guidance values are no longer modified for water hardness (Warne, et al., 2018).

Groundwater samples were assessed against NHMRC & NRMMC (2014) drinking water guidelines, with concentrations of copper observed to be below the limit of reporting and/or the assessment criteria.

Conclusions and recommendations

No soil or water samples collected contained analytes exceeding the adopted health-based assessment criteria. Copper was the only contaminant of concern identified and exceeded the adopted ecological assessment criteria in soil, sediment and surface water samples. Copper contamination was not observed in groundwater samples.

Additional investigations to determine the extent of the contamination were recommended, including:

- Offsite impacts in sediment
- Leachability of copper in soil
- Detailed assessment of impacts on the aquatic ecology
- Additional sampling following demolition of the site infrastructure
- Bunding around the stormwater drains during demolition
- Stormwater management during demolition.

2.3.2 Envirowest Consulting Pty Ltd (2017b) *Additional Investigation Blayney Dewatering Facility (Ref: L7794c3)*

Objective

To delineate copper impacted sediment within the creek to enable preparation of a remedial action plan. Specifically, to analyse sediment using the toxicity characteristic leaching procedure (TCLP) to characterise the leachability of copper in sediments.

Scope of work

Envirowest undertook an investigation on 6 October 2017 to determine the extent of impacted sediments in Abattoir Creek and the drainage channel down-gradient from the site. Sample locations are indicated in Figure 3 of Appendix A. The investigation included:

- Collection of five sediment samples from Abattoir Creek (locations 101-105) and four sediment samples from the drainage channel (locations 106-109)
- One surface water sample was collected from each of Abattoir Creek (location 111) and the drainage channel (location 110)
- Three soil samples were collected on the site, in each of the northern, southern and north-eastern part of the site. Samples were collected from 0.5 mbgl and 1.0 mbgl.
- Sediment and water samples were analysed for copper
- Analysis of copper using TCLP on six soil and sediment samples, previously collected from the site in June 2017 (locations 10-1000, 20-500, 35-500, 38, 40, 42)

Results

Sediment samples collected offsite within Abattoir Creek and the drainage channel were analysed for copper and assessed against the ANZECC (2000) ISQG for highly disturbed ecosystems, with concentrations of copper in sediments identified within both Abattoir Creek and the drainage channel at above the adopted assessment criterion.

Surface water samples were assessed against ANZECC (2000) hardness modified freshwater aquatic ecosystem trigger value for protection of 95% of species. Concentrations of copper in all samples were below the assessment criterion.

Concentrations of copper following TCLP were variable, with no relationship observed between primary analytical results and leachability results.

GHD observe that samples collected from the drainage channel were assessed against ANZECC (2000) sediment quality guidelines, however GHD consider this material to be soil (as opposed to sediment).

Conclusions and recommendations

Concentrations of copper in sediment reduced with distance from the site, and were below the assessment criteria 200 m from the site in both Abattoir Creek and the drainage channel.

Additional investigations were recommended to characterise the lateral distribution of copper within Abattoir Creek and the drainage channel.

2.3.3 Envirowest Consulting Pty Ltd (2017c) *Additional Investigation Blayney Dewatering Facility (Ref: L7794c4)*

Objective

Envirowest undertook an investigation over 16 November and 7 December 2017 to determine the extent of impacted sediments in Abattoir Creek and the drainage channel down-gradient from the Blayney Dewatering Facility.

Scope of work

The investigation locations are indicated in Figure 3 of Appendix A and included:

- Collection of 13 sediment samples from three locations in Abattoir Creek (locations 39, 42, 112), and 12 sediment samples from three locations in the drainage channel (locations 106.1, 107.1, 108.1).
- Samples were collected from both the high water level, and from the base of the creek. Samples were collected from various depths ranging from surface level to 300 mm below ground level in samples collected from Abattoir Creek, and from 0-100 mm, 400-500 mm, and 900-1000 mm in two of three locations, with surface samples only (0-100 mm) collected in location 108.
- Collection of one surface water sample (location 112) from Abattoir Creek
- Analysis of three samples (one from Abattoir Creek, and two from the drainage channel) to characterise the bioavailability of copper to flora and fauna
- Copper analysis of three leaf matter samples to determine accumulation in vegetation, two from willow trees and one from cumbungee (cattails)
- Total of 29 samples collected

Results

Grey discolouration, consistent with mining ore was observed on the surface soils within the drainage channel. The ambient background concentration of copper in sediments was determined to be 35 mg/kg and background pH of 6.5, though sample locations used to determine this background concentration are unknown. Bioavailability of copper in sediments was measured at between 4.3-26.0%.

Surface water samples were assessed against a hardness modified freshwater aquatic ecosystem trigger value for protection of 95% of species of 603 mg/L (ANZECC, 2000), with concentrations of copper exceeding this criterion in Abattoir Creek immediately downstream from the site, and in the drainage channel downstream near Adelaide Street North.

Sediment samples were assessed against the ANZECC (2000) ISQG for highly disturbed ecosystems. Concentrations of copper in sediment samples collected between 0.0 and 0.10 m exceeded the assessment criterion in samples collected from Abattoir Creek down downstream from the site, between the site and Adelaide Street North, and from the drainage channel within samples collected between Gerty Street and Maria Street. Concentrations of copper in samples collected from 200-300 mm below ground level were below the ANZECC (2000) assessment criteria.

Conclusions and recommendations

Elevated levels of copper in sediments were identified within Abattoir Creek and the drainage channel downstream of the site. The elevated levels were restricted to the upper 100 mm of the sediment profile.

2.3.4 GHD (2017) *Abattoir Creek Aquatic Ecology Survey*

Objectives

In 2017, GHD undertook an aquatic ecology survey of the Abattoir Creek adjacent to the dewatering facility, to determine the current ecological health of the system, up- and downstream of the stormwater outlet from the site.

Scope of works

The survey included the investigation of seven locations along Abattoir Creek, three located upstream and four downstream of the stormwater outlet, and included:

- Macroinvertebrate sampling at edge habitat and benthic regions and assessment
- Vertebrate (fish) assessment by electrofishing
- Habitat assessment of sample locations, including general attributes of the site, the instream, habitat and a visual assessment of human disturbances
- In situ physico-chemical water quality assessment including temperature, pH, electrical conductivity, dissolved oxygen and turbidity. Samples were also collected and analysed for alkalinity, nutrients, metals and hardness
- To provide some context to the survey, historical surface water data collected by Newcrest both upstream and downstream was also assessed. The temporal range of water quality data was from 2001 to 2017
- Sediment samples collected from the seven sampling locations were analysed for heavy metals including copper

Results

Surface water samples were assessed against the ANZECC (2000) water quality guidelines. In summary:

- All samples exceeded the nutrient concentration guidelines which were considered consistent with SIGNAL-2 bi-plot assessments that the communities were generally indicative of those which have been exposed to industrial, agricultural and urban pollution with high nutrient exposure.
- Dissolved oxygen concentrations and electrical conductivity readings were all within the guideline values.
- Surface water temperatures ranged from 6.4 °C to 8.8°C.

The surface water results showed an increase in copper downstream of the stormwater outlet, however, results were within 10% of the hardness modified trigger value (HMTV) calculated for the study. GHD recorded a second spike in surface water copper downstream of a refuelling depot, which was above the HMTV for the study, but was still below the concentrations recorded in the Envirowest contamination report (2017c).

Sediment samples were assessed against the interim sediment quality for highly disturbed sites guidelines. Samples located upstream of the discharge point had copper concentrations of an order of magnitude lower than samples downstream. Copper concentrations exceeded the ISQG value of 270 mg/kg at two locations and had a range of values from 60 to 1,380 mg/kg.

Macroinvertebrate samples at all sites were considered to be severely impaired (BAND-C) and one site upstream of the discharge point was considered extremely impaired (BAND-D) by the AUSRIVAS model. Higher O/E50 ratios were located downstream, which generally indicate improved ecological health.

All three of the fish species (Common Carp, Mountain Galaxias and Plague minnow) collected in Abattoir Creek during the fish survey were present at sampling locations both upstream and downstream of the discharge point. Overall, the results from this study show that Abattoir Creek is in poor ecological condition despite the occurrence of Mountain Galaxias throughout the surveyed sections. There were no clear indications that poor conditions were linked specifically to elevated levels of copper in the water and sediments as the bio-assessment, based on the macroinvertebrate surveys, indicated that the whole section of Creek is in poor condition and has low ecological value

Conclusions

The conclusions of the survey stated that the results from surface water, fish species and macroinvertebrate sampling showed no evidence of significant difference between all the sampling locations, both up- and downstream of the stormwater outlet, suggesting that factors other than the elevated copper levels are, or have in the past, caused significant deleterious impacts on the overall ecological health of Abattoir Creek.

2.3.5 Envirowest Consulting Pty Ltd (2018a) *Additional creek sediment sampling downslope of the Blayney Dewatering Facility (Ref: L7794c5)*

Objectives

Envirowest Consulting Pty Ltd (Envirowest) undertook an investigation on 18 January 2017 to determine the extent of impacted sediments in Abattoir Creek, down-gradient from the site.

Scope of works

The investigation locations are indicated in Figure 3 of Appendix A and included:

- Collection of five sediment samples from between the site and Adelaide Street North, and south of the railway lines (parallel to Henry Street and Farm Lane) (locations 201, 202, 203, 38, 42)
- Samples were collected from the edge of the bank at the mid-water level
- Samples collected from between the railway line and Belubula River were analysed for copper, iron, pH, organic carbon, acid volatile sulphide (AVS)
- Samples collected from west of Gerty Street were not assessed for copper, but were analysed for , iron, pH, organic carbon, AVS, and one sample (location 38) was analysed for particle size distribution

Results

Sediment samples were assessed against the ANZECC (2000) ISQG for highly disturbed ecosystems. Concentrations of copper in sediment samples collected between the railway line and Belubula River ranged from 40 to 108 mg/kg and were below the adopted assessment criterion (ANZECC, 2000). Copper concentrations within these samples was considered unlikely to impact on the creek ecology.

Bioavailability parameters sampled indicated the creek sediments contained high levels of iron, silty/clay and organic carbon, and Envirowest (2018a) revised the sediment assessment criterion for copper to 600 mg/kg.

2.3.6 Envirowest Consulting Pty Ltd (2018b) *Remediation Action Plan: Blayney Dewatering Facility (Ref: R7794rap1.2)*

Based on their previous investigations at the site, Envirowest prepared a RAP to remediate the impacted area, which were identified as the dewatering pond and tank area including areas to the north and south, and the drainage channel (both onsite and offsite).

The general remedial methodology proposed was as follows:

- Removal of surface vegetation
- Excavation of copper impacted soil
- Transport of impacted material to the Cadia Mine
- Validation sampling
- Backfilling of excavation with ENM or VENM
- Management of residual contamination with an environmental management plan

It was also proposed that 'any copper impacted soil unable to be excavated' due to presence of services, will be contained (capped) using an impermeable geotextile membrane, and backfilling with a minimum of 0.50 m thickness of compacted gravelly clay. An environmental management plan would then be developed and implemented to manage the capping layer and potential future breaches.

2.3.7 GHD Pty Ltd (2019a) CVO AEMR - Surface and Groundwater Assessment Report

GHD undertook monitoring of surface water and groundwater quality to meet the Cadia Holding Pty Ltd (CHPL) internal and annual reporting requirements, which included assessment of water quality within Abattoir Creek adjacent to the Blayney Dewatering Facility. GHD noted that historically, spatial trends of water quality were apparent, with copper concentrations generally being higher downstream of the site. Following conclusions of operations at the site however, increased copper concentrations downstream of the site were no longer observed.

Concentrations of copper within the upstream monitoring location NEC061 ranged between <0.001 and 0.009 mg/L. Concentrations of copper within the downstream monitoring location NEC062 ranged between <0.001 and 0.034 mg/L. Concentrations of copper during the most recent monitoring round, undertaken in June 2019, was below the laboratory limit of reporting in NEC061, and 0.004 mg/L in NEC062.

3. Site condition

GHD undertook a site walkover on 26 November 2019. Observations made during this walkover are described within the sections below, with illustrative photographs provided in Appendix B.

3.1 Topography

The site is located at approximately 863 m above the Australian Height Datum (AHD) and was observed to be generally flat, with a minor (<0.5 m) depression where the drainage channel in the north of the site is located.

Regional topography indicates that the town of Blayney is located within a relatively flat erosional depression, likely formed by the Belubula River, which traverses the area in a north-east to south-west direction.

3.2 Buildings and roads

The site is accessed from the north via Gerty Street, with access via the south not possible due to the presence of railway lines and rail corridor bordering the site.

Surfaces across the site were observed to be most asphalt, generally in good condition with some cracks visible. A concreted area is located on the northern side of the dewatering plant. A narrow unsealed strip of land in the north of the site between site buildings and the drainage channel was bare soil covered with gravel (i.e. not sealed).

The surface to the south of the dewatering pond was observed to be covered with asphalt in good condition, with concrete edging and access paths also in good condition. West and north of the dewatering pond are unsealed, covered with grass and weeds with some bare soil visible. The dewatering pond is fenced with a chain-link fence, topped with rows of barbed wire.

The buildings that formerly housed the dewatering plant remain at the site. These are constructed of concrete and steel, and clad in corrugated iron. Two concentrate storage tanks for storage of return water are located between the main plant building and the dewatering pond.

3.3 Vegetation

Vegetation at the site is sparse due to surfaces being covered in asphalt. However, established trees border the northern boundary of the site, along the banks of Abattoir Creek. Aquatic plants such as Azolla, Common Starwort and waterweed was found within the creek by GHD (2017) as well as sedge, dock weed, rush and speedwell around the banks. Offsite, grass covers the base of the drainage channel. Vegetation in these areas did not appear distressed.

3.4 Contaminant indicators

Contaminant indicators at the site were described by Envirowest (2017a) to be grey surface discolouration along the road easement, in the location of stored containers (likely containing copper ore, before or after dewatering). The discolouration was observed to have the appearance of ore concentrate and covered an area of approximately 60 x 5 m.

The site continues to pump return water between the replacement dewatering facility located east of Blayney and the Cadia site. During the site walkover, the pumps were not operational, and surface water had pooled near the pump house.

Copper staining was observed on concrete surfaces within the decommissioned site buildings still present on site.

3.5 Geology

The Blayney 1:100 000 Geological Map (Geological Survey of New South Wales, 1997), indicates that the geology underlying the town of Blayney is characterised by siltstones and river stones derived from felsic volcanics, volcanic sandstone, and limestone of the Anson Formation (Geoscience Australia, 1995). The area immediately to the south of the train line (at the southern extent of the site) appears to be underlain by the Blayney Volcanics of the Carbonne Group, characterised by basalt and volcanic sandstone.

The site appears to be atop alluvium from the Cainozoic (current) era (Geological Survey of New South Wales, 1997), likely associated with the Belubula River, and characterised by gravel, sand, silt and clay. Previous investigations at the site undertaken by Envirowest (2017a) encountered gravels, clay and silt, consistent with this. A summary of material observed during these investigations is presented in Table 3.

Table 3 Summary of material observations

Depths observed	Material	Origin	Contaminant indicators
0.0-0.4	Bitumen Sandy gravel, yellow, dark yellow-brown, grey Gravelly sand, yellow-brown, dark yellow brown moist	Fill	-
0.0-0.7	Clayey gravel, dark brown	Fill	-
0.3-1.5	Gravelly clay: dark yellow-brown with ironstone	Natural	-
0.2-1.8	Silty clay: grey, yellow-brown, dark yellow-brown, red-brown, dark brown, bright yellow dry, moist to wet	Natural	Organic odour
1.8-2.2	Clayey silt, dark grey to black with gravel	Natural	-
2.2-3.0	Silty clay, grey, dark grey, yellow-grey	Natural	-

3.6 Hydrology

Abattoir Creek is an urban stream in an industrial area, receiving road and stormwater, and may be utilised for irrigation and/or stock watering. Surface water runoff from the site is expected to enter stormwater grates on the site which were observed by GHD to discharge to Abattoir Creek, or may discharge to the drainage channel located in the northern extent of the site. Abattoir Creek discharges to Belubula River, approximately 830 m south-west of the site. Belubula River, in turn, discharges to Carcoar Lake, approximately 11.30 km south-west of the site.

A search of the Bureau of Meteorology (2019) *Australian Groundwater Explorer* bore records by GHD on 04 December 2019 identified the presence of eight registered bores within 1000 metres of the site. These are summarised in Table 4

Table 4 Summary of groundwater bores

Bore ID	Latitude / Longitude	Distance to site / direction	Purpose	Status
GW030980	-33.530663 / 149.252014	490 m south	Recreation	Unknown

Bore ID	Latitude / Longitude	Distance to site / direction	Purpose	Status
GW704346	-33.526109 / 149.258113	580 m east	Monitoring	Abandoned
GW057777	-33.531819 / 149.253533	620 m south south-east	Recreation	Unknown
GW701704	-33.530002 / 149.247055	640 m west south-west	Water supply	Functioning
GW700028	-33.532329 / 149.25618	780 m south-east	Water Supply	Unknown
GW048610	-33.532051 / 149.257014	810 m south-east	Water supply	Unknown
GW045394	-33.528996 / 149.260347	820 m east-south-east	Exploration	Abandoned
GW053845	-33.534769 / 149.250414	920 m south	Recreation	Functioning

Groundwater was encountered between 2.6 m and 5.3 m below top of casing (mbTOC) in four groundwater monitoring wells installed at the site, with groundwater flow direction inferred to be to the north, towards Abattoir Creek (Envirowest, 2017a). Due to the observed depth to groundwater, and the relatively impermeable clayey soils observed at the site, it is considered unlikely that hydraulic conductivity exists between Abattoir Creek and groundwater at the site. No registered groundwater bores were observed to be hydraulically down-gradient within 1000 metres of the site.

3.7 Identified contamination

3.7.1 Contaminants of concern

Based on the site use history as a dewatering facility for copper ore concentrate, the primary contaminant of potential concern at the site was identified as copper.

Petroleum hydrocarbons (including BTEX and TRH fractions) were also initially considered a contaminant of potential concern (COPC); however, investigations by Envirowest (2017a) determined that concentrations of these COPC were below the laboratory limit of reporting in all samples (soil, sediment and water) collected and analysed.

3.7.2 Rationale for assessment criteria

GHD consider that the zoning, historical site use, and likely future site use as described in Section 2 imply that the site falls within the NEPC (2013) commercial/industrial generic land use scenario. This scenario includes the following assumptions, which are considered applicable to the site, and therefore to determine the soil validation criteria:

- Single or multistorey buildings
- Does not include childcare, educational, or residential site use
- Users of the site are adult employees
- Outdoor areas are largely covered by hardstand with limited areas of landscaping or lawns

Abattoir Creek is an urban stream in an industrial area, receiving road and stormwater which is consistent with the Australian and New Zealand Government (ANZG) (2019) definition of ‘highly disturbed system’. However, the ANZG (2019) freshwater criteria for 95% species protection was adopted for copper in freshwater, due to surface water within Abattoir Creek ultimately discharging to Belubula River.

The drainage channel is a constructed depression for diverting surface water. Water was not observed within the drainage channel during the site inspection undertaken by GHD on 26 November 2019, and it is considered to be a non-flowing or ephemeral and artificial channel. ANZECC (2000) defines 'aquatic ecosystem' to be a watery environment in which plants and animals interact with the chemical and physical features of the environment. The drainage channel is not considered to meet this definition, and as such, the NEPC (2013) environmental investigation levels (EILs) for soil-specific added contaminant limits for aged copper in soils were adopted, for commercial/industrial land use. Envirowest (2017c) calculated the EIL based on a pH of 6.5, an added contaminant limit (ACL) of 400 mg/kg, and an ambient background concentration (ABC) for copper of 35 mg/kg.

Sediment within Abattoir Creek was assessed against the ANZG (2019) *Pathway for toxicant default guideline value publication* upper guideline value (GV-high).

GHD has assessed the environmental samples collected during investigations undertaken by Envirowest (Envirowest, 2017a; Envirowest, 2017c; Envirowest, 2018a) against the assessment criteria described in Table 5.

Table 5 Adopted assessment criteria for copper

Assessment criterion	Matrix	Location	Unit	Criterion value
NEPC (2013) HIL	Soil	Onsite	mg/kg	240,000
NEPC (2013) EIL^	Soil	Onsite, and offsite within the drainage channel	mg/kg	435
ANZG (2019) GV-high	Sediment	Offsite within Abattoir Creek	mg/kg	270
NEPC (2013) GIL	Groundwater	Onsite	mg/L	2
ANZG (2019) freshwater 95%	Surface water	Offsite within Abattoir Creek	µg/L	1.4

3.7.3 Soil

Concentrations of copper in soil samples collected onsite were below the NEPC (2013) HIL assessment criteria in all samples. Sample locations are provided in Figure 3 of Appendix A, and historical analytical results presented in Appendix C.

Concentrations of copper in soil samples collected onsite exceeded the NEPC (2013) EIL assessment criteria in a number of locations, as indicated in Figure 4 of Appendix A and summarised in Table 6 below. In addition, soil samples collected offsite within the drainage channel exceeded the NEPC (2013) EILs in three locations, also summarised in Table 6.

Table 6 Summary of NEPM (2013) EIL exceedances for copper

Area	Location IDs	Range of exceedances (mg/kg)	Depth range (mbgl)
Onsite	13, 17, 19, 20, 22, 34, 35	440 to 58,000	0.0-0.5
Unnamed drainage channel (onsite)	9,10	521 to 2,400	0.0-1.0
Unnamed drainage channel (offsite)	106,107	1600 to 11,000	0.0-0.1

3.7.4 Sediment

Concentrations of copper in sediment samples located within Abattoir Creek exceeded the Australian Government (2019) assessment criteria in eight locations as summarised in Table 7. Historical analytical results are presented in Appendix C.

Table 7 Exceedances of ANZG (2019) sediment assessment criteria

Sample location	Sample depth (mbgl)	Concentration (mg/kg)
29	0.1	2,200
38	0.1	16,700
39	0.1	1,770
39.1-S(0-100)	0.1 (duplicate)	1,000
40	0.1	1,860
41	0.1	1,140
42	0.1	666
104	0.1	560
105	0.1	540

3.7.5 Groundwater

Four groundwater monitoring wells are located at the site, as indicated in Figure 3 of Appendix A. Concentrations of copper from sampling undertaken by Envirowest (2017a) in July 2019 were below the NEPC (2013) assessment criteria by more than two orders of magnitude. As such, groundwater is not considered to have been impacted by dewatering activities at the site, and remediation of groundwater is not considered to be required.

3.7.6 Surface water

A number of surface water locations were observed to exceed the adopted ANZG (2019) assessment criterion of 1.4 µg/L, as indicated in Table 8, with a maximum copper concentration of 51 µg/L observed immediately adjacent to the site in sample location 45. Concentrations of copper in surface water samples collected upstream of the site (locations 43 and 44) were below the laboratory limit of reporting (LOR).

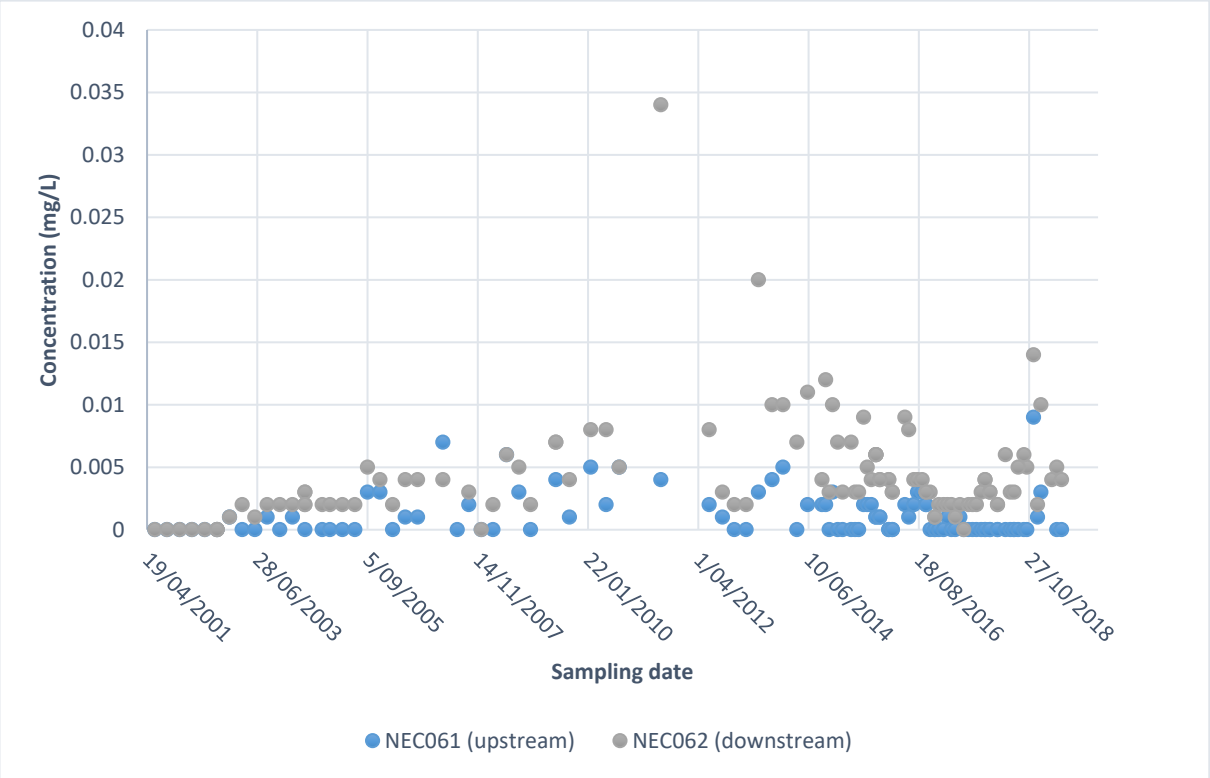
Table 8 Summary of ANZG (2019) exceedances in surface water

Sample ID	Location	Concentration (µg/L)
45	Abattoir Creek, adjacent site	51
46	Abattoir Creek, downstream near Adelaide Street	2
47	Abattoir Creek, downstream near Mid Western Highway	2
110	Unnamed drainage channel, downstream west of Adelaide Street	11
111	Unnamed drainage channel, downstream near eastern end of Maria Street	7
112-W	Unnamed drainage channel, downstream south of railway line	2

Routine monitoring both upstream and downstream of the site by Cadia between June 2001 and June 2019 indicated a number of exceedances of the assessment criterion in surface water both upstream and downstream of the site, as indicated in Chart 1. GHD (2019a) also observe that, following the decommissioning of the site, spatial trends for concentrations of dissolved copper upstream and downstream of the site were no longer observed.

With the removal of source material from the site to prevent further offsite migration, and removal of locally impacted shallow sediment in Abattoir Creek it is considered copper concentrations will be further reduced in surface water. As such, remedial strategies to address dissolved copper in surface water within Abattoir Creek or the drainage channel are not considered to be required. However, surface water will be assessed as part of the validation program.

Chart 1 Concentrations of copper in Abattoir Creek surface water between June 2011 and June 2019



4. Conceptual site model

The conceptual site model (CSM) is a qualitative analysis tool that defines the contamination sources, transport mechanisms, exposure pathways and receptors considered. The CSM has been developed based on GHD's understanding of the site setting, including geology, hydrogeology and surrounding land use in order to identify potentially significant source-pathway-receptor (SPR) linkages in respect of risks to human health and the environment. The potential sources, receptors and pathways are summarised in the sections below, and presented schematically in Appendix A.

4.1 Contaminants of potential concern

Based on previous investigations, summarised in Section 2.3, the contaminant of potential concern (COPC) is considered to be copper only.

This COPC is consistent with site usage as dewatering facility for copper ore originating from the Cadia site.

No asbestos was been reported during previous investigations, or during the hazardous building material survey undertaken by GHD (2019b).

4.2 Potential sources

Due to the distribution of copper in soils at the site, it is considered that loading of copper concentrate into containers, temporary storage of containers and loading onto trains are likely sources of contamination at the site, as well as, the retention pond located on site.

Based on this, and observations of site drainage and stormwater infrastructure, it is considered likely copper impacted soil has entered the drainage channel through surface water runoff. Copper has likely entered Abattoir Creek directly via stormwater drainage that originates near the area historically used for storage of containers of copper concentrate, as a stormwater grate and associated discharge pipe were observed by GHD during the site walkover on 26 November 2019.

4.3 Pathways

Plausible mechanisms by which humans or ecological receptors could be exposed to contamination include:

- Direct contact (including incidental ingestion and inhalation) with contaminated soil for human receptors working at the site
- Direct contact with contaminated soils, sediment and surface water for ecological receptors in Abattoir Creek and the off-site drainage channel.

4.4 Receptors

When evaluating potential adverse effects to humans or the environment from exposure to a contaminated site, all potentially exposed populations should be considered. For the site, the identified receptors include:

- Current and future commercial/industrial users, including site workers
- Intrusive maintenance (utility) workers
- Ecological receptors in Abattoir Creek, and further downstream in Belubula River

Potential SPR linkages are presented in Table 9.

Table 9 Summary of potentially complete source-pathway-receptor linkages

Source	Pathway	Receptor	Complete linkage
Copper contaminated soils onsite	Direct contact	Onsite commercial users including site workers	**Incomplete** – Concentrations of copper in soils onsite were below the assessment criteria for human health
		Onsite ecological receptors including flora and fauna	**Incomplete** – Ecological receptors were not observed to be present onsite due to the commercial/industrial site use and ground surfaces almost entirely covered in asphalt
	Migration into stormwater channels and surface water runnoff	Offsite ecological receptors including Abattoir Creek and the drainage channel	**Complete** – Surface water and stormwater runoff originating at the site has transported copper into Abattoir Creek and the drainage channel
Copper contaminated sediment in Abattoir Creek	Direct contact	Offsite ecological receptors including flora and fauna	**Complete** – Concentration of copper in sediments exceeded the assessment criteria
	Migration into Abattoir Creek and the drainage channel	Offsite ecological receptors including Abattoir Creek and the drainage channel	**Potentially complete** – Concentrations of copper in surface water in Abattoir Creek have historically exceeded the assessment criteria (GHD, 2017). In addition, Abattoir Creek discharges to Belubula River.
Copper contaminated soils in the unnamed drainage channel	Direct contact	Offsite ecological receptors including flora and fauna	**Complete** – Concentrations of copper in soil in the drainage channel exceed the ecological assessment criteria.
	Migration into Abattoir Creek and the drainage channel	Offsite ecological receptors including Abattoir Creek and the drainage channel	**Potentially complete** – The drainage channel connects to Abattoir Creek which is likely the receptor for any surface water runoff originating from the drainage channel

5. Remedial strategy

5.1 Goals and objectives

The objective of the remedial strategy is to enable the lease to be terminated in accordance with the lease conditions for the site in such a manner that:

- No ongoing contamination liability exists for the site as a result of dewatering activities at the site
- No environmental management plan is required to manage contamination at the site
- No environmental management plan is required to manage contamination located offsite in either Abattoir Creek or the off-site channel.

5.2 Remediation methodology

As described in Section 3.7, copper was observed at concentrations exceeding the assessment criteria for protection of ecological receptors in the following general areas:

- Soil onsite
- Soil offsite within the drainage
- Sediment offsite within Abattoir Creek

The proposed remediation methodology will facilitate removal of source material in soil, and reinstatement of excavations with imported fill. This is expected to result in a reduction in potential contaminant load in surface water runoff from the site into Abattoir Creek, and to preclude the requirement for an ongoing management plan. The proposed methodology is as follows:

- Demolition of existing site infrastructure and buildings
- Data gap assessment to address data gaps on the site (such as building footprints), and refinement of remedial extent (where required)
- Ecological risk assessment of Abattoir Creek and refinement of remedial extent (where required)
- Excavation of hardstand and soil in the onsite remedial areas indicated in Figure 5 of Appendix A to the nominal depths described in Table 10
- Excavation of soil off-site in the drainage channel in the remedial areas indicated in Figure 5 of Appendix A to the nominal depths described in Table 10
- Transport of excavated material to Cadia Operations site for disposal
- Validation sampling of excavation areas
- Reinstatement of excavations with imported virgin excavated natural material (VENM), excavated natural material (ENM), suitable quarry material, or potential reuse of crushed concrete won from demolition works at the site (where appropriate)
- Preparation of a validation report

5.2.1 Demolition of existing site infrastructure

It is understood that demolition of the existing site infrastructure, including the site buildings and dewatering pond, will be undertaken in early 2020. GHD (2019b) undertook a hazardous

building material survey for the site, as reported in *Blayney Decommissioned Dewatering Facility - Hazardous Building Materials Pre Demolition Assessment.*

Following completion of the survey, it was concluded that asbestos containing materials (ACM) were not identified on site. However, synthetic mineral fibres, ozone depleting substances, and lead based paint were identified in a number of locations.

To minimise the potential for further contamination of the site resulting from the identified hazardous building materials, demolition of the existing site infrastructure should be undertaken with reference to the recommendations detailed in GHD (2019b).

5.2.2 Data gap assessment

Data gaps are considered to exist for the site with regards to the extent of contamination as indicated Area A shown in Figure 5 of Appendix A. This area is estimated to comprise approximately 2316 m^2 and corresponds to the footprint of the buildings, infrastructure and dewatering pond. Discolouration of concrete surfaces consistent with copper impacts were observed within site buildings during the GHD site walkover, which may indicate contamination beneath these structures. For this area, the NSW EPA (1995) *Sampling design guidelines* recommends eight sampling locations, based on a systematic sampling pattern. Following demolition of site buildings and infrastructure (i.e. the dewatering pond), additional soil sampling should be undertaken in Area A in accordance with NEPC (2013), including collection and analysis of quality assurance and quality control (QA/QC) samples, as follows:

- Using a grid based sampling distribution, nominate eight sampling locations within Area A as indicated in Figure 5 of Appendix A
- Undertake soil boring to a maximum depth of 5.0 mbgl
- Collection of primary and QA/QC soil samples at the following depths:
  - 0.0 to 0.2 mbgl
  - 0.5 mbgl
  - 1.0 mbgl and every metre thereafter
- Analysis of all samples for copper at a NATA accredited laboratory
- Refinement of the RAP to expand the excavation areas if concentrations of copper are identified at above the site assessment criteria described in Table 5.

In addition, a review of historical aerial photographs will be undertaken for the site during this stage. This is required to identify any other potentially contaminating activities that may have occurred at the site. A review of historical aerial photographs may identify, for example, cut and fill activities and presence of underground storage tanks, which will enable remedial activities at the site to be planned and undertaken safely and effectively.

5.2.3 Ecological risk assessment of Abattoir creek

Remedial Area G (Abbatoir Creek) is considered to be poorly defined with limited sample locations advanced within this area. Area G covers an estimated 1166 m^2, and NSW EPA (1995) recommends a total of seven sample locations for an area this size. Additional sampling of sediments should be undertaken in Area G in accordance with NEPC (2013) to meet the recommended sampling density in NSW EPA (1995), including collection and analysis of quality assurance and quality control (QA/QC) samples, as follows:

- Using a grid based sampling distribution, nominate five sampling locations within Area G, as indicated in Figure 5 of Appendix A
- Undertake augering to a maximum depth of 0.5 mbgl

- Collection of primary and QA/QC soil samples at the following depths
  - 0.0 to 0.1 mbgl
  - 0.2 mbgl
  - 0.5 mbgl
- Analysis of all samples for copper at a NATA accredited laboratory

Although previous investigations by GHD (2017) indicated ecological communities in Abattoir Creek to be severely or extremely impaired, disturbance and excavation of sediments within remedial Areas E and G has not been demonstrated to have a net positive impact on the ecological community. As a result, an ecological risk assessment (ERA) should be undertaken to assess the ecological risk of copper impacted sediments in remedial Areas E and G. The analytical results from additional sampling in Area G should be used to inform the ERA.

5.2.4 Excavation of impacted material

Following identification of underground services, surface materials (i.e. asphalt) within the nominated remedial areas will be removed where necessary. Material within the remedial areas identified in Figure 5 of Appendix A will be excavated to the depths described in Table 10.

Table 10 Estimated remedial extents

Area ID	Area (m^2)	Depth of excavation (mbgl)	Approximate volume (m^3)^	Description
Area A	2316 (potential)	1.0#	2316	**Data gap**: Buildings and pond onsite
Area B	365	1.0	365	Soil onsite
Area C	1068	1.0	1068	Soil onsite
Area D	1512	1.0	1512	Soil onsite
Area F	1343	0.5	672	Drainage channel offsite
Estimated total volume	**-**	**-**	**5933**	**-**

Notes: #estimated depth based on onsite remedial Areas B, C and D. ^A bulking factor has not been applied to these volumes, which are insitu estimates only.

5.2.5 Disposal of excavated material

NSW EPA (2018) *Environment Protection Licence (EPL) 5590*, as issued to CHPL, identifies the premises to which this EPL applies as Cadia Valley Operations located at Cadia Road, Cadia, NSW 2800 (Cadia Operations site). Item A2.1 lists the site as included within these premises (NSW EPA, 2018, p. 6).

All material (e.g. soil, sediment, and asphalt) generated from remediation of the site is to be transported to the Cadia Operations site, and emplaced within an existing potentially acid forming (PAF) cell. The material will be encapsulated by a low-permeability clay liner, and subsequently rehabilitated using a store and release cover system.

All documentation pertaining to the transport, acceptance, and emplacement at the Cadia Operations site must be retained for inclusion in the validation report.

5.3 Validation

It is imperative that residual soil be validated to assess the efficacy of remedial activities described in Section 5.2 prior to reinstatement of excavations. The validation methodology and criteria are descried below.

5.3.1 Sampling

NSW EPA (1995) recommends a systematic sampling plan be adopted for site validation. The number of samples required for validation of each sample area was determined by the minimum number of samples required for detection of a circular hotspot based on the measured area (m^2) of each remedial area (NSW EPA, 1995, p. 8). To enable calculation of the 95% upper confidence limit (95% UCL) of the arithmetic mean, a minimum of eight samples are required; therefore the number of recommended samples for validation of each area was determined to be a minimum of eight.

Samples should be distributed systematically in a manner that enables a minimum of one sample from each excavation wall, with base samples to be distributed at regular intervals across the base of the excavation. Samples should be collected from 0.0-0.15 m below the surface residual layer. All samples will be analysed for the primary COPC for the site (i.e. copper).

Following removal of copper impacted soils from the site, unnamed drainage channel, and sediment from within Abattoir Creek, it is expected that concentrations of copper within Abattoir Creek surface water will be reduced. All samples will be analysed for the primary COPC for the site (i.e. copper). Surface water samples will be collected following the completion of remedial works at the site in the following locations:

- One upstream sample collected near the location of NEC061
- Three downstream samples collected from near the locations 42, 103, and 101

Groundwater samples will be collected from the four groundwater monitoring wells located at the site (MW1, MW2, MW3, MW4). All samples will be analysed for the primary COPC for the site (i.e. copper).

Quality assurance and quality control samples to demonstrate the reliability of the data for decision making purposes should be collected and analysed at the following rates:

- One inter-laboratory duplicate collected for every 20 primary samples collected
- One intra-laboratory duplicate collected for every 20 primary samples collected
- One rinsate blank sample per person per day

Transport spikes and blanks are not required, as the contaminants of concern are not volatile and not susceptible to loss (as a result of volatilisation) during storage and/or transport.

5.3.2 Assessment criteria

To assess whether the remedial objectives have been achieved, GHD proposes the validation criteria for copper as detailed in Table 11.

If the validation criteria for soil and/or sediment are not met, then additional material may be required to be excavated (likely in the vicinity of the sampling location with the highest concentration of copper) and further validation sampling of the newly excavated surface. If site constraints preclude additional material being excavated from the nominated remedial areas, then an ecological risk assessment will be undertaken to determine whether any unacceptable residual risk to ecological receptors remains.

Table 11 Validation criteria for copper

Assessment criterion	Matrix	Location	Unit	Criterion value
NEPC (2013) HIL	Soil	Onsite	mg/kg	240,000
NEPC (2013) EIL^	Soil	Onsite, and offsite within the drainage channel	mg/kg	435
ANZG (2019) GV-high	Sediment	Offsite within Abattoir Creek	mg/kg	270
NEPC (2013) GIL	Groundwater	Onsite	mg/L	2
ANZG (2019) freshwater 95%	Surface water	Offsite within Abattoir Creek	µg/L	1.4

Each remedial area (i.e. Area A to Area G) will be considered successfully remediated when

- The 95% UCL of the arithmetic average concentration of validation samples within each area is demonstrated to be equal to or below the validation criteria described in Table 11; or
- An ecological risk assessment determines that no unacceptable risk to ecological receptors remains within the nominated remedial areas

6. Materials management

Remediation at the site will involve excavation of material impacted with copper. This section details the methodologies for management of materials at the site during the remediation.

6.1 Material excavation and stockpile management

Prior to commencement of excavation, a designated area is to be set up within the site for the containment of excavated material. The containment area should be in the form of a bunded area (i.e. to minimise runoff) with an impermeable surface liner (e.g. HDPE sheeting or tarpaulin). Once excavated material has been placed in the containment area, it must be covered to prevent the spread of contamination through dust or generation of contaminated surface water runoff.

Tracking of materials is required for the duration of the works, and the contractor is required to create and maintain a register that details the following:

- Origin of the material (e.g. excavation area)
- Volume
- Key dates (e.g. excavation, transport offsite)
- Final destination

Material tracking information, including transport dockets, are required to complete the site validation, and a copy of the register and supporting documentation must be provided to the environmental consultant upon completion of the works.

6.2 Imported materials

Following demonstration that remedial areas meet the assessment criteria described in Section 5.3.2, reinstatement of remedial Areas A to C, and Area F (if required), may then occur. This will require an estimated 5933 m^3 of imported material for reinstatement. A minimum compression standard has not been specified for reinstated excavations, and this should be agreed with the site owner prior to commencement of works.

Imported fill intended for use at the site is to be:

- Classified as virgin excavated natural material (VENM)
- Classified as excavated natural material (ENM) in accordance with the NSW EPA (2014a) *The Excavated natural material order 2014* or
- Suitable quarry material
- Crushed concrete won from demolition of buildings and/or surfaces at the site (where suitable)

The *Protection of the Environment Operations Act 1997* defines VENM as meeting the following requirements:

- Natural material (such as clay, gravel, sand, soil)
- Has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities
- Does not contain sulphidic ores or soils or any other waste

Classification, quarry, and import documentation are required to complete the site validation, and a copy supporting documentation must be provided to the environmental consultant upon completion of the works.

Crushed concrete won from demolition of buildings and/or surfaces at the site will be assessed for suitability for reuse on site. Crushed concrete intended for reuse will be visually inspected by a suitably qualified and experienced environmental consultant, with samples collected for analysis at a NATA accredited laboratory at or above the sampling rates described in EPA Victoria (2009) *Industrial waste resource guidelines: soil sampling*. Crushed concrete will be considered suitable for reuse if the following conditions are met:

- The material does not contain any fibrous or bonded asbestos, or asbestos fibres or fines
- No contaminant indicators (e.g. odours or staining) are observed
- It does not contain any other demolition material (e.g. glass, timber, reo/re-bar, insulating materials, scrap metal)
- Concentrations of copper are below the remedial assessment criterion for soil onsite, as described in Table 5.

There may be geotechnical requirements if considerable amounts of crushed concrete are used to backfill remedial excavations.

Approval from the site owner to use crushed concrete as backfill material should be sought prior to remedial works commencing.

6.3 Dewatering

Groundwater at the site was encountered by Envirowest (2017a) at depths of greater than 2.5 mbgl. As maximum excavation depths are expected to be 1.0 m, dewatering is not expected to be required for the remedial activities at the site.

7. Environmental management plans

It is the responsibility of the remediation contractor to provide, install, and maintain all required environmental control measures for the duration of the project.

The minimum environmental controls anticipated to be required for the project are described in the sections below, but are not necessarily exhaustive. The remediation contractor must identify and implement any additional control measures required.

7.1 Dust

Due to the surface area of the excavations as well as dry local conditions, dust generation is considered likely. The following measures should be employed to minimise excessive generation of dust:

- Stop work (e.g. excavating, loading material into transport vehicles) if visible dust is moving over site boundaries
- Stop work on very windy days
- Ensure stockpiles are covered when not in use and at the end of each day
- Consider erecting temporary hurricane fencing covered by silt cloth (or alternative), to prevent movement of dust and debris off-site
- Wet excavations and stockpiles to minimise production of dust

7.2 Stormwater runoff

Due to the surface area of the site, some generation of stormwater or surface water runoff is expected. Due to the proximity to Abattoir Creek and the drainage channel, surface water runoff must be diverted away from Abattoir Creek for the duration of the remedial works. In addition, the identified stormwater drainage originating on the site which discharges into Abattoir Creek must also be diverted for the duration of the remedial works. The following additional measures should also be applied to minimise the risk imposed by stormwater runoff from impacted areas:

- Silt fences erected across all areas where surface water could flow into (i.e. upgradient) or from (i.e. downgradient) the proposed excavation or stockpile areas
- Stockpiles will be placed on surfaces lined with HDPE sheeting and covered when not in use and at the end of each day to minimise infiltration of water and leaching of contaminants into site drainage
- Absorbent booms will be deployed around drains and stockpiles as required to capture any impacted soils leaching from excavated materials
- When weather is forecast for greater than 30 mm of rain, provisions should be made to enable water to be pumped out of open excavations and disposed of to a suitably licenced facility

7.3 Noise

All operations will be conducted within the noise limits permitted in NSW EPA (2018) *Environment Protection Licence 5590* as detailed in Table 12 below.

Table 12 Noise limits for works undertaken at the site (NSW EPA, 2018)

Locality and location	Day^	Evening^	Night^	Night#
85 Carcoar Street Blayney	50	50	39	49
15 Railway Lane Blayney	50	50	36	46
9 Hill Street Blayney	46	46	37	47
Blayney Primary School	46	46	36	46
Blayney Pre-School	58	58	45	55

Notes: ^Measurement given in A-weighted equivalent continuous sound over a 15 minute period.
#Measurement given in A-weighted equivalent continuous sound over a one minute period.

NSW EPA (2018) defined the following:

- Day is defined as the period from:
  - 7 am to 6 pm Monday to Saturday
  - 8 am to 6 pm on Sundays and Public Holidays
- Evening is defined as the period 6 pm to 10 pm
- Night is defined as the period from:
  - 10 pm to 7 am Monday to Saturday
  - 10 pm to 8 am on Sundays and Public Holidays.

7.4 Vehicular traffic

The remediation contractor is responsible for keeping public roads on the routes of site vehicles clean of any material sourced from the site. All equipment and trucks are to be decontaminated prior to leaving the site (e.g. using a rumble strip and/or wheel wash) to prevent the inadvertent transport of contaminated material off-site.

8. Site management

8.1 Communication

Prior to commencement of remedial works, a communication plan will be required to formalise communication protocol, progress updates, and points of contact between the contractor, environmental consultant, and site owner/manager. These should be clearly defined and circulated, as demonstrated in Table 13

Table 13 Remedial works site contacts

Role	Company	Contact	Phone
Client/site owner			
Remediation contractor			
Validation consultant			

8.2 Permitting

The remediation contractor must identify permitting requirements and arrange issue of permits for the relevant site personal, and remediation works should not commence until an appropriate permit to work system has been established, and permits completed. This may include certificates, permits, or approvals for works such as:

- Hot works permit
- Safe entry
- Confined space
- Excavation
- Underground services
- Working at heights
- Activities carried out on waterfront land

8.3 Legislation and guidance documents

In addition to permitting requirements, the contractor will ensure that all site works are undertaken in accordance with the regulatory approvals and licensing that may be relevant as outlined in Table 14. Requirements should be assessed prior to remediation works.

Table 14 Summary of legislative framework

Legislation	Summary
Contaminated Land Management Act 1997	In NSW, the management of contaminated land is shared by the NSW EPA, the Department of Planning and Environment (DoPE) and planning consent authorities (e.g. Blayney Shire Council). The Contaminated Land Management (CLM) Act 1997 is the primary act under which contaminated land in NSW is regulated by the NSW EPA. Under the CLM Act the NSW EPA regulates contaminated sites where the contamination is 'significant enough to warrant regulation'. Contaminated sites that are not regulated by the NSW EPA are usually managed by local councils through the land use planning processes of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the Protection of Environment Operations Act 1997. Contamination at the site is considered to be managed under the EP&A Act.

Legislation	Summary
Environmental Planning and Assessment Act 1979	The *EP&A Act* and the Environmental Planning and Assessment Regulation 2000 provide the framework for development and environmental assessment in NSW. A key function of the *EP&A Act* is the planning approach for the remediation of contaminated land under *State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land*. In particular, *SEPP 55* provides for Category 1 and Category 2 remediation. Projects classified as Category 1 require development consent, while projects classified as Category 2 do not require development consent. GHD notes that development consent under *SEPP 55 – Remediation of Land* for the remedial works is not required, due to the works falling within the State Significant Development Approval for the Cadia Valley Operations. As such, the remedial works are considered to be Category 2 remediation work (work not needing consent) as defined in *SEPP 55 – Remediation of Land*. *SEPP 55* requires that local councils be notified 30 days before category 2 remediation works commence.
Protection of the Environment Operations Act 1997	The *Protection of the Environment Operations (POEO) Act 1997* is the key environment protection legislation administered by NSW EPA. The *POEO Act* provides the key mechanisms for protecting the environment. The *POEO Act* provides a single integrated licensing arrangement to control the air, noise, water and waste impacts of an activity. The NSW EPA is the regulatory authority for the licensing of activities specified under Schedule 1 of the *POEO Act 1997* (scheduled activities) and councils are commonly the regulatory authority for non-scheduled activities. The proposed remediation works are not currently considered to constitute a Scheduled Activity under *POEO Act* (and designated development under Environmental Planning and Assessment Regulation 2000) on the basis that: • Contaminated soil treatment will not comprise incineration of more than 1,000 m^3 per year. • Contaminated soil treatment is not proposed to comprise treatment (other than by incineration) of more than 30,000 m^3 of contaminated soil or disturb more than an aggregate area of three hectares. • Contaminated soil will not be received from off-site.
POEO (Waste) Regulation 2014	The *POEO Act 1997* provides the regulatory regime for waste management under the *Protection of the Environment Operations (Waste) Regulation 2014*. Requirements include: • Waste transport requirements. • Waste tracking and record requirements, including with NSW and ex-State. • Waste classification (in accordance with NSW EPA (2014) Waste Classification Guidelines). • Waste immobilisation approvals. • Waste disposal facilities (i.e. legally able to receive the waste materials).

Legislation	Summary
Water Management Act 2000	The *Water Management Act 2000* is administered by NSW Department of Industry and provides for the sustainable and integrated management of the water sources of the State of NSW for the benefit of both present and future generations. The NSW Aquifer Interference Policy outlines the requirements of water licensing and assessment processes for aquifer interference activities.
Blayney Shire Council Development Control Plan 2018	Remediation must be conducted in a manner generally compliant with Blayney Shire Council Development Control Plan (DCP) 2018. Key components of the DCP that may be relevant to the proposed remediation planning include, but are not limited to: • Section D5 Site Planning Earthworks and Utilities • Section G6 Land Contamination • Section G9 Land & Soils
Work Health and Safety Act 2011	Remediation must be conducted in a manner compliant with Work Health and Safety Act 2011, including, but are not limited to • Safe Work Australia (2016) *Managing electrical risks in the workplace: code of practice* • Safe Work Australia (2018a) *How to manage work health and safety risks: code of practice* • Safe Work Australia (2018b) *Excavation Work: Code of Practice*

8.4 Site access and security

Prior to commencement of capital works or remediation, site establishment must include adequate fencing to restrict entry to the site by public. This should include, as a minimum:

- Two metre high chain link (hurricane) fencing
- Gates at nominated ingress/egress locations
- Gates should be kept closed whenever vehicles are not moving onto or off the site
- Gates should be kept locked outside of hours of operation

Site access and security must be maintained until completion of the remedial works. The duration for excavations remaining open on-site must be minimised as much as practicable

8.5 Inductions

The remediation contractor will be responsible for conducting site safety inductions for all personnel required in the work area, and documented evidence of inductions should be retained on-site for the duration of the works. Inductions should include, as a minimum:

- Job safety and environmental analysis (JSEA) or safe work method statement (SWMS)
- Personnel responsibilities
- Personal protective equipment requirements
- Emergency response procedures
- Contact details for key personnel and emergency services

In addition to general site inductions, a daily ‘toolbox’ talk should be undertaken prior to work commencing and should include, as a minimum:

- Specific tasks to be undertaken that day

- Expected movement of vehicles
- Work staging
- Changes to the programme
- Any previously identified hazards
- Personnel present on-site
- Environmental factors that may influence or impact the work (e.g. weather).

8.6 Underground services

Prior to conducting any intrusive works, the remediation contractor will conduct a search for underground utilities and other infrastructure. As a minimum, this will include the following:

- Conducting a dial before you dig (DBYD) search
- Inspection of utility plans
- Employing the professional services of a cable locating company using equipment including a cable locating tool and a ground penetrating radar device
- Confirming that any services encountered are disconnected prior to the commencement of intrusive works or establishing a nominal setback from any identified services.

GHD has identified a number of services on or near the site, including a Jemena gas main. These have been provided on Figure 6 of Appendix A for the purposes of planning only, and have not been verified by a service locator.

8.7 Daily site inspection

Daily site inspections should be undertaken by the remediation contractor for the duration of the remedial works to reporting on the condition, location, and status of the following as a minimum:

- Site fencing and signage
- Locks on ingress/egress points
- Bunding and covering of stockpiles;
- Open excavations and trenches;
- Waste management containers
- General housekeeping including storage of equipment, cleanliness of equipment and site surfaces, dust generation and other potential environmental issues
- Vehicle and equipment condition.

8.8 Hours of operation

All works must be undertaken within the hours of operation approved by the Blayney Shire Council.

8.9 Signage

Signage should be erected on the site fencing and displayed for the duration of the works, and include the following as a minimum:

- Warning signs indicating danger of open excavations
- Warning signs indicating no unauthorised access, or similar restricted access signage

- Contact details of the remediation contractor and the site supervisor
- Contact details of the site owner and/or Newcrest contact
- Signs indicating personal protective equipment (PPE) requirements

8.10 Transport

Any motor vehicles, trucks or mechanised equipment transported to and from the site should adhere to the following as a minimum:

- Comply with road rules
- Use main roads where possible, and minimise use of local suburban roads
- Securely cover all loads
- Display nature and hazard rating of load, if applicable
- Conduct deliveries within the specified site hours of operation
- Prevent tracking of materials outside the work area
- Use appropriately licensed contractors to transport waste materials

9. Contingency planning

This section presents the contingency measures to be implemented to complete the remediation should unforeseen issues arise.

9.1 Unexpected finds protocol

An unexpected find refers to an unanticipated discovery of significant contamination in the subsurface, such as stained or odorous soils or other contaminant indicators in an area not previously identified, or contaminated material of a nature not previously encountered at the site (e.g. asbestos).

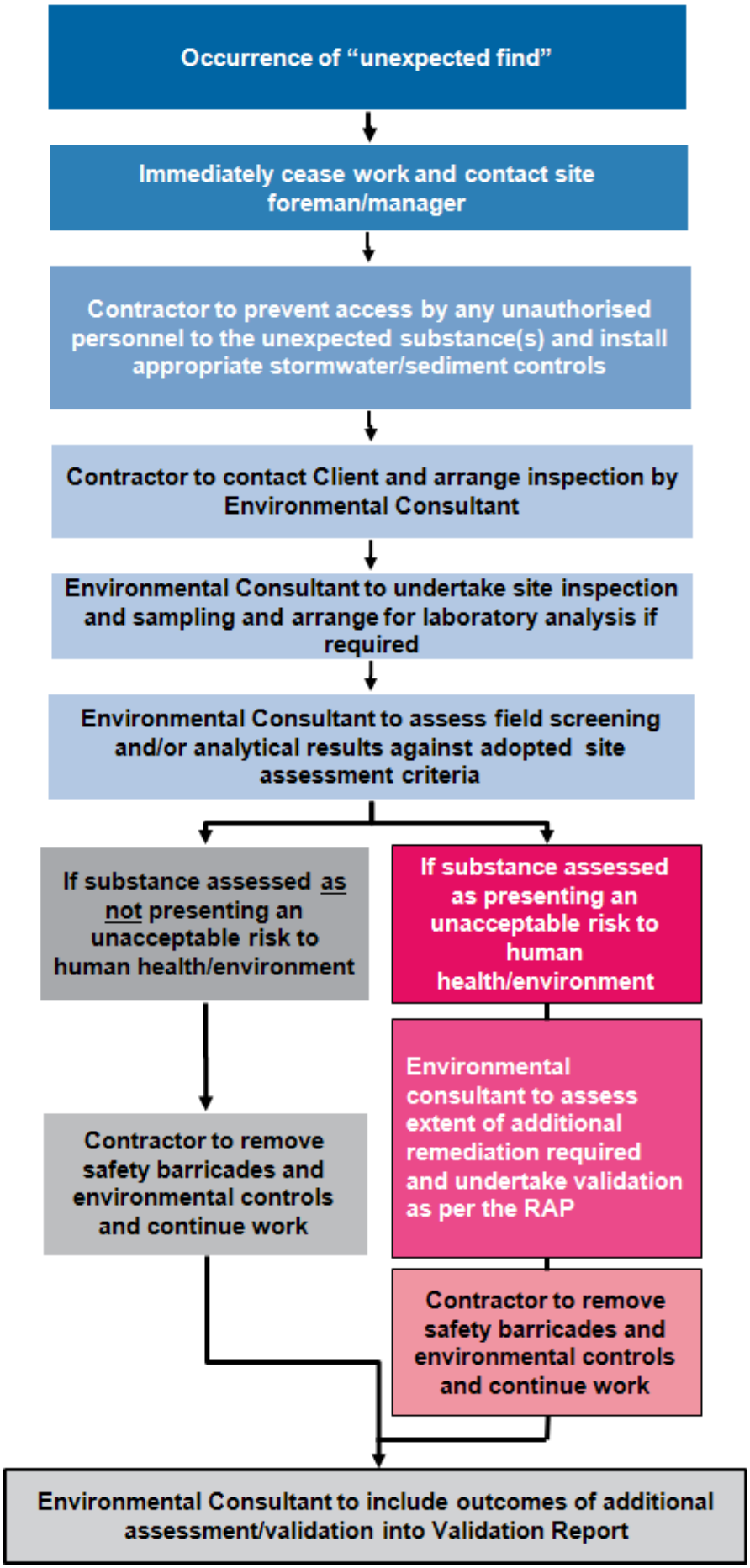
In the event that unexpected contaminated material is encountered during the remediation, the procedures in Graphic 1 should be followed. In addition to the general procedure in Graphic 1, the following specific protocols should also be adopted:

- If unexpected contamination is identified in excavated material produced during the remediation, then waste classification testing should be completed in accordance with the NSW EPA (2014b) *Waste Classification Guidelines*. A waste classification letter should be prepared by an appropriately qualified environmental consultant to confirm that the material is suitable for disposal to the Cadia Operations site.
- If the unexpected contamination is identified at the extent of the remediation area or in areas where remediation is limited vertically or horizontally by sub-surface conditions, a detailed inspection of the contamination should be undertaken by the environmental consultant including sampling, field screening and photographs where possible. An ecological risk assessment will be then undertaken to determine whether any unacceptable residual risk to ecological receptors remains.

In addition to the above, the remediation contractor shall provide procedures in a Construction Works Plan or Construction Environmental Management Plan to address the following items:

- Generation of unacceptable dust or vapours
- Generation of unacceptable noise
- Uncovering friable or fibrous ACM
- Remedial works taking longer than planned
- Unexpected discovery of underground structures or services
- Significant contamination at extent of remediation area

Graphic 1 Unexpected finds protocol



9.2 Underground structures

In the event that unexpected underground structures (e.g. unidentified tanks or sumps) are encountered, an assessment should be made to evaluate the type and nature of the structure, and steps taken to isolate the structure, if required. Assessment measures may include one or a combination of the following approaches:

- Review of existing records
- Localised detailed excavation
- Using geophysical techniques (e.g. ground penetrating radar)

Where the obstruction is suspected or positively identified as a former petrol tank or sump, care should be taken to remove soil materials supporting the structure to enable an assessment of the extent and depth of the structure to be made. Care must be taken to prevent product leaking or spilling from the structure.

Where practicable, attempts should be made to assess the contents of liquids or other materials contained by the structure, and assess whether these materials can be removed prior to progressing the remediation excavation using appropriate means (e.g. skimming scavenger pumps, mopping devices, oleophilic blankets etc.). Measures should be taken to minimise the potential for free-phase liquids to enter the ground or surface water during excavation to reduce the potential for contaminating otherwise uncontaminated materials.

In the event that underground structures (e.g. including former process pipes) are encountered which overlap the boundary of the remediation area, excavations should cease in this area and further consultations with the site owner, Newcrest representatives, EPA, Blayney Shire Council, the remediation contractor and environmental consultant to agree a course of action. This may include removal of any liquid, to the extent practicable and extension of the remediation area to allow removal the encountered structure.

9.3 Contaminated soil at the extent of excavation

In the event that material encountered at the designated limits of the remediation area are still considered contaminated, works should cease and further consultation be undertaken with the site owner, Newcrest representatives, EPA, Blayney Shire Council, the remediation contractor and environmental consultant to agree a course of action.

Three ‘decision rules’ should be applied to ascertain whether removal of the contamination is practicable:

a. Is the contamination below the water table?

b. Is the contamination below or within competent bedrock

c. Is the contamination present at locations where it is unable to be removed or treated due to safety concerns relating to stability (e.g. at the site boundary), presence of nearby structures or services, or project constraints?

Where excavation of impacted material is not possible or practical due to site constraints such as site boundaries or competent bedrock, and validation sampling indicates concentrations of COPC greater than site remediation criteria, additional treatment of exposed soil surfaces may be required. Alternatively, a site-specific risk assessment may be required following validation sampling to assess risk to receptors. Any risk assessment is to be carried out in accordance with the methodology outlined in NEPC (2013).

10. Occupational health and safety

10.1 Health and safety plan

Prior to commencing demolition or remediation works, the remediation contractor must prepare a site specific health and safety plan to ensure works are conducted in a safe manner, and that risk of potential injuries and incidents is minimised to the extent practicable. The health and safety plan should include:

- Assignment of responsibilities for site personnel
- Communication protocols
- A summary of site conditions
- Details of works to be conducted including JSEA/SWMS for specific tasks
- A qualitative risk assessment of identified hazards and mitigating measures to minimise the associated risk
- PPE requirements
- Evacuation procedures, emergency contacts, and directions and contact details of the closest hospital with emergency facilities
- Incident reporting procedures

The remediation contractor or their representative must induct all site personnel and any site visitors onto the plan. Non-essential personnel must not be authorised to enter the work area.

10.2 Procedures to minimise contaminant exposure

PPE requirements will be defined in the health and safety plan including the following:

- Minimum PPE for all workers for the duration of works on-site will include hard hats, steel-capped boots and high visibility vests or shirts
- Hearing protection must be retained for use, as required
- Other potential exposure pathways for the COPC at the site include dermal contact, inhalation of dust and incidental ingestion of dust or soil. Therefore, long-sleeved shirts and trousers must be worn by all workers at all times. Gloves and safety goggles must be worn by personnel handling potentially contaminated soil or sediment.
- Good personal hygiene practices such as washing hands regularly and prior to eating food, eating food away from work sites in a designated area, and maintaining clean and tidy work areas.

10.3 Incident reporting

All incidents (including near miss incidents) occurring on the job or on the site must be immediately reported to the site manager.

In the event of an emergency, all members of the project team shall assemble at the nominated assembly point and wait for further instruction from the site manager or delegate at the assembly area. The site manager will then assess the situation and, if required, inform other affected parties including Blayney Shire Council, NSW EPA, neighbours and site staff.

If there is an incident, which creates an immediate risk to the surrounding environment requiring an emergency response, the site manager will contact a suitably qualified hazardous materials contractor to contain the issue and mitigate the risk to human and/or ecological receptors as far

as possible. Following the emergency response actions, the site manager should engage a suitably qualified environmental professional to assess the extent of impact to the environment and propose appropriate remedial actions to mitigate the risk to an acceptable level if required.

11. Validation reporting

Following completion of the remedial works, a suitably qualified and experienced environmental consultant must compile a validation report in accordance the NSW Office of Environment and Heritage (2011) *Guidelines for Consultants Reporting on Contaminated Sites.*

The validation report will verify that all necessary remediation works have been completed, and the site is suitable for a specified end use.

The validation report will include analytical data and classification (if applicable) for any material treated or disposed of off-site, material transport dockets, and waste receipts for tracking purposes.

The validation report will detail that the site has been made suitable for the assumed development scenario at the site (i.e. continued commercial/industrial use).

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Safework Australia. (2016). Managing electrical risks in the workplace: code of practice.

Work Health and Safety Act 2011

13. Limitations

This report: has been prepared by GHD for Newcrest Mining Limited and *may only be used and relied on by Newcrest Mining Limited for the purpose agreed between GHD and the Newcrest Mining Limited as set out in section 1.2 of this report.*

GHD otherwise disclaims responsibility to any person other than Newcrest Mining Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report in section 1.5. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Newcrest Mining Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

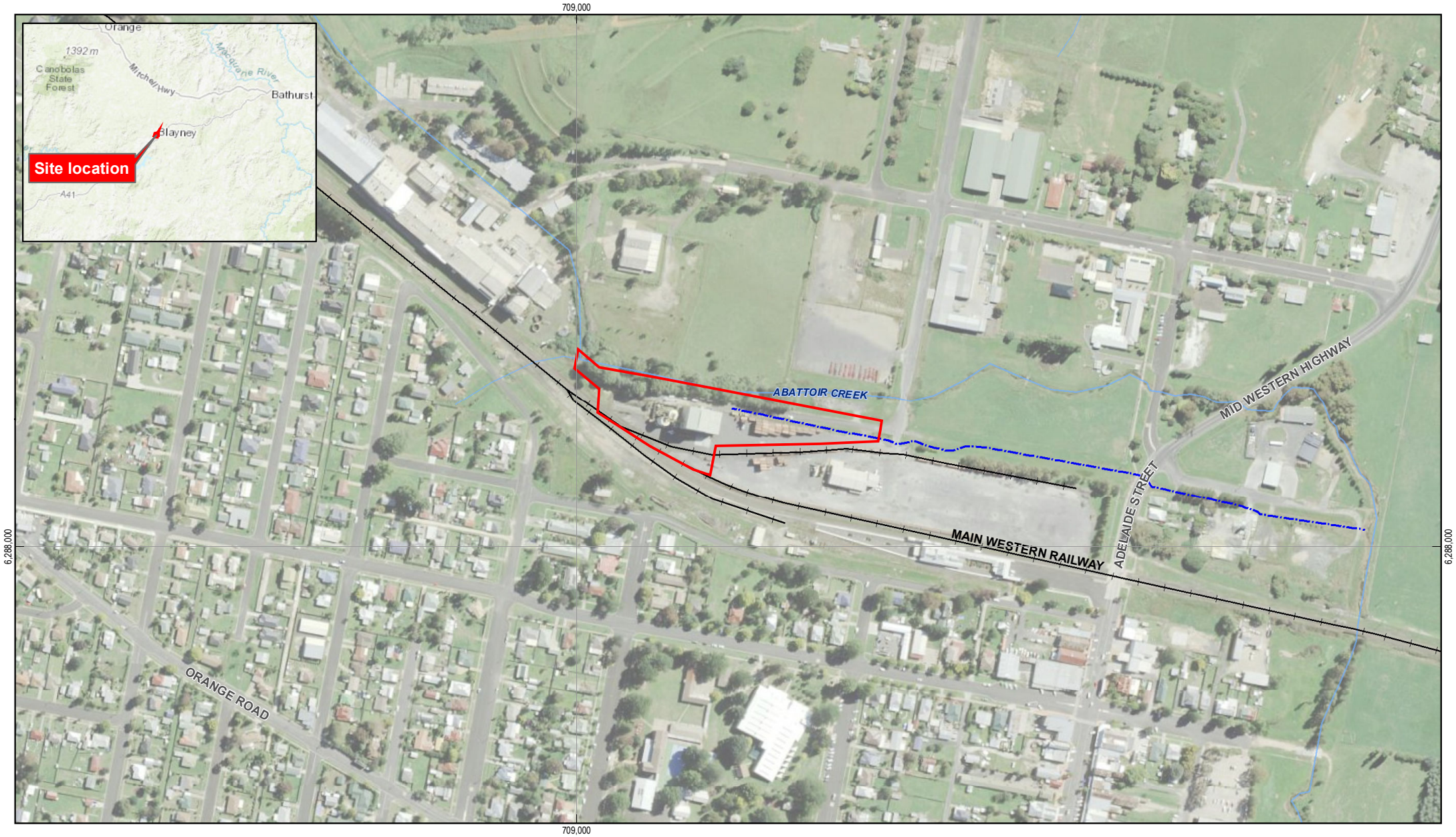
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Appendices

Appendix A – Figures



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Site boundary
- Unnamed drainage channel
- Railway
- Watercourses

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number	12510129
Revision	A
Date	09 Jan 2020

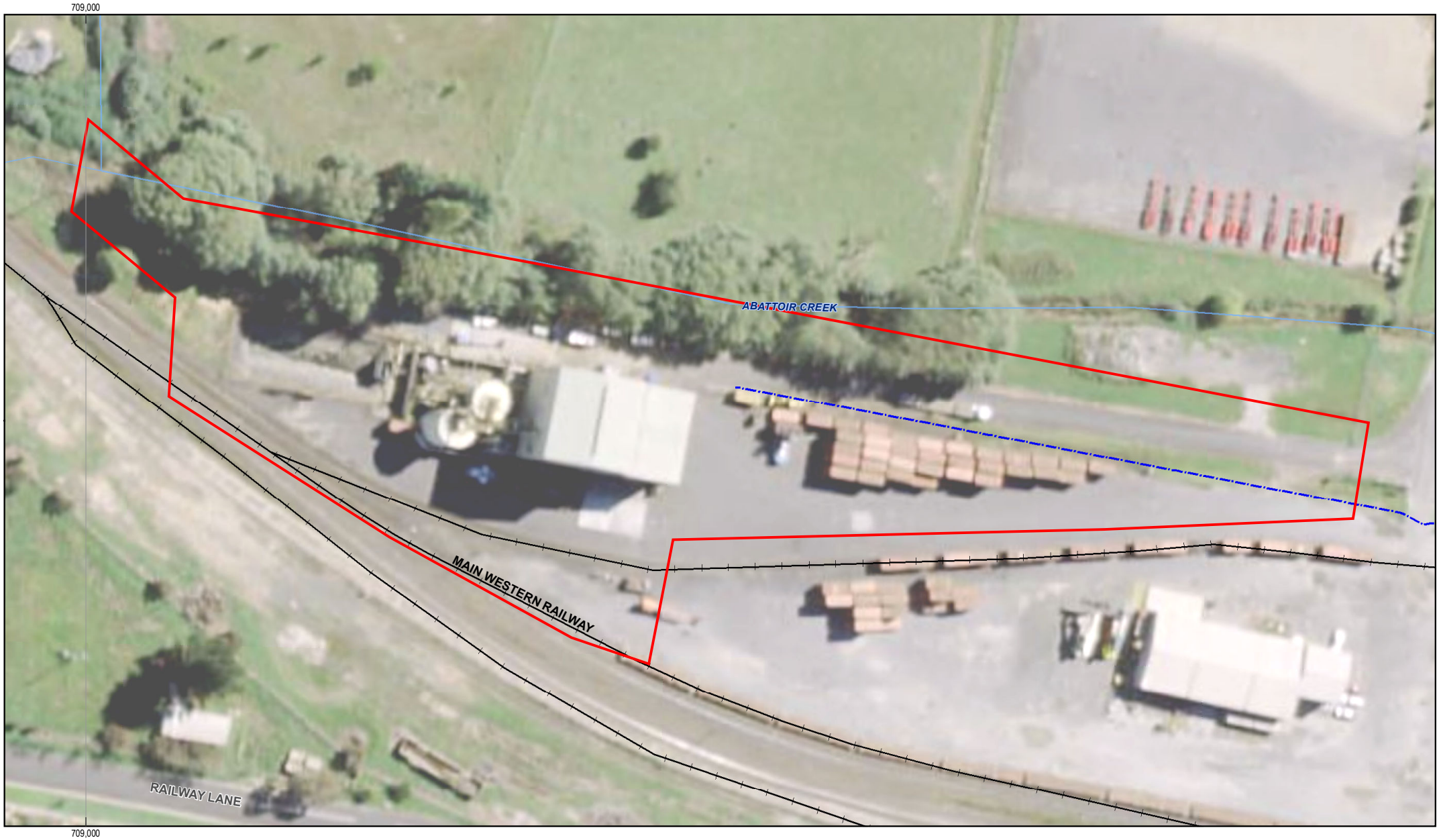
Site Locality Plan

Figure 1

G:\21\12510129\GIS\Maps\Deliverables\Z001_12510129_SiteLocalityPlan.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Data source: Six Maps, NSW Imagery, 2019. Created by:kqvelasco



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Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Site boundary
- Unnamed drainage channel
- Railway
- Watercourses

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number	12510129
Revision	A
Date	09 Jan 2020

Site Layout

Figure 2

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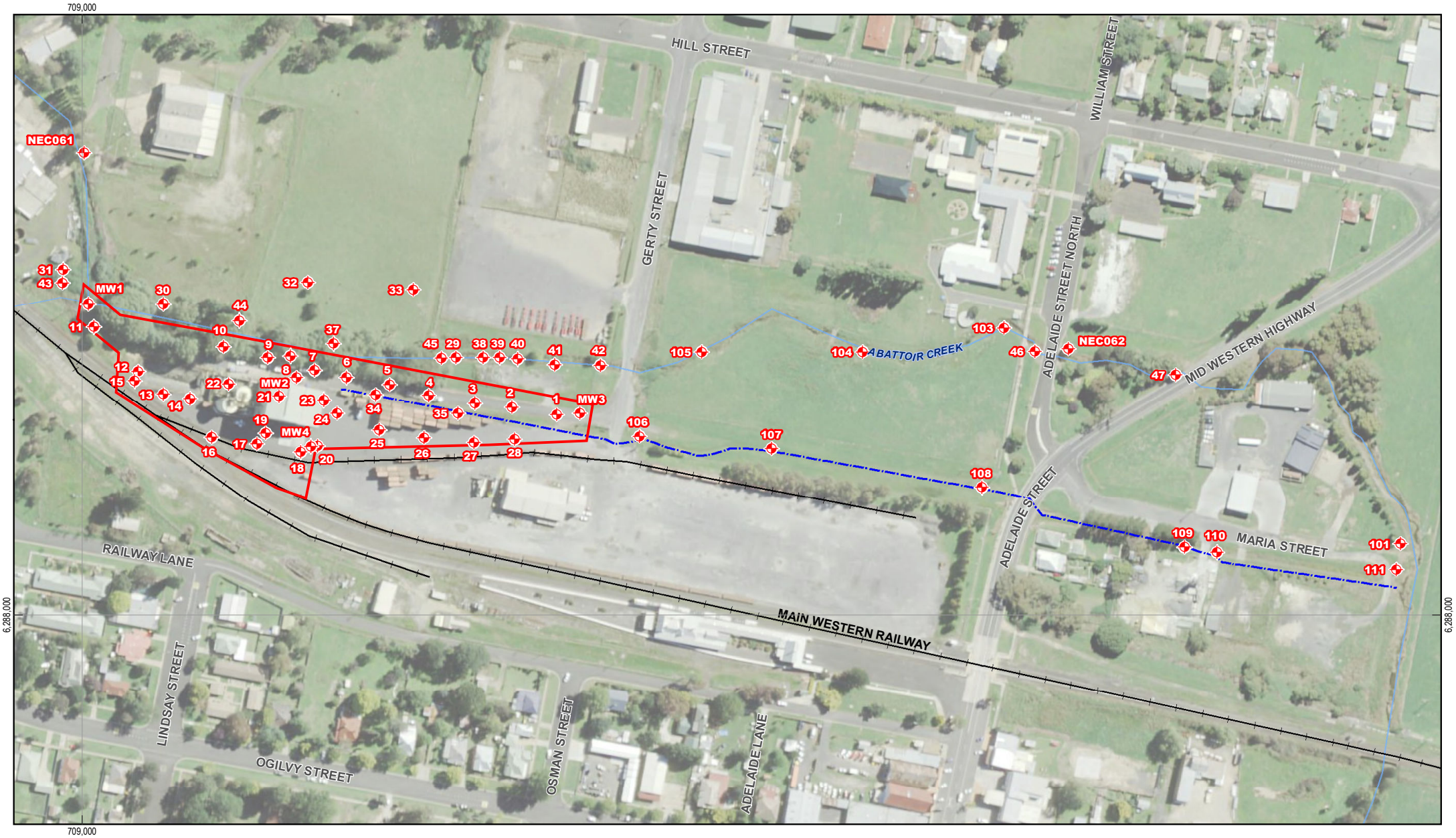
Data source: Six Maps, NSW Imagery, 2019. Created by:kqvelasco



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Investigation location
- Site boundary
- Railway
- Watercourses
- Unnamed drainage channel

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number 12510129
Revision A
Date 09 Jan 2020

Investigation Locations

Figure 3

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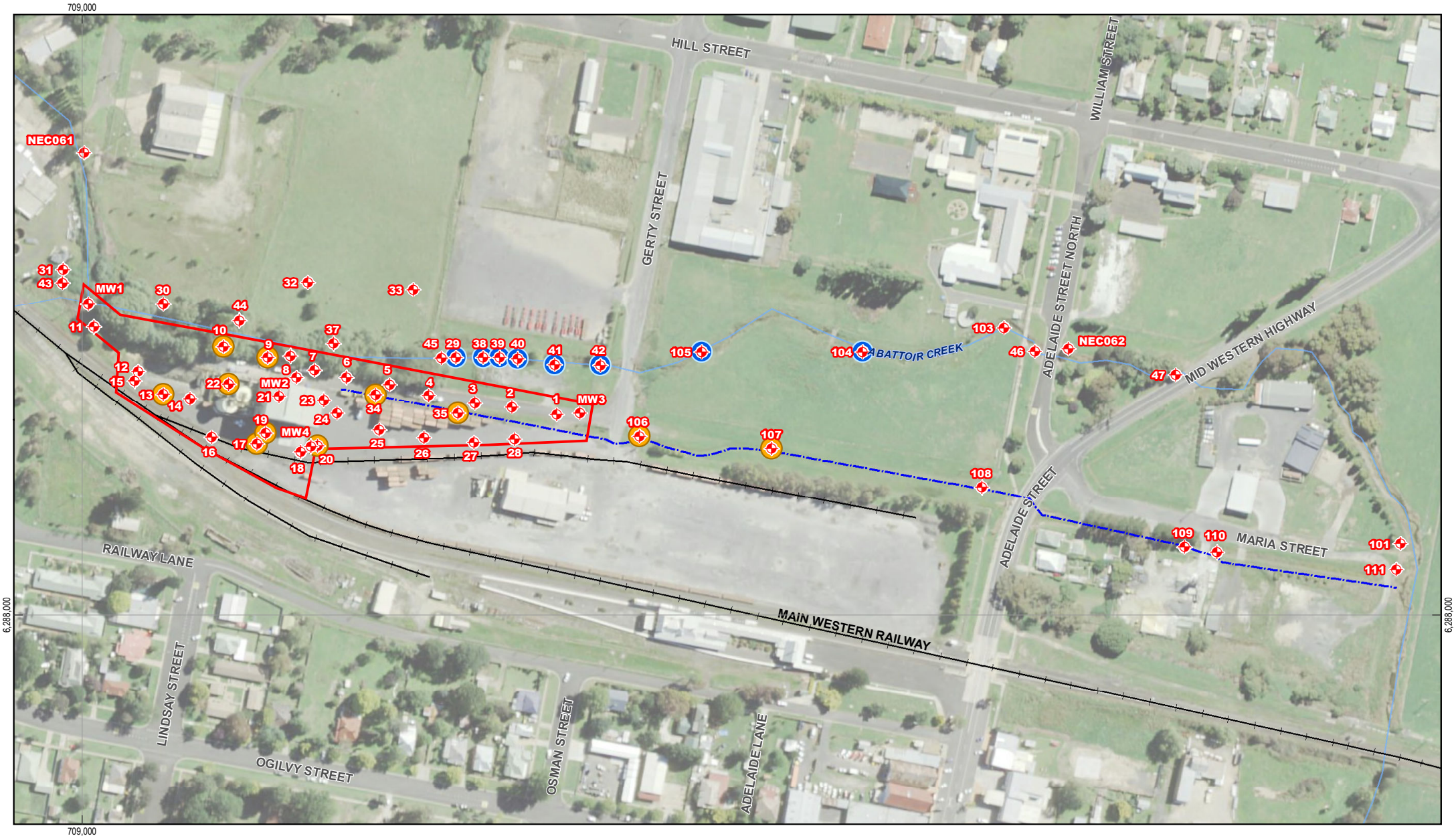
Data source: Six Maps, NSW Imagery, 2019. Created by:kqvelasco



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Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Investigation location
- ANZECC - ISQGI
- EILS - Commercial/Industrial
- Site boundary
- Railway
- Watercourses
- Unnamed drainage channel

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number 12510129
Revision A
Date 09 Jan 2020

Exceedances of assessment criteria

Figure 4

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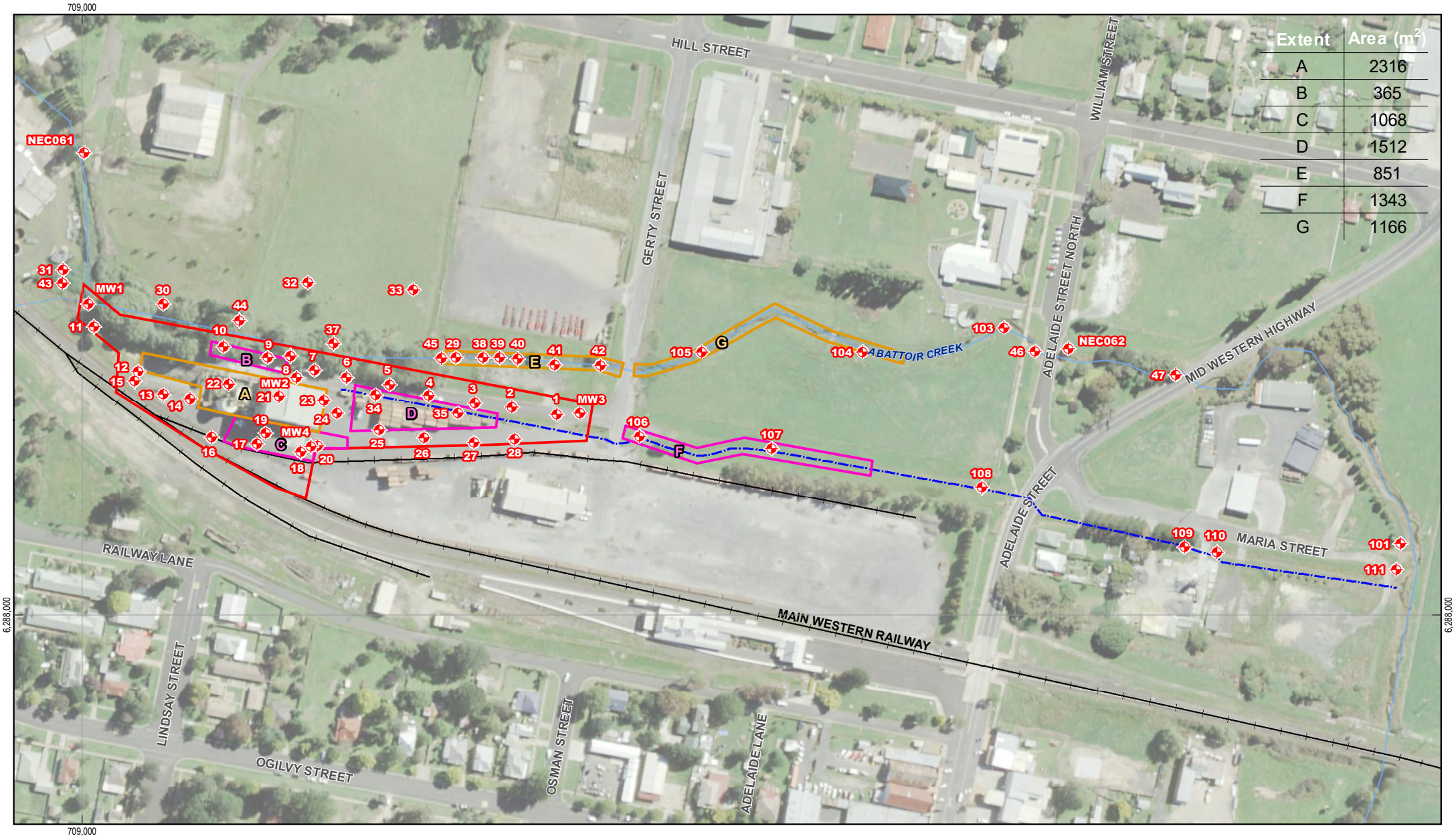

Extent	Area (m^2)
A	2316
B	365
C	1068
D	1512
E	851
F	1343
G	1166

Paper Size A4

0 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Investigation location
- Approximate data gap
- Approximate remedial extent
- Site boundary
- Railway
- Watercourses
- Unnamed drainage channel

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number 12510129
Revision A
Date 09 Jan 2020

Remedial extent

Figure 5

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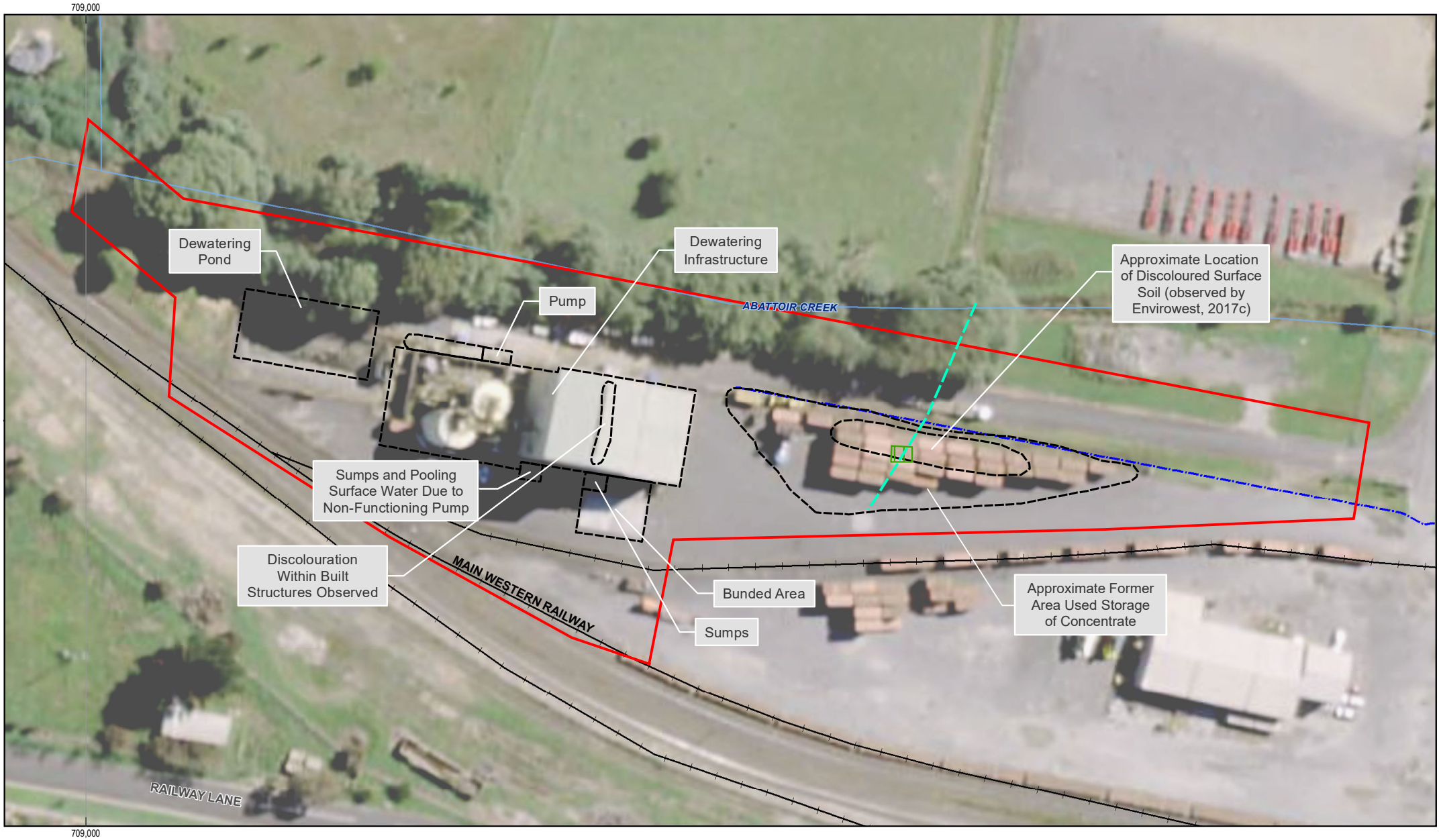

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Metres

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Site Features and Observations
- Site boundary
- Stormwater Grates
- Railway
- Watercourses
- Unnamed drainage channel
- Approximate Stormwater Drainage

Newcrest Mining Limited
Blayney Dewatering Facility
Contamination Review

Job Number	12510129
Revision	A
Date	09 Jan 2020

Site features and observed contamination

Figure 6

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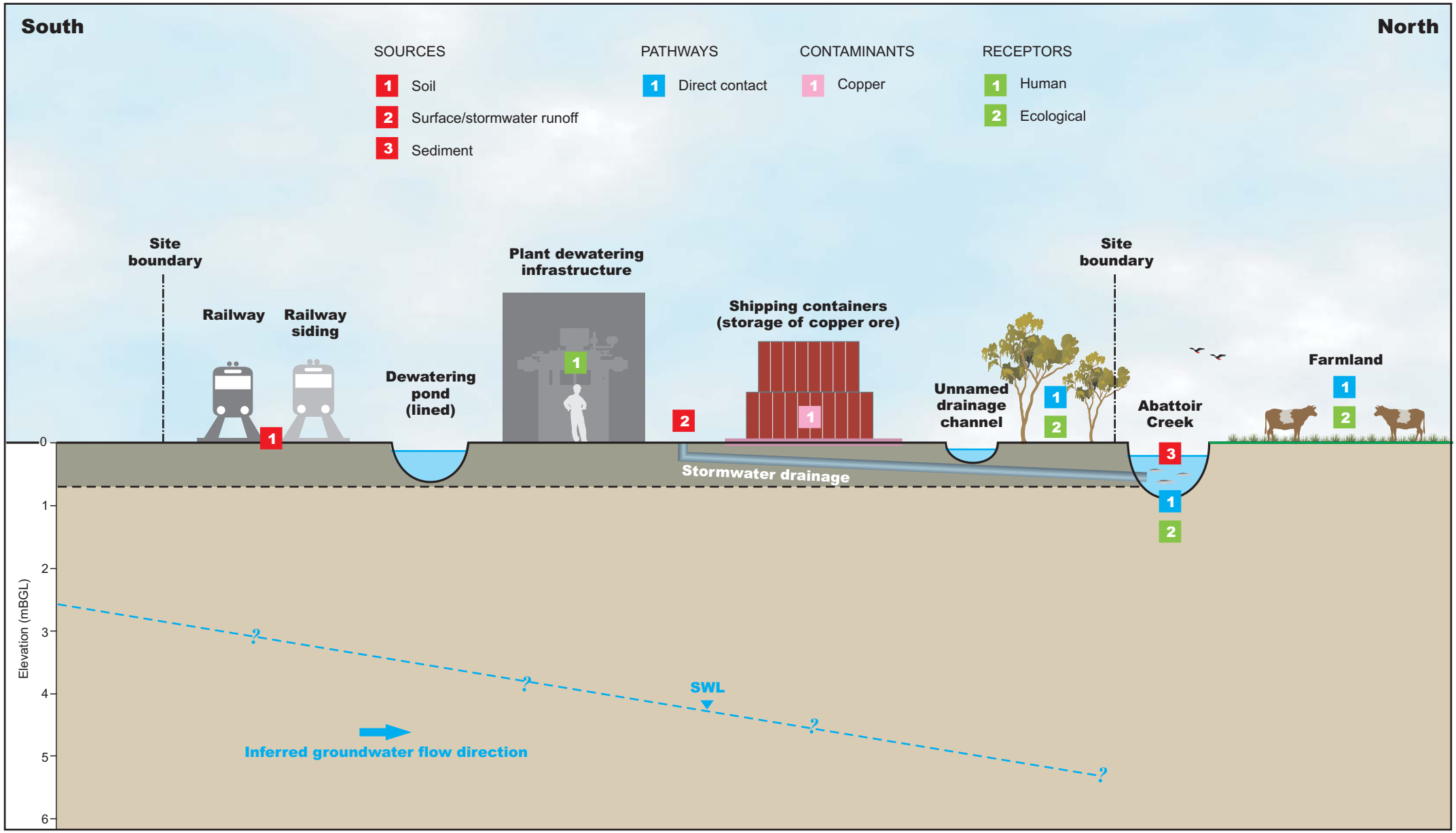


Conceptual diagram only - not to scale

LEGEND

- Fill
- Natural (gravelly clay/silty clay)
- Groundwater level
- Staining

Newcrest Mining Limited
Blayney Dewatering Facility Contamination Review
90 Gerty Street, Blayney, NSW 2799

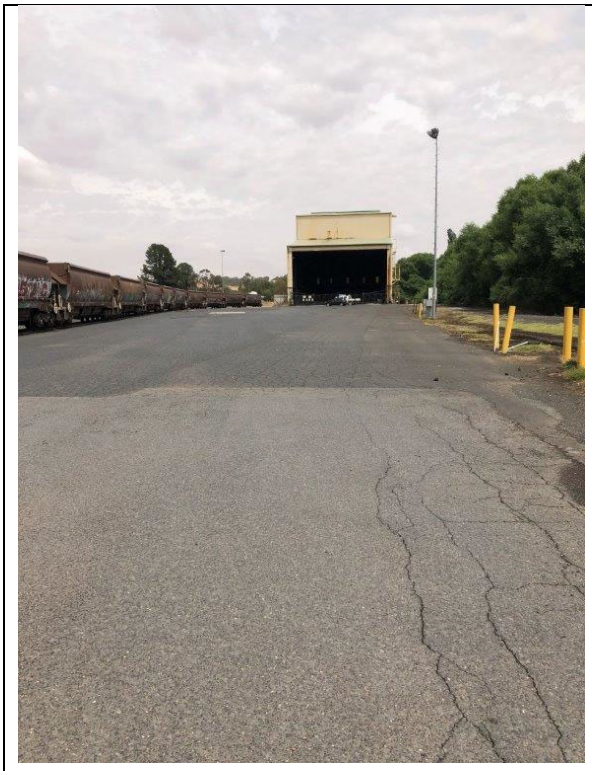
Conceptual Site Model

Job Number	12-510129
Revision	0
Date	10 Dec 2019

Figure 7

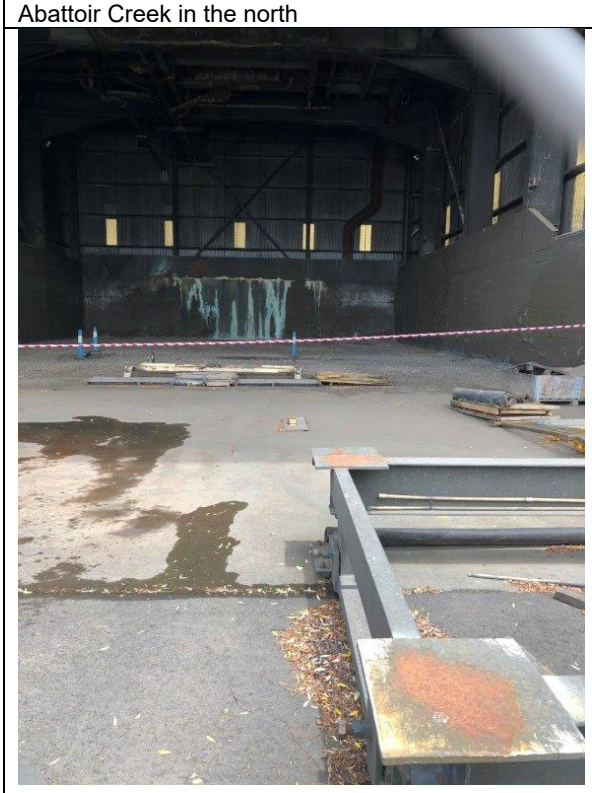
999 Hay Street Perth WA 6000 **T** 61 8 6222 8222 **F** 61 8 6222 8555 **E** permail@ghd.com **W** www.ghd.com

Appendix B – Photolog



Photograph 1 Site buildings in the west of the site, railway lines and siding in the south, proximity to Abattoir Creek in the north

Photograph 2 Unsealed areas in the north of the site

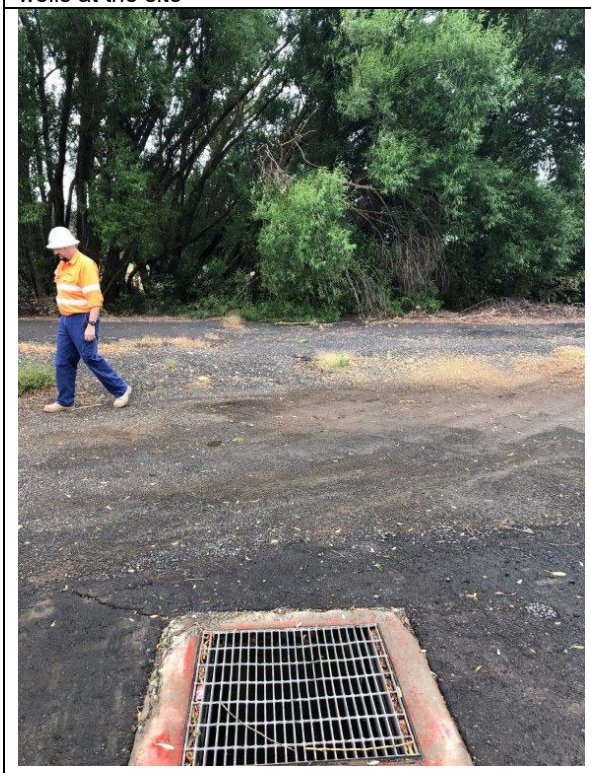


Photograph 3 Copper staining visible on internal surfaces of site buildings

Photograph 4 Dewatering pond to the west of site buildings

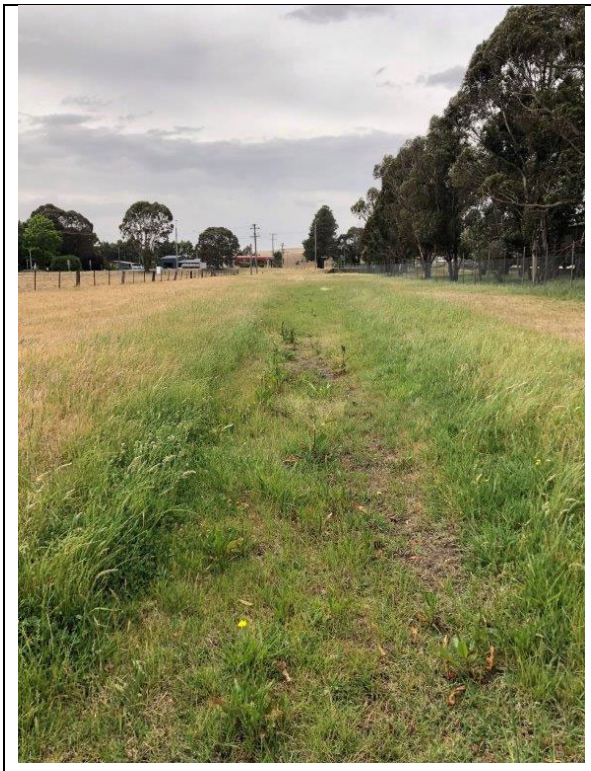
Photograph 5 Example of groundwater monitoring wells at the site

Photograph 6 Stormwater drain observed at the site



Photograph 7 Proximity of stormwater drain to Abattoir Creek

Photograph 8 Abattoir Creek showing vegetation and location of stormwater outlet



Photograph 9 Unnamed drainage channel (the channel) offsite

Photograph 10 Site access from Gerty Street

Appendix C – Historical analytical results

Appendix C

Table 1 - Historical analytical results table - Soil

						NA	Inorganics			Metals								
						Conductivity (1:5 aqueous extract)	Electrical conductivity (lab)	Moisture Content (%)	Soil pH	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Benzene
						µS/cm	µS/cm	%	PH	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																		
NEPM 2013 EIL-Commercial/Industrial																		
0-2m										160		310[#1]	435	1,800		290	3,600	
NEPM 2013 Table 1A(1) HIL D Comm/Ind										3,000[#2]	900	3,600[#3]	240,000	1,500[#4]	730[#5]	6,000	400,000	
Location Code	**Depth**	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**													
1-100	0.1	13/02/2017	1-100_13 Feb 17	Normal	soil	24	24	3	8.4	4	<0.3	78	27	3	<0.05	65	9.2	<0.1
1-500	0.5	13/02/2017	1-500_13 Feb 17	Normal	soil	69	69	16	7.3	5	0.6	83	130	16	<0.05	18	48	<0.1
1-1000	1	13/02/2017	1-1000_13 Feb 17	Normal	soil	68	68	16	7	10	0.4	65	51	18	<0.05	18	47	<0.1
2-100	0.1	13/02/2017	2-100_13 Feb 17	Normal	soil	45	45	4.6	8.4	<3	<0.3	90	23	4	<0.05	67	10	<0.1
2-500	0.5	13/02/2017	2-500_13 Feb 17	Normal	soil	46	46	14	7.7	5	0.6	97	130	15	<0.05	25	48	<0.1
3-100	0.1	13/02/2017	3-100_13 Feb 17	Normal	soil	42	42	5.5	8.7	<3	<0.3	100	22	3	<0.05	66	11	<0.1
3-500	0.5	13/02/2017	3-500_13 Feb 17	Normal	soil	84	84	17	7.5	5	0.6	72	130	13	<0.05	17	40	<0.1
4-100	0.1	13/02/2017	4-100_13 Feb 17	Normal	soil	41	41	5.9	8.7	<3	<0.3	170	21	4	<0.05	120	11	<0.1
4-500	0.5	13/02/2017	4-500_13 Feb 17	Normal	soil	67	67	16	7.5	4	0.5	60	96	13	<0.05	16	29	<0.1
5-100	0.1	13/02/2017	5-100_13 Feb 17	Normal	soil	25	25	4.9	8.4	3	<0.3	150	26	4	<0.05	120	10	<0.1
5-500	0.5	13/02/2017	5-500_13 Feb 17	Normal	soil	32	32	14	7.6	6	0.4	67	93	11	<0.05	29	33	<0.1
6-100	0.1	13/02/2017	6-100_13 Feb 17	Normal	soil	27	27	7	7.9	4	<0.3	200	53	4	<0.05	150	9.9	<0.1
6-500	0.5	13/02/2017	6-500_13 Feb 17	Normal	soil	24	24	14	7.7	9	0.6	110	180	8	<0.05	70	50	<0.1
7-100	0.1	13/02/2017	7-100_13 Feb 17	Normal	soil	50	50	6.2	8.5	<3	<0.3	37	290	6	<0.05	23	22	<0.1
7-500	0.5	13/02/2017	7-500_13 Feb 17	Normal	soil	36	36	11	7.8	7	0.5	91	170	8	<0.05	38	48	<0.1
8-100	0.1	13/02/2017	8-100_13 Feb 17	Normal	soil	95	95	9.9	8	7	0.3	76	260	10	<0.05	41	35	<0.1
8-500	0.5	13/02/2017	8-500_13 Feb 17	Normal	soil	52	52	12	7.3	6	0.6	75	210	9	<0.05	28	48	<0.1
9-100	0.1	13/02/2017	9-100_13 Feb 17	Normal	soil	410	410	2.4	4	5	<0.3	14	2,400	8	<0.05	9.4	28	<0.1
9-500	0.5	13/02/2017	9-500_13 Feb 17	Normal	soil	200	200	9.6	6.2	4	0.4	49	840	13	<0.05	21	38	<0.1
10-100	0.1	13/02/2017	10-100_13 Feb 17	Normal	soil	480	480	4.3	4.5	<3	<0.3	16	1,300	5	<0.05	11	27	<0.1
10-300	0.3	13/02/2017	10-300_13 Feb 17	Normal	soil	570	570	3.8	4.4	<3	<0.3	16	1,300	6	<0.05	11	29	<0.1
10-500	0.5	14/07/2017	10-500_14 Jul 17	Normal	soil			12.6					521					
10-1000	1	14/07/2017	10-1000_14 Jul 17	Normal	soil			13.7					788					
10-2000	2	14/07/2017	10-2000_14 Jul 17	Normal	soil			13.8					313					
10-3000	3	14/07/2017	10-3000_14 Jul 17	Normal	soil			15.7					224					
11-100	0.1	13/02/2017	11-100_13 Feb 17	Normal	soil	32	32	2.6	6.3	23	0.7	15	170	97	0.07	9.3	140	<0.1
11-700	0.7	13/02/2017	11-700_13 Feb 17	Normal	soil	110	110	11	6.5	13	0.5	31	200	55	0.35	8.8	92	<0.1
12-100	0.1	13/02/2017	12-100_13 Feb 17	Normal	soil	79	79	5.3	7.3	4	0.5	23	120	24	<0.05	7.2	83	<0.1
12-500	0.5	13/02/2017	12-500_13 Feb 17	Normal	soil	61	61	12	6.2	<3	<0.3	30	22	23	<0.05	6.4	18	<0.1
12-2000	2	13/02/2017	12-2000_13 Feb 17	Normal	soil	31	31	18	6.5	9	0.4	51	31	31	<0.05	9.1	26	<0.1
12-3000	3	13/02/2017	12-3000_13 Feb 17	Normal	soil	26	26	17	6.3	12	0.4	53	39	41	<0.05	14	30	<0.1
13-100	0.1	13/02/2017	13-100_13 Feb 17	Normal	soil	34	34	2.8	6.6	<3	0.3	8.5	440	10	<0.05	13	50	<0.1
13-500	0.5	13/02/2017	13-500_13 Feb 17	Normal	soil	62	62	13	6.3	4	0.4	29	97	39	<0.05	9.9	31	<0.1
13-2000	2	13/02/2017	13-2000_13 Feb 17	Normal	soil	36	36	16	6	<3	<0.3	23	57	26	<0.05	7.4	20	<0.1
13-3000	3	13/02/2017	13-3000_13 Feb 17	Normal	soil	43	43	18	5.8	<3	<0.3	25	19	15	<0.05	9.1	19	<0.1
14-100	0.1	13/02/2017	14-100_13 Feb 17	Normal	soil	570	570	7.8	10.4	<3	<0.3	43	160	8	<0.05	31	32	<0.1
14-500	0.5	13/02/2017	14-500_13 Feb 17	Normal	soil	1,400	1,400	5.5	11.7	<3	<0.3	9.6	290	6	0.05	6.1	34	<0.1
14-2000	2	13/02/2017	14-2000_13 Feb 17	Normal	soil	84	84	16	6.7	8	0.4	49	14	22	<0.05	6.5	14	<0.1
14-3000	3	13/02/2017	14-3000_13 Feb 17	Normal	soil	65	65	17	6.4	12	0.4	56	36	30	<0.05	12	33	<0.1
15-100	0.1	13/02/2017	15-100_13 Feb 17	Normal	soil	93	93	6.7	7	15	0.6	35	76	60	<0.05	16	85	<0.1
15-500	0.5	13/02/2017	15-500_13 Feb 17	Normal	soil	40	40	11	6.8	17	0.4	39	56	45	<0.05	12	53	<0.1
16-100	0.1	13/02/2017	16-100_13 Feb 17	Normal	soil	53	53	3.7	8.3	<3	0.3	4.5	120	4	<0.05	14	46	<0.1
16-500	0.5	13/02/2017	16-500_13 Feb 17	Normal	soil	44	44	4.4	8.4	3	<0.3	5.1	74	7	<0.05	13	49	<0.1
17-100	0.1	13/02/2017	17-100_13 Feb 17	Normal	soil	120	120	4.1	9	<3	<0.3	4.8	470	4	<0.05	15	46	<0.1
17-500	0.5	13/02/2017	17-500_13 Feb 17	Normal	soil	51	51	4.4	8.2	9	<0.3	4.3	93	18	<0.05	2.8	61	<0.1
18-100	0.1	13/02/2017	18-100_13 Feb 17	Normal	soil	79	79	4.4	9.4	<3	0.3	4.9	330	5	<0.05	15	50	<0.1
18-500	0.5	13/02/2017	18-500_13 Feb 17	Normal	soil	68	68	4.9	9	7	<0.3	4.6	110	13	<0.05	7.2	56	<0.1
19-100	0.1	13/02/2017	19-100_13 Feb 17	Normal	soil	1,700	1,700	11	4.1	16	0.6	61	4,800	19	0.09	31	53	<0.1
19-500	0.5	13/02/2017	19-500_13 Feb 17	Normal	soil	1,500	1,500	10	3.9	22	0.6	81	5,800	20	0.14	46	55	<0.1
19-500	0.5	14/07/2017	19-500_14 Jul 17	Normal	soil			13.9					264					
19-1000	1	14/07/2017	19-1000_14 Jul 17	Normal	soil			14					8					
19-1200	1.2	13/02/2017	19-1200_13 Feb 17	Normal	soil	2,600	2,600	13	6	6	1.5	23	28	33	<0.05	6.2	29	<0.1
19-2000	2	14/07/2017	19-2000_14 Jul 17	Normal	soil			14.3					138					
19-3000	3	14/07/2017	19-3000_14 Jul 17	Normal	soil			16.8					34					
20-100	0.1	13/02/2017	20-100_13 Feb 17	Normal	soil	1,300	1,300	6.7	4.3	72	2.6	61	58,000	78	0.24	25	350	<0.1
20-500	0.5	13/02/2017	20-500_13 Feb 17	Normal	soil	730	730	16	5.5	10	0.8	66	1,400	16	<0.05	21	63	<0.1
20-2000	2	14/07/2017	20-2000_14 Jul 17	Normal	soil		220	15.8	7.1				14					
20-3000	3	14/07/2017	20-3000_14 Jul 17	Normal	soil		130	17.2	6.3				56					
21-400	0.4	13/02/2017	21-400_13 Feb 17	Normal	soil	220	440	14	5.6	6	0.6	61	150	10	<0.05	17	55	<0.1
21-900	0.9	13/02/2017	21-900_13 Feb 17	Normal	soil	130	410	15	5.7	6	0.5	53	84	12	<0.05	13	34	<0.1
22-100	0.1	13/02/2017	22-100_13 Feb 17	Normal	soil	440	130	7.6	8.7	29	1.2	13	20,000	32	0.1	19	190	<0.1

						NA	Inorganics			Metals								
						Conductivity (1:5 aqueous extract)	Electrical conductivity (lab)	Moisture Content (%)	Soil pH	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Benzene
						µS/cm	µS/cm	%	PH	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																		
NEPM 2013 EIL-Commercial/Industrial																		
0-2m										160		310[#1]	435	1,800		290	3,600	
NEPM 2013 Table 1A(1) HIL D Comm/Ind										3,000[#2]	900	3,600[#3]	240,000	1,500[#4]	730[#5]	6,000	400,000	
22-400	0.4	13/02/2017	22-400_13 Feb 17	Normal	soil	410	57	9.2	9.2	37	1.4	20	26,000	40	0.16	22	370	<0.1
23-100	0.1	13/02/2017	23-100_13 Feb 17	Normal	soil	130	100	3.8	9.8	<3	0.3	4.2	40	4	<0.05	14	39	<0.1
23-500	0.5	13/02/2017	23-500_13 Feb 17	Normal	soil	57	62	4.7	9.4	4	0.3	6.3	47	8	<0.05	13	48	<0.1
24-100	0.1	13/02/2017	24-100_13 Feb 17	Normal	soil	100	93	3	9.6	<3	0.3	5.2	35	4	<0.05	17	43	<0.1
24-500	0.5	13/02/2017	24-500_13 Feb 17	Normal	soil	62	45	3.5	8.8	<3	0.3	4.6	20	6	<0.05	15	46	<0.1
25-100	0.1	13/02/2017	25-100_13 Feb 17	Normal	soil	93	93	3.8	9.6	<3	<0.3	4.4	38	4	<0.05	15	42	<0.1
25-500	0.5	13/02/2017	25-500_13 Feb 17	Normal	soil	45	45	4.6	8.8	10	0.3	4	49	14	<0.05	7.2	58	<0.1
26-100	0.1	13/02/2017	26-100_13 Feb 17	Normal	soil	97	97	3	9.5	<3	0.3	4.2	140	5	<0.05	17	52	<0.1
26-400	0.4	13/02/2017	26-400_13 Feb 17	Normal	soil	80	80	3.8	9.5	<3	0.3	3.9	25	5	<0.05	16	49	<0.1
27-100	0.1	13/02/2017	27-100_13 Feb 17	Normal	soil	85	85	4.4	9.7	<3	<0.3	3.9	27	4	<0.05	13	39	<0.1
27-500	0.5	13/02/2017	27-500_13 Feb 17	Normal	soil	31	30	4.4	8.7	10	0.3	3.6	70	20	<0.05	2.8	63	<0.1
28-100	0.1	14/02/2017	28-100_14 Feb 17	Normal	soil	730	730	7.2	11.3	8	<0.3	14	38	9	<0.05	13	44	<0.1
28-500	0.5	14/02/2017	28-500_14 Feb 17	Normal	soil	810	810	11	11.4	8	<0.3	14	48	12	<0.05	11	49	<0.1
32-100	0.1	14/02/2017	32-100_14 Feb 17	Normal	soil	150	150	12	6.4	10	<0.3	53	56	13	<0.05	24	39	<0.1
32-300	0.3	14/02/2017	32-300_14 Feb 17	Normal	soil	160	160	10	6.1	7	<0.3	59	35	13	<0.05	19	32	<0.1
33-100	0.1	14/02/2017	33-100_14 Feb 17	Normal	soil	76	76	7.2	6	8	<0.3	39	100	13	<0.05	13	41	<0.1
33-300	0.3	14/02/2017	33-300_14 Feb 17	Normal	soil	39	39	7.6	6	6	<0.3	42	48	12	<0.05	12	31	<0.1
34-100	0.1	14/02/2017	34-100_14 Feb 17	Normal	soil	170	170	0.8	4.5	36	1.1	34	24,000	48	0.25	22	350	<0.1
34-200	0.2	14/02/2017	34-200_14 Feb 17	Normal	soil	93	93	18	4.8	19	0.6	58	6,200	27	0.21	15	84	<0.1
35-100	0.1	14/02/2017	35-100_14 Feb 17	Normal	soil	4,800	4,800	5.6	3.3	56	1.7	48	42,000	52	0.36	32	320	<0.1
35-200	0.2	14/02/2017	35-200_14 Feb 17	Normal	soil	1,700	1,700	29	3.3	120	1.5	54	15,000	85	0.86	21	160	<0.1
35-500	0.5	14/07/2017	35-500_14 Jul 17	Normal	soil			13.2					2,890					
106	0.1	6/10/2017	106_06 Oct 17	Normal	soil			35.4					11,000					
106.1-(0-100)	0 - 0.1	16/11/2017	106.1-(0-100)_16 Nov 17	Normal	soil			25.7					6,300					
106.1-(400-500)	0.4 - 0.5	16/11/2017	106.1-(400-500)_16 Nov 17	Normal	soil			20.5					64					
106.1-(900-1000)	0.9 - 1	16/11/2017	106.1-(900-1000)_16 Nov 1	Normal	soil			16.8					20					
106.1-N (0-100)	0 - 0.1	16/11/2017	106.1-N (0-100)_16 Nov 17	Normal	soil			2.9					80					
106.1-S (0-100)	0 - 0.1	16/11/2017	106.1-S (0-100)_16 Nov 17	Normal	soil			10.7					200					
107	0.1	6/10/2017	107_06 Oct 17	Normal	soil			30.7					1,600					
107.1-(0-100)	0 - 0.1	16/11/2017	107.1-(0-100)_16 Nov 17	Normal	soil			34.9					2,000					
107.1-(400-500)	0.4 - 0.5	16/11/2017	107.1-(400-500)_16 Nov 17	Normal	soil			19.8					20					
107.1-(900-1000)	0.9 - 1	16/11/2017	107.1-(900-1000)_16 Nov 1	Normal	soil			20.2					33					
107.1-N (0-100)	0 - 0.1	16/11/2017	107.1-N (0-100)_16 Nov 17	Normal	soil			12					84					
107.1-S (0-100)	0 - 0.1	16/11/2017	107.1-S (0-100)_16 Nov 17	Normal	soil			20.1					300					
108	0.1	6/10/2017	108_06 Oct 17	Normal	soil			24.4					89					
108.1-N (0-100)	0 - 0.1	16/11/2017	108.1-N (0-100)_16 Nov 17	Normal	soil			18.7					180					
108.1-S (0-100)	0 - 0.1	16/11/2017	108.1-S (0-100)_16 Nov 17	Normal	soil			11.9					51					
109	0.1	6/10/2017	109_06 Oct 17	Normal	soil			46					280					
112	0.1	16/11/2017	112_16 Nov 17	Normal	soil			63.1					300					

Statistics

Number of Results	72	74	100	74	72	72	72	100	72	72	72	72	72	72
Number of Detects	72	74	100	74	50	45	72	100	72	12	72	72	0	
Minimum Concentration	24	24	0.8	3.3	3	0.3	3.6	8	3	0.05	2.8	9.2	<0.1	
Maximum Concentration	4,800	4,800	63.1	11.7	120	2.6	200	58,000	97	0.86	150	370	<0.1	
Average Concentration *	336	329	12	7.3	11	0.45	44	2,429	19	0.061	24	63	0.05	
Standard Deviation *	721	712	9.4	1.9	18	0.43	40	8,227	20	0.12	27	76	0	

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 Develop site specific based on CEC, pH, clay content, state and traffic volume

#2 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Schedule B7).

#3 In the absence of a guideline value for total chromium, chromium VI value adopted

#4 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.

#5 Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.

							BTEXN						TRH - NEPM 2013						
							Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																			
NEPM 2013 EIL-Commercial/Industrial																			
0-2m																			
NEPM 2013 Table 1A(1) HIL D Comm/Ind																			
Location Code	**Depth**	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**														
1-100	0.1	13/02/2017	1-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
1-500	0.5	13/02/2017	1-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
1-1000	1	13/02/2017	1-1000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
2-100	0.1	13/02/2017	2-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
2-500	0.5	13/02/2017	2-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
3-100	0.1	13/02/2017	3-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
3-500	0.5	13/02/2017	3-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
4-100	0.1	13/02/2017	4-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
4-500	0.5	13/02/2017	4-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
5-100	0.1	13/02/2017	5-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
5-500	0.5	13/02/2017	5-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
6-100	0.1	13/02/2017	6-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
6-500	0.5	13/02/2017	6-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
7-100	0.1	13/02/2017	7-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
7-500	0.5	13/02/2017	7-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
8-100	0.1	13/02/2017	8-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
8-500	0.5	13/02/2017	8-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
9-100	0.1	13/02/2017	9-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
9-500	0.5	13/02/2017	9-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
10-100	0.1	13/02/2017	10-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
10-300	0.3	13/02/2017	10-300_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
10-500	0.5	14/07/2017	10-500_14 Jul 17	Normal	soil														
10-1000	1	14/07/2017	10-1000_14 Jul 17	Normal	soil														
10-2000	2	14/07/2017	10-2000_14 Jul 17	Normal	soil														
10-3000	3	14/07/2017	10-3000_14 Jul 17	Normal	soil														
11-100	0.1	13/02/2017	11-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
11-700	0.7	13/02/2017	11-700_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	200	<120	<210
12-100	0.1	13/02/2017	12-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
12-500	0.5	13/02/2017	12-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
12-2000	2	13/02/2017	12-2000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
12-3000	3	13/02/2017	12-3000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
13-100	0.1	13/02/2017	13-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
13-500	0.5	13/02/2017	13-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
13-2000	2	13/02/2017	13-2000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
13-3000	3	13/02/2017	13-3000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
14-100	0.1	13/02/2017	14-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
14-500	0.5	13/02/2017	14-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
14-2000	2	13/02/2017	14-2000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
14-3000	3	13/02/2017	14-3000_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
15-100	0.1	13/02/2017	15-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
15-500	0.5	13/02/2017	15-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
16-100	0.1	13/02/2017	16-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
16-500	0.5	13/02/2017	16-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
17-100	0.1	13/02/2017	17-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
17-500	0.5	13/02/2017	17-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
18-100	0.1	13/02/2017	18-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
18-500	0.5	13/02/2017	18-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
19-100	0.1	13/02/2017	19-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
19-500	0.5	13/02/2017	19-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	98	<120	<210
19-500	0.5	14/07/2017	19-500_14 Jul 17	Normal	soil														
19-1000	1	14/07/2017	19-1000_14 Jul 17	Normal	soil														
19-1200	1.2	13/02/2017	19-1200_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
19-2000	2	14/07/2017	19-2000_14 Jul 17	Normal	soil														
19-3000	3	14/07/2017	19-3000_14 Jul 17	Normal	soil														
20-100	0.1	13/02/2017	20-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
20-500	0.5	13/02/2017	20-500_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
20-2000	2	14/07/2017	20-2000_14 Jul 17	Normal	soil														
20-3000	3	14/07/2017	20-3000_14 Jul 17	Normal	soil														
21-400	0.4	13/02/2017	21-400_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
21-900	0.9	13/02/2017	21-900_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
22-100	0.1	13/02/2017	22-100_13 Feb 17	Normal	soil		<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210

						BTEXN						TRH - NEPM 2013						
						Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																		
NEPM 2013 EIL-Commercial/Industrial																		
0-2m																		
NEPM 2013 Table 1A(1) HIL D Comm/Ind																		
22-400	0.4	13/02/2017	22-400_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
23-100	0.1	13/02/2017	23-100_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
23-500	0.5	13/02/2017	23-500_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
24-100	0.1	13/02/2017	24-100_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
24-500	0.5	13/02/2017	24-500_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
25-100	0.1	13/02/2017	25-100_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
25-500	0.5	13/02/2017	25-500_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
26-100	0.1	13/02/2017	26-100_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
26-400	0.4	13/02/2017	26-400_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
27-100	0.1	13/02/2017	27-100_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
27-500	0.5	13/02/2017	27-500_13 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
28-100	0.1	14/02/2017	28-100_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
28-500	0.5	14/02/2017	28-500_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
32-100	0.1	14/02/2017	32-100_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
32-300	0.3	14/02/2017	32-300_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
33-100	0.1	14/02/2017	33-100_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
33-300	0.3	14/02/2017	33-300_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210
34-100	0.1	14/02/2017	34-100_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	1,600	420	2,000
34-200	0.2	14/02/2017	34-200_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	110	110	1,700	<120	1,900
35-100	0.1	14/02/2017	35-100_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	45	45	2,500	400	3,000
35-200	0.2	14/02/2017	35-200_14 Feb 17	Normal	soil	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	820	180	1,000
35-500	0.5	14/07/2017	35-500_14 Jul 17	Normal	soil													
106	0.1	6/10/2017	106_06 Oct 17	Normal	soil													
106.1-(0-100)	0 - 0.1	16/11/2017	106.1-(0-100)_16 Nov 17	Normal	soil													
106.1-(400-500)	0.4 - 0.5	16/11/2017	106.1-(400-500)_16 Nov 17	Normal	soil													
106.1-(900-1000)	0.9 - 1	16/11/2017	106.1-(900-1000)_16 Nov 1	Normal	soil													
106.1-N (0-100)	0 - 0.1	16/11/2017	106.1-N (0-100)_16 Nov 17	Normal	soil													
106.1-S (0-100)	0 - 0.1	16/11/2017	106.1-S (0-100)_16 Nov 17	Normal	soil													
107	0.1	6/10/2017	107_06 Oct 17	Normal	soil													
107.1-(0-100)	0 - 0.1	16/11/2017	107.1-(0-100)_16 Nov 17	Normal	soil													
107.1-(400-500)	0.4 - 0.5	16/11/2017	107.1-(400-500)_16 Nov 17	Normal	soil													
107.1-(900-1000)	0.9 - 1	16/11/2017	107.1-(900-1000)_16 Nov 1	Normal	soil													
107.1-N (0-100)	0 - 0.1	16/11/2017	107.1-N (0-100)_16 Nov 17	Normal	soil													
107.1-S (0-100)	0 - 0.1	16/11/2017	107.1-S (0-100)_16 Nov 17	Normal	soil													
108	0.1	6/10/2017	108_06 Oct 17	Normal	soil													
108.1-N (0-100)	0 - 0.1	16/11/2017	108.1-N (0-100)_16 Nov 17	Normal	soil													
108.1-S (0-100)	0 - 0.1	16/11/2017	108.1-S (0-100)_16 Nov 17	Normal	soil													
109	0.1	6/10/2017	109_06 Oct 17	Normal	soil													
112	0.1	16/11/2017	112_16 Nov 17	Normal	soil													

Statistics

Number of Results	72	72	72	72	72	72	72	72	72	72	72	72	72	72
Number of Detects	0	0	0	0	0	0	0	0	2	2	6	3	4	
Minimum Concentration	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	
Maximum Concentration	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	110	110	2,500	420	3,000	
Average Concentration *	0.05	0.05	0.05	0.1	0.15	0.3	12	12	14	14	137	71	209	
Standard Deviation *	0	0	0	0	0	0	0	0	12	12	397	59	463	

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 Develop site specific based on CEC, pH, clay content, state and traffic volume
#2 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate
#3 In the absence of a guideline value for total chromium, chromium VI value adopted
#4 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specifi
#5 Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is pr

							TRH - NEPM 1999						PAHs
						TRH C37-C40	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL												
NEPM 2013 EIL-Commercial/Industrial												
0-2m												370
NEPM 2013 Table 1A(1) HIL D Comm/Ind												
Location Code	**Depth**	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**							
1-100	0.1	13/02/2017	1-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
1-500	0.5	13/02/2017	1-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
1-1000	1	13/02/2017	1-1000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
2-100	0.1	13/02/2017	2-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
2-500	0.5	13/02/2017	2-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
3-100	0.1	13/02/2017	3-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
3-500	0.5	13/02/2017	3-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
4-100	0.1	13/02/2017	4-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
4-500	0.5	13/02/2017	4-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
5-100	0.1	13/02/2017	5-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
5-500	0.5	13/02/2017	5-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
6-100	0.1	13/02/2017	6-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
6-500	0.5	13/02/2017	6-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
7-100	0.1	13/02/2017	7-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
7-500	0.5	13/02/2017	7-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
8-100	0.1	13/02/2017	8-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
8-500	0.5	13/02/2017	8-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
9-100	0.1	13/02/2017	9-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
9-500	0.5	13/02/2017	9-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
10-100	0.1	13/02/2017	10-100_13 Feb 17	Normal	soil	<100	<20	<20	50	<45	<110	<0.1
10-300	0.3	13/02/2017	10-300_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
10-500	0.5	14/07/2017	10-500_14 Jul 17	Normal	soil							
10-1000	1	14/07/2017	10-1000_14 Jul 17	Normal	soil							
10-2000	2	14/07/2017	10-2000_14 Jul 17	Normal	soil							
10-3000	3	14/07/2017	10-3000_14 Jul 17	Normal	soil							
11-100	0.1	13/02/2017	11-100_13 Feb 17	Normal	soil	<100	<20	<20	51	<45	<110	<0.1
11-700	0.7	13/02/2017	11-700_13 Feb 17	Normal	soil	<100	<20	<20	100	100	210	<0.1
12-100	0.1	13/02/2017	12-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
12-500	0.5	13/02/2017	12-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
12-2000	2	13/02/2017	12-2000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
12-3000	3	13/02/2017	12-3000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
13-100	0.1	13/02/2017	13-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
13-500	0.5	13/02/2017	13-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
13-2000	2	13/02/2017	13-2000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
13-3000	3	13/02/2017	13-3000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
14-100	0.1	13/02/2017	14-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
14-500	0.5	13/02/2017	14-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
14-2000	2	13/02/2017	14-2000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
14-3000	3	13/02/2017	14-3000_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
15-100	0.1	13/02/2017	15-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
15-500	0.5	13/02/2017	15-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
16-100	0.1	13/02/2017	16-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
16-500	0.5	13/02/2017	16-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
17-100	0.1	13/02/2017	17-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
17-500	0.5	13/02/2017	17-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
18-100	0.1	13/02/2017	18-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
18-500	0.5	13/02/2017	18-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
19-100	0.1	13/02/2017	19-100_13 Feb 17	Normal	soil	<100	<20	<20	66	<45	<110	<0.1
19-500	0.5	13/02/2017	19-500_13 Feb 17	Normal	soil	<100	<20	<20	89	<45	<110	<0.1
19-500	0.5	14/07/2017	19-500_14 Jul 17	Normal	soil							
19-1000	1	14/07/2017	19-1000_14 Jul 17	Normal	soil							
19-1200	1.2	13/02/2017	19-1200_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
19-2000	2	14/07/2017	19-2000_14 Jul 17	Normal	soil							
19-3000	3	14/07/2017	19-3000_14 Jul 17	Normal	soil							
20-100	0.1	13/02/2017	20-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
20-500	0.5	13/02/2017	20-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
20-2000	2	14/07/2017	20-2000_14 Jul 17	Normal	soil							
20-3000	3	14/07/2017	20-3000_14 Jul 17	Normal	soil							
21-400	0.4	13/02/2017	21-400_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
21-900	0.9	13/02/2017	21-900_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
22-100	0.1	13/02/2017	22-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1

							TRH - NEPM 1999						PAHs
						TRH C37-C40	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL												
NEPM 2013 EIL-Commercial/Industrial												
0-2m												370
NEPM 2013 Table 1A(1) HIL D Comm/Ind												
22-400	0.4	13/02/2017	22-400_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
23-100	0.1	13/02/2017	23-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
23-500	0.5	13/02/2017	23-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
24-100	0.1	13/02/2017	24-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
24-500	0.5	13/02/2017	24-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
25-100	0.1	13/02/2017	25-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
25-500	0.5	13/02/2017	25-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
26-100	0.1	13/02/2017	26-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
26-400	0.4	13/02/2017	26-400_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
27-100	0.1	13/02/2017	27-100_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
27-500	0.5	13/02/2017	27-500_13 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
28-100	0.1	14/02/2017	28-100_14 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
28-500	0.5	14/02/2017	28-500_14 Feb 17	Normal	soil	<100	<20	<20	50	<45	<110	<0.1
32-100	0.1	14/02/2017	32-100_14 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
32-300	0.3	14/02/2017	32-300_14 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
33-100	0.1	14/02/2017	33-100_14 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
33-300	0.3	14/02/2017	33-300_14 Feb 17	Normal	soil	<100	<20	<20	<45	<45	<110	<0.1
34-100	0.1	14/02/2017	34-100_14 Feb 17	Normal	soil	140	<20	<20	800	1,100	1,900	<0.1
34-200	0.2	14/02/2017	34-200_14 Feb 17	Normal	soil	<100	<20	<20	1,600	270	1,900	<0.1
35-100	0.1	14/02/2017	35-100_14 Feb 17	Normal	soil	120	<20	<20	1,700	1,100	2,800	<0.1
35-200	0.2	14/02/2017	35-200_14 Feb 17	Normal	soil	<100	<20	<20	400	590	990	<0.1
35-500	0.5	14/07/2017	35-500_14 Jul 17	Normal	soil							
106	0.1	6/10/2017	106_06 Oct 17	Normal	soil							
106.1-(0-100)	0 - 0.1	16/11/2017	106.1-(0-100)_16 Nov 17	Normal	soil							
106.1-(400-500)	0.4 - 0.5	16/11/2017	106.1-(400-500)_16 Nov 17	Normal	soil							
106.1-(900-1000)	0.9 - 1	16/11/2017	106.1-(900-1000)_16 Nov 1	Normal	soil							
106.1-N (0-100)	0 - 0.1	16/11/2017	106.1-N (0-100)_16 Nov 17	Normal	soil							
106.1-S (0-100)	0 - 0.1	16/11/2017	106.1-S (0-100)_16 Nov 17	Normal	soil							
107	0.1	6/10/2017	107_06 Oct 17	Normal	soil							
107.1-(0-100)	0 - 0.1	16/11/2017	107.1-(0-100)_16 Nov 17	Normal	soil							
107.1-(400-500)	0.4 - 0.5	16/11/2017	107.1-(400-500)_16 Nov 17	Normal	soil							
107.1-(900-1000)	0.9 - 1	16/11/2017	107.1-(900-1000)_16 Nov 1	Normal	soil							
107.1-N (0-100)	0 - 0.1	16/11/2017	107.1-N (0-100)_16 Nov 17	Normal	soil							
107.1-S (0-100)	0 - 0.1	16/11/2017	107.1-S (0-100)_16 Nov 17	Normal	soil							
108	0.1	6/10/2017	108_06 Oct 17	Normal	soil							
108.1-N (0-100)	0 - 0.1	16/11/2017	108.1-N (0-100)_16 Nov 17	Normal	soil							
108.1-S (0-100)	0 - 0.1	16/11/2017	108.1-S (0-100)_16 Nov 17	Normal	soil							
109	0.1	6/10/2017	109_06 Oct 17	Normal	soil							
112	0.1	16/11/2017	112_16 Nov 17	Normal	soil							

Statistics

Number of Results	72	72	72	72	72	72	72
Number of Detects	2	0	0	10	5	5	0
Minimum Concentration	<100	<20	<20	<45	<45	<110	<0.1
Maximum Concentration	140	<20	<20	1,700	1,100	2,800	<0.1
Average Concentration *	52	10	10	88	65	160	0.05
Standard Deviation *	13	0	0	285	191	451	0

* A Non Detect Multiplier of 0.5 has been applied.

Comments

#1 Develop site specific based on CEC, pH, clay content, state and traffic volume
#2 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate
#3 In the absence of a guideline value for total chromium, chromium VI value adopted
#4 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specifi
#5 Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is pr

						NA	Inorganics			Metals									
						Conductivity (1:5 aqueous extract)	Electrical conductivity (lab)	Moisture Content (%)	Soil pH	Arsenic	Cadmium	Chromium (III+VI)	Copper	Iron	Lead	Mercury	Nickel	Zinc	Benzene
						µS/cm	µS/cm	%	PH	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																			
ANZG 2019 (GV-high)										70	10	370	270		220	1	52	410	
Location Code	**Depth**	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**														
29-100	0.1	14/02/2017	29-100_14 Feb 17	Normal	Sediment	240	240	57	7.6	42	0.6	53	2,200		33	0.11	29	380	<0.1
30-100	0.1	14/02/2017	30-100_14 Feb 17	Normal	Sediment	380	380	30	8.7	27	0.6	37	150		48	0.1	17	130	<0.1
31-100	0.1	14/02/2017	31-100_14 Feb 17	Normal	Sediment	380	380	32	8.6	27	0.3	47	200		41	0.12	23	240	<0.1
37	0.1	14/07/2017	37_14 Jul 17	Normal	Sediment			30.5					101						
38	0.1	14/07/2017	38_14 Jul 17	Normal	Sediment			51.5					16,700						
38	0.1	18/01/2019	38_18 Jan 19	Normal	Sediment								16,700						
39	0.1	14/07/2017	39_14 Jul 17	Normal	Sediment			46.5					1,770						
39.1-C (0-100)	0 - 0.1	16/11/2017	39.1-C (0-100)_16 Nov 17	Normal	Sediment			39.8					790						
39.1-C (200-300)	0.2 - 0.3	16/11/2017	39.1-C (200-300)_16 Nov 17	Normal	Sediment			32.4					160						
39.1-N (0-100)	0 - 0.1	16/11/2017	39.1-N (0-100)_16 Nov 17	Normal	Sediment			27					990						
39.1-N (200-300)	0.2 - 0.3	16/11/2017	39.1-N (200-300)_16 Nov 17	Normal	Sediment			24.9					100						
39.1-S (0-100)	0 - 0.1	16/11/2017	39.1-S (0-100)_16 Nov 17	Normal	Sediment			30.2					1,000						
39.1-S (200-300)	0.2 - 0.3	16/11/2017	39.1-S (200-300)_16 Nov 17	Normal	Sediment			25.4					73						
40	0.1	14/07/2017	40_14 Jul 17	Normal	Sediment			66.7					1,860						
41	0.1	14/07/2017	41_14 Jul 17	Normal	Sediment			60.7					1,140						
42	0.1	14/07/2017	42_14 Jul 17	Normal	Sediment			53.5					666						
42.1-C (0-100)	0 - 0.1	16/11/2017	42.1-C (0-100)_16 Nov 17	Normal	Sediment			27.1					180						
42.1-C (200-300)	0.2 - 0.3	16/11/2017	42.1-C (200-300)_16 Nov 17	Normal	Sediment			19.3					82						
42.1-N (0-100)	0 - 0.1	16/11/2017	42.1-N (0-100)_16 Nov 17	Normal	Sediment			60.9					630						
42.1-N (200-300)	0.2 - 0.3	16/11/2017	42.1-N (200-300)_16 Nov 17	Normal	Sediment			28.1					31						
42.1-S (0-100)	0 - 0.1	16/11/2017	42.1-S (0-100)_16 Nov 17	Normal	Sediment			64.6					1,100						
42.1-S (200-300)	0.2 - 0.3	16/11/2017	42.1-S (200-300)_16 Nov 17	Normal	Sediment			48.9					210						
101	0.1	6/10/2017	101_06 Oct 17	Normal	Sediment			56.4					110						
102	0.1	6/10/2017	102_06 Oct 17	Normal	Sediment			41.4					100						
103	0.1	6/10/2017	103_06 Oct 17	Normal	Sediment			32.1					47						
104	0.1	6/10/2017	104_06 Oct 17	Normal	Sediment			59.6					560						
105	0.1	6/10/2017	105_06 Oct 17	Normal	Sediment			65.3					540						
201		18/01/2019	201_18 Jan 19	Normal	Sediment			37.1					40	16,000					
202		18/01/2019	202_18 Jan 19	Normal	Sediment			34					91	13,000					
203		18/01/2019	203_18 Jan 19	Normal	Sediment			62.9					108	18,000					
Statistics																			
Number of Results						3	3	26	3	3	3	3	27	3	3	3	3	3	3
Number of Detects						3	3	26	3	3	3	3	27	3	3	3	3	3	0
Minimum Concentration						240	240	19.3	7.6	27	0.3	37	31	13,000	33	0.1	17	130	<0.1
Maximum Concentration						380	380	66.7	8.7	42	0.6	53	16,700	18,000	48	0.12	29	380	<0.1
Average Concentration *						333	333	43	8.3	32	0.5	46	1,785	15,667	41	0.11	23	250	0.05
Standard Deviation *						81	81	15	0.61	8.7	0.17	8.1	4,341	2,517	7.5	0.01	6	125	0

* A Non Detect Multiplier of 0.5 has been applied.

						BTEXN						TRH - NEPM 2013								TRH - NEPM 1999						PAHs
						Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	TRH C37-C40	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL																									
ANZG 2019 (GV-high)																									2.1
Location Code	**Depth**	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**																				
29-100	0.1	14/02/2017	29-100_14 Feb 17	Normal	Sediment	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	<100	<20	<20	<45	<45	<110	<0.1
30-100	0.1	14/02/2017	30-100_14 Feb 17	Normal	Sediment	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	<100	<20	<20	<45	<45	<110	<0.1
31-100	0.1	14/02/2017	31-100_14 Feb 17	Normal	Sediment	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	<100	<20	<20	<45	<45	<110	<0.1
37	0.1	14/07/2017	37_14 Jul 17	Normal	Sediment																				
38	0.1	14/07/2017	38_14 Jul 17	Normal	Sediment																				
38	0.1	18/01/2019	38_18 Jan 19	Normal	Sediment																				
39	0.1	14/07/2017	39_14 Jul 17	Normal	Sediment																				
39.1-C (0-100)	0 - 0.1	16/11/2017	39.1-C (0-100)_16 Nov 17	Normal	Sediment																				
39.1-C (200-300)	0.2 - 0.3	16/11/2017	39.1-C (200-300)_16 Nov 17	Normal	Sediment																				
39.1-N (0-100)	0 - 0.1	16/11/2017	39.1-N (0-100)_16 Nov 17	Normal	Sediment																				
39.1-N (200-300)	0.2 - 0.3	16/11/2017	39.1-N (200-300)_16 Nov 17	Normal	Sediment																				
39.1-S (0-100)	0 - 0.1	16/11/2017	39.1-S (0-100)_16 Nov 17	Normal	Sediment																				
39.1-S (200-300)	0.2 - 0.3	16/11/2017	39.1-S (200-300)_16 Nov 17	Normal	Sediment																				
40	0.1	14/07/2017	40_14 Jul 17	Normal	Sediment																				
41	0.1	14/07/2017	41_14 Jul 17	Normal	Sediment																				
42	0.1	14/07/2017	42_14 Jul 17	Normal	Sediment																				
42.1-C (0-100)	0 - 0.1	16/11/2017	42.1-C (0-100)_16 Nov 17	Normal	Sediment																				
42.1-C (200-300)	0.2 - 0.3	16/11/2017	42.1-C (200-300)_16 Nov 17	Normal	Sediment																				
42.1-N (0-100)	0 - 0.1	16/11/2017	42.1-N (0-100)_16 Nov 17	Normal	Sediment																				
42.1-N (200-300)	0.2 - 0.3	16/11/2017	42.1-N (200-300)_16 Nov 17	Normal	Sediment																				
42.1-S (0-100)	0 - 0.1	16/11/2017	42.1-S (0-100)_16 Nov 17	Normal	Sediment																				
42.1-S (200-300)	0.2 - 0.3	16/11/2017	42.1-S (200-300)_16 Nov 17	Normal	Sediment																				
101	0.1	6/10/2017	101_06 Oct 17	Normal	Sediment																				
102	0.1	6/10/2017	102_06 Oct 17	Normal	Sediment																				
103	0.1	6/10/2017	103_06 Oct 17	Normal	Sediment																				
104	0.1	6/10/2017	104_06 Oct 17	Normal	Sediment																				
105	0.1	6/10/2017	105_06 Oct 17	Normal	Sediment																				
201		18/01/2019	201_18 Jan 19	Normal	Sediment																				
202		18/01/2019	202_18 Jan 19	Normal	Sediment																				
203		18/01/2019	203_18 Jan 19	Normal	Sediment																				
Statistics																									
Number of Results						3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of Detects						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration						<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	<100	<20	<20	<45	<45	<110	<0.1
Maximum Concentration						<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<25	<25	<25	<25	<90	<120	<210	<100	<20	<20	<45	<45	<110	<0.1
Average Concentration *						0.05	0.05	0.05	0.1	0.15	0.3	12	12	12	12	45	60	105	50	10	10	22	22	55	0.05
Standard Deviation *						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* A Non Detect Multiplier of 0.5 has been applied.

	Metals
	Copper
	mg/L
EQL	
NEPM 2013 Table 1C GILs, Drinking Water	2

Location Code	Date/Time	Field ID	Sample Type	Matrix Type	
MW1	21/07/2019	MW1_21 Jul 19	Normal	water	0.002
MW2	21/07/2019	MW2_21 Jul 19	Normal	water	0.002
MW3	21/07/2019	MW3_21 Jul 19	Normal	water	0.001
MW4	21/07/2019	MW4_21 Jul 19	Normal	water	0.006

Statistics

Number of Results	4
Minimum Concentration	0.001
Maximum Concentration	0.006
Average Concentration *	0.0028
Median Concentration *	0.002
Standard Deviation *	0.0022

* A Non Detect Multiplier of 0.5 has been applied.

					Metals
					Copper
					mg/L
EQL					
ANZG 2019 FW 95%					0.0014
Location Code	**Date/Time**	**Field ID**	**Sample Type**	**Matrix Type**	
43	14/07/2017	43_14 Jul 17	Field_D	water	<0.001
43	14/07/2017	43_14 Jul 17	Normal	water	<0.001
44	14/07/2017	44_14 Jul 17	Normal	water	<0.001
45	14/07/2017	45_14 Jul 17	Normal	water	0.051
46	14/07/2017	46_14 Jul 17	Normal	water	0.002
47	14/07/2017	47_14 Jul 17	Normal	water	0.002
110	6/10/2017	110_06 Oct 17	Normal	water	0.011
111	6/10/2017	111_06 Oct 17	Normal	water	0.007
112-W	16/11/2017	112-W_16 Nov 17	Normal	water	0.002

Statistics

Number of Results	9
Number of Detects	6
Minimum Concentration	<0.001
Maximum Concentration	0.051
Average Concentration *	0.0085
Standard Deviation *	0.016

* A Non Detect Multiplier of 0.5 has been applied.

GHD

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12510129-1107/https://projectsportal.ghd.com/sites/pp15_05/blayneydewateringfac/ProjectDocs/12510129-REP-DRAFT_Blayney Dewatering Facility.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev0	E Cooke	J Hannaford		J Hannaford		10/01/2020

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