Appendix B4

Construction Soil and Water Management Sub-Plan

HumeLink West

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Approved on behalf of HLWJV by	Tim Burns
Signed	
Dated	

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Annexure I Tannin Management Procedure

Definitions

Term	Definition
Acid sulphate soil and potential acid sulphate soil	Potential acid sulphate soils are soils which have the potential to generate acid sulphate once exposed to the air. This generally occurs as a result of excavation of soils or as a result of drawdown of ground water so exposing the soils to air (oxygen) and so initiating the reaction of the sulphites in the soils becoming oxygenated at forming sulphates.
Compliance audit	Verification of how implementation is proceeding with respect to a Construction Environmental Management Plan (CEMP) (which incorporates the relevant approval conditions).
Enabling Works	An initial stage (as defined under an approved Enabling Works Management Plan under condition B64 of this approval) of the following activities defined as low risk in the Enabling Works Management Plan: 1. Site establishment and the operation of construction compounds, including excavations, surface preparation, site access points and utility connections; 2. Site establishment of worker accommodation facilities; 3. Minor adjustments to existing access tracks and road improvement; 4. Utility relocations and adjustments; 5. Establishment of new access tracks in the Enabling Works Management Plan
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.
Environmental incident	An unexpected event that has, or has the potential to, cause harm to the environment and requires some action to minimise the impact or restore the environment.
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental policy	Statement by an organisation of its intention and principles for environmental performance.
Environmental target	Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
Environmental Representative	A suitably qualified and experienced person independent of HumeLink design and construction personnel employed for the duration of construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
HumeLink Approvals	HumeLink approvals include:

Term	Definition
	• HumeLink Infrastructure Approval NSW SSI 36656827. • HumeLink EPBC Approval Cth EPBC 2021/9121.
Non-compliance	Failure to comply with the requirements of the HumeLink Approvals or any applicable licence, permit or legal requirements.
Non-conformance	Failure to conform to the requirements of HLW system documentation or supporting documentation, but is not considered a non-compliance.
Planning Approval Documentation	The NSW planning approval documents, as they relate to the HLW and as listed in MCoA A2 of the NSW Infrastructure Approval for HumeLink (SSI 36656827).
Principal, the	TransGrid
Synergy	UGL-EMS incident management software program to manage, report, record and take action on emergency and incidents.
Flow-path	Class 4 Waterway (generally unnamed or constructed by landowner for the purposes of redirection of water) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools post rain events (e.g., dry gullies, shallow floodplain depressions, or water diversion channels with no aquatic flora present).
Waterways (naturally formed)	Waterways with riparian vegetation that is habitat for native birds, reptiles, frogs, mammals and insects and geomorphic features as identified in the *River Styles Geometric Unit Quick Reference Guide*.
Waste Tracking Register –	Spreadsheet used for managing and reporting predominantly on waste classification, quantities, and destinations.

Abbreviations

Abbreviation	Expanded text
ACMP	Accommodation Camp Management Plan
ACT	Australian Capital Territory
AEC	Area of Environmental Concern
AEP	Annual exceedance probability. The chance of a rainfall or a flood event exceeding a nominated level in any one year, usually expressed as a percentage. For example, if a peak flood level has a 5% AEP, it means that there is a five per cent chance (that is one-in-20 chance) of being exceeded in any one year. The frequency of floods is generally referred to in terms of their AEP or ARI. In this Soil and Water Management Plan (SWMP) the frequency of floods generated by runoff from the study catchments is referred to in terms of their AEP, for example a 1% AEP flood.
AQMP	Air Quality Management Plan
ANZECC	Australian and New Zealand Environment and Conservation Council
AR	Amendment Report
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
BCS	Biodiversity, Conservation and Science Directorate of the NSW Department of Climate Change, Energy, Environment and Water
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management sub-plan
BoM	Bureau of Meteorology
CCS	Community consultation strategy
CEMP	Construction Environmental Management Plan
CEMS	Contractors Environmental Management System
CEnvP(SC)	Certified Environmental Practitioner (Site Contamination)
CLMP	Contaminated Land Management Plan
CoMA	Commonwealth Conditions of Ministerial Approval (EPBC:2021/9121)
CPESC	Certified Professional in Erosion and Sediment Control
CSSI	The Critical State Significant Infrastructure, as described in Schedule 1, the carrying out of which is approved under the terms of this approval
Cth	Commonwealth of Australia
DCCEEW – Cth	The Commonwealth Department of Climate Change, Energy, the Environment and Water

Abbreviation	Expanded text
DCCEEW – NSW	Department of Climate Change, Energy, the Environment and Water (NSW) (formerly DPE)
DPE	Department of Planning and Environment
DPHI	Department of Planning, Housing, and Infrastructure (formerly DPE)
DPI	Department of Primary Industries
ECM	Environmental Constraints Map
EIS	Environmental Impact Statement
EM	Environmental Manager
EMS	Environmental Management System
ENM	Excavated Natural Materials
ER	Environmental Representative.
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1989 (Cth)
EPL	Environment Protection Licence
ESC	Erosion Sediment Control
ESCP	Erosion and Sediment Control Plan
EWMP	Enabling Works Management Plan
EWMS	Environmental Work Method Statement
FCNSW	Forestry Corporation NSW
GDE	Groundwater Dependent Ecosystem
HLWJV	HumeLink West Joint Venture (UGL Limited and CPB Contractors)
HLE	The HumeLink East Stage of the HumeLink project
HLW	The HumeLink West Stage of the HumeLink project
HMP	Heritage Management Plan
IECA	International Erosion Control Association
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
mAHD	Metres Australian Height Datum
MCoA	NSW Minister's Conditions of Approval (SSI-36656827)
MDB	Murray Darling Basin
Minister (NSW), the	NSW Minister for Planning and Environment
Minister (Cth), the	Cth Minister for Climate Change, Energy, the Environment and Water
ML	Mega Litre

Abbreviation	Expanded text
NOA	Naturally Occurring Asbestos
NSW	New South Wales
PASS	Potential Acid Sulfate Soil
PESCP	Progressive Erosion and Sediment Control Plan
PFAS	Per- and polyfluoroalkyl substances
PIRMP	Pollution Incident Response Management Plan
PMF	Probable Maximum Flood. The flood that occurs as a result of the Probable Maximum Precipitation (PMP) on a study catchment. The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood prone land (i.e., the floodplain).
PMP	Property Management Plan
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
RAAF	Royal Australian Air Force
ROL	Road occupancy licence
RtS	Response to Submissions Report
RUSLE	Revised Universal Soil Loss Equation
SDS	Safety Data Sheet
SDWC	Sydney Drinking Water Catchment
SEARs	Secretary's Environmental Assessment Requirements
SMART	Specific, Measurable, Achievable, Realistic, and Timely principles
SPMP	Stockpile Management Plan
SSI	State Significant Infrastructure
SuMP	Sustainability Management Plan
SVC	Snowy Valleys Council
SWMP	Soil and Water Management Plan
TfNSW	Transport for NSW
TN	Total Nitrogen
TP	Total Phosphorus
UGL-EMS	UGL Environmental Management System
UMM	Updated Mitigation Measure as outlined in the Amendment Report

Abbreviation	Expanded text
VENM	Virgin Excavated Natural Materials
WAL	Water Access Licence
WMP	Waste Management Sub-Plan
WMS	Work Method Statement
WQMP	Water Quality Management Plan
WTP	Water Treatment Plant
WWCC	Wagga Wagga City Council

1. Introduction

1.1. Context

This construction Soil and Water Management Sub-Plan (SWMP) forms part of the HumeLink West (HLW) Construction Environmental Management Plan (CEMP). The SWMP has been prepared to outline and describe how the UGL Limited and CPB Contractors Joint Venture (HLWJV), during the construction of HLW, will comply with the Minister's Conditions of Approval (MCoA), the Updated Mitigation Measures (UMM), and undertake its duties in accordance with the Planning Approval Documentation listed under MCoA A2.

1.2. Background and project description

The background and description of the HumeLink project (HumeLink) and the staging of HumeLink into the HumeLink East project (HLE) and the HumeLink West project (HLW) is detailed in Section 1.1 and Section 1.3 of the CEMP and represented in Figure 1-1.

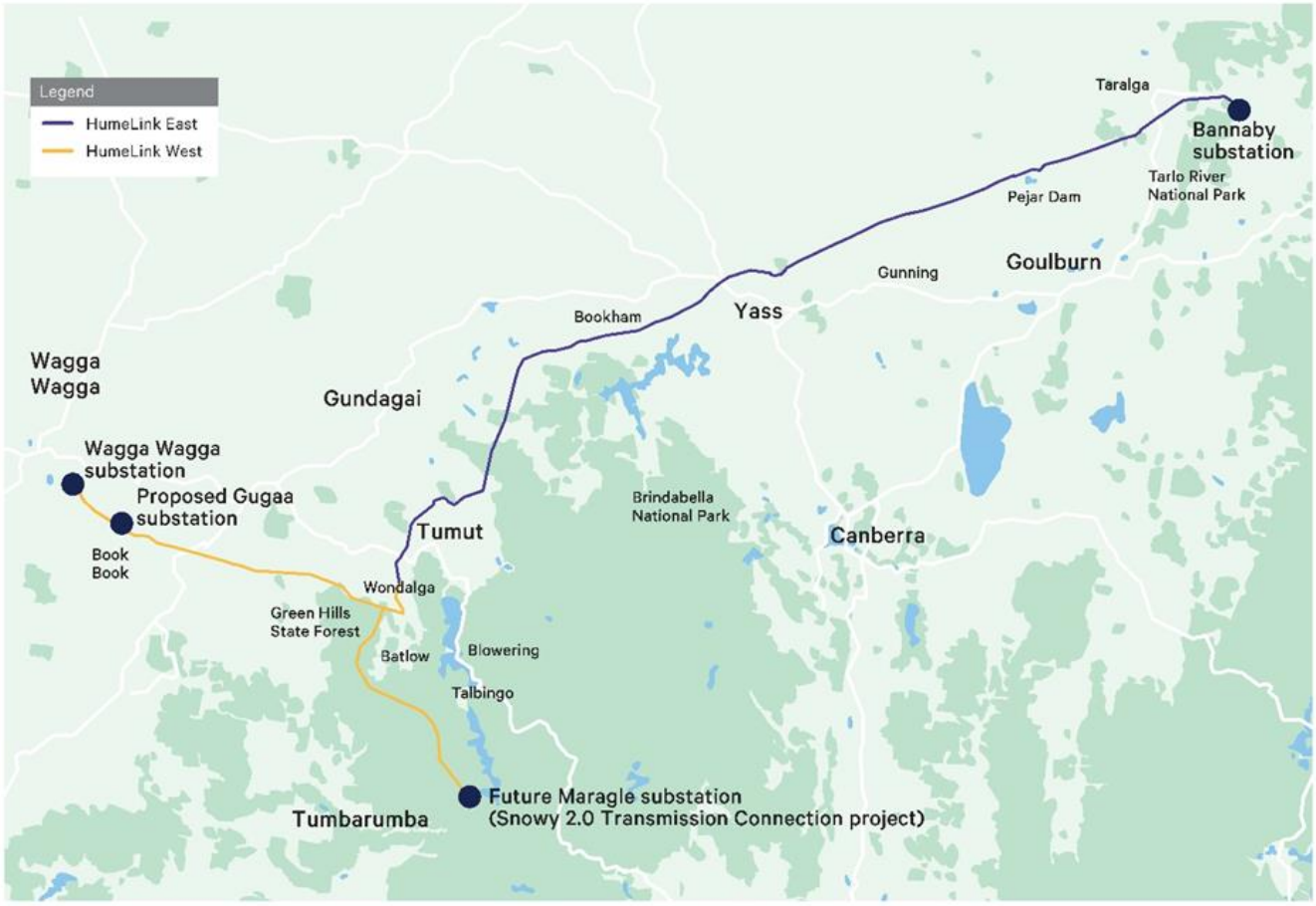

Figure 1-1 Staging for HumeLink

1.3. Scope

The scope of this Plan is to describe how the HLWJV proposes to manage the soil and water during construction of HLW. This plan also describes the responsibilities of the HLWJV team including delivering continuous improvement, the auditing and reporting structure to be used during construction of the HLW.

1.4. Interface with other planning documents

This Plan is a component of a suite of documents, prepared as part of the implementation of HLWJV's Environmental Management System, and is based on the requirements of the UGL Environmental Management System (UGL-EMS). The UGL-EMS overview is described in the Section 1.4 of the CEMP.

The key documents that interface with this Plan are outlined in the table below.

Table 1-1 Key interfaces with this document

Plan	Reference	Interface
Construction Environmental Management Plan (CEMP)	Internal Construction Document	• Provides details on overall HLW staging, interactions between Sub-Plans of the CEMP, and management of cumulative impacts. • Provides a framework for how the construction works will be managed. • Identifies procedures, processes and management systems that will apply in relation to construction activities. • Provides environmental planning and controls for construction including environmental risk assessment, regulatory requirements, protection measures and sustainability requirements.
Enabling Works Management Plan (EWMP)	MCoA B64	• Provides a framework for how the enabling works will be managed. • Identifies procedures, processes and management systems that will apply in relation to enabling work construction activities. • Provides environmental planning and controls for enabling work construction including environmental risk assessment, regulatory requirements, protection measures and sustainability requirements.
Construction Biodiversity Management Sub-Plan	MCoA B26	• Specifies control measures relating to management of biodiversity aspects of the HLW that require control measures. • Provides a management framework for minimising impacts on biodiversity. • Describes a biodiversity monitoring program and management measures to evaluate and report against performance criteria. • Identify and assign responsibilities for ongoing management actions.

Plan	Reference	Interface
Construction Waste Management Sub-Plan	MCoA B57	• Provides detail in how HLW manages waste generated during construction.
Community Communication Strategy	MCoA A24	• Details the framework for management of stakeholders and how to engage them. • Provides processes and procedures that guide the outcome of community engagement. • Provides an assessment of sensitive receivers indicating special considerations that will impact traffic control devices.
Interface and Third-Party Management Plan	Internal Management Document	• Details framework for third party interaction. • Provides procedures, processes and management systems that will apply in relation third party management.
Health & Safety Management Plan	Internal Management Document	• Details framework for health and safety processes.

In addition to the HLWJV's documents the SWMP will also interface with external documents including, but not limited to the HLE works and the Snowy 2.0 Transmission Line works (SSI-9717).

These documents are separate to the UGL-EMS and do not form part of the approval of this CEMP document and will be managed through the HLWJV Interface Management Plan to assist in the management of cumulative impacts.

2. Purpose and objectives

2.1. Purpose

This plan describes the HLWJV approach to soil and water management during construction of HLW detailed within the HumeLink Infrastructure Approval NSW SSI 36656827. This includes the Planning Approval Documentation listed in the Minister's Conditions of Approval (MCoA) A2

- HumeLink - EIS (TransGrid).
- RtS EIS (TransGrid).
- HumeLink - Amendment Report (TransGrid).
- HumeLink – Addendum to EIS Technical Report 10 - Contamination (TransGrid).
- HumeLink – Addendum to EIS Technical Report 11 - Flooding (TransGrid).
- HumeLink – Addendum to EIS Technical Report 12 – Surface Water and Groundwater (TransGrid).

2.2. Objectives

The key objective of the SWMP is to ensure all MCoA, environmental management measures and licence/permit requirements relevant to construction soil and water management are described, scheduled, and assigned responsibility as outlined in:

- The HumeLink Approval:
  - *HumeLink Infrastructure Approval NSW SSI 36656827.*
  - *HumeLink EPBC Approval Cth EPBC 2021/9121.*
- Planning Approval Documentation listed in the Minister's Conditions of Approval (MCoA) A2 and as amended:
  - HumeLink - EIS (TransGrid).
  - HumeLink - Amendment Report (TransGrid).
  - HumeLink – Biodiversity Development Assessment Report (BDAR) (August 2023).
- Updated Mitigation Measures (UMM).
- Relevant legislation and other requirements described in Section 3.1 of this Plan.

2.3. Targets

The following targets have been established for the management of soil and water during the delivery of HLW:

- Ensure compliance with the relevant legislative requirements.
- Ensure compliance with the HumeLink Approvals and Planning Approvals Documentation where required.
- Consider opportunities for reuse of treated water during construction.
- Environmental values of nearby, connected and affected water sources are improved and/or maintained.
- Water discharged from construction sites meets discharge criteria that has been developed in consideration of the NSW Water Quality Objectives.
- Construction is carried out in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of environmental management

measures.

- Construction support sites and construction sites are laid out such that flows are not significantly impeded.
- Maintain or reduce flood levels within and adjacent to the alignment.
- Erosion and sediment controls are implemented and comply with Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (DECC 2008).
- Potential acid sulfate soils and naturally occurring asbestos are avoided where practicable and where interaction occurs, they are managed in accordance with good practice measures.
- Contamination is managed to protect environmental values and human health.
- Groundwater impacts minimise the modification of natural groundwater flows, flows, levels and the rights of registered water users.

Monitoring and reporting of the objective and targets identified above will be undertaken in accordance with Section 8.3 and 8.7.

3. Environmental requirements

3.1. Legislation

Legislation and regulatory requirements relevant to the SWMP is included in Appendix A1 of the CEMP.

3.2. Additional approvals licenses, permits and requirements

Refer to Appendix A4: Legal Obligations Register of the CEMP.

3.3. Guidelines and standards

The main guidelines, specifications and policy documents relevant to this plan include:

- *Acid Sulfate Soil Guidelines, Acid Sulfate Soil Management Advisory Committee*, August 1998.
- *(National) Acid Sulfate Soil Sampling and Identification Methods Manual, Department of Agriculture and Water Resources*, June 2018.
- *Australian and New Zealand Environment and Conservation Council* (ANZECC) and *Agriculture and Resource Management Council of Australia and New Zealand* (ARMCANZ) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, 2018.
- *Guidelines for Assessment and Management of Groundwater Contamination*, DEC, 2007.
- *Guidelines for Controlled Activities on Waterfront Land, DPE 2022.*
- *Environmental Best Management Practice Guideline for Concreting Contractors*, DEC, 2004.
- *NSW Aquifer Interference Policy*, DPI, 2012.
- *Controlled activities – Guidelines for riparian corridors on waterfront land*, (DPE 2022).
- *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*, NSW Fisheries 2003.
- *Policy and Guidelines for Fish Habitat and Conservation and Management*, NSW Fisheries, 2013.
- *Managing Urban Stormwater: Soils and Construction (4th Edition) Volume 1* (the “Blue Book”), Landcom, 2004.
- *Managing Urban Stormwater: Soils and Construction (4th Edition) Volume 2A*: *Installation of*

Services, DECC, 2008.

- *Managing Urban Stormwater: Soils and Construction - Volume 2D: Main Road Construction*, DECC, 2008.
- *Managing Urban Stormwater – Soils and Construction Volume 2C Unsealed Roads*, DECC, 2008.
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW*, NSW EPA 2022.
- *Contaminated Land Guidelines - Consultants reporting on contaminated land*, NSW EPA, 2020.
- *Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997*, NSW EPA, 2015.
- *Waste Classification Guidelines*, NSW EPA, 2014.
- *Salinity Training Manual*, DPI, 2014.
- *Book 4 Dryland Salinity Productive use of Saline Land and Water*, NSW DECC, 2008.
- *Code of Practice – How to manage and control asbestos in the workplace*, SafeWork NSW, 2022.
- *Code of Practice – How to safely remove asbestos*, SafeWork NSW, 2022.

3.4. Minister's Conditions of Approval

The MCoA relevant to this Plan are listed in Table 3-1. A cross reference is also included to indicate where and how the conditions are addressed in this Plan or other HLW management documents.

Table 3-1 MCoA relevant to the SWMP

MCoA No.	Condition Requirements	Document Reference
Soil and Water Management Plan		
B24	Prior to the commencement of construction (excluding Enabling Works, if the relevant requirements of this condition are adequately addressed in the Enabling Works Management Plan of condition B64), the Applicant must prepare a Soil and Water Management Plan for the development to the satisfaction of the Planning Secretary. This plan must:	This plan or EWMP in accordance with MCoA 67
	(a) be prepared in consultation with the relevant Council, BCS and Water Group;	Section 4.1
	(b) ensuring the requirements in conditions B18 to B23 are met;	Section 7.3
	(c) managing flood risk during construction and operation;	Section 6.2.6 Section 7.3.11 Table 7-1 (MMSW43 and 44) (as relates to construction)
	(d) investigating, assessing and managing contaminated land, soils, groundwater and blasting in the development area;	Section 7.3
	(e) investigating, assessing and managing the potential for asbestos and other hazardous materials in the development area;	Sections 7.3.15-18

MCoA No.	Condition Requirements	Document Reference
	(f) managing any unexpected and / or suspected contaminated land, asbestos and unexploded ordinance excavated, disturbed or otherwise discovered during construction; and	Annexure B
	(g) a program to monitor and report on the impacts and environmental performance of the development.	Section 8.3
	Following the Planning Secretary's approval, the Proponent must implement the Soil and Water Management Plan. *Note: The Soil and Water Management Plan must incorporate all relevant aspects of the development, including Enabling Works consistent with the requirements of condition B67.*	
Enabling Works Management Plan		
B64	Prior to commencing Enabling Works, an Enabling Works Management Plan must be prepared which outlines the environmental management practices and procedures to be implemented. The Enabling Works Management Plan must be prepared in consultation with the relevant council(s) and government agencies. The Enabling Works Management Plan must include: (a) a description of activities to be undertaken during Enabling Works (including scheduling and duration of work to be undertaken at the site) focussing on low risk activities; (b) risk assessment for types of activities to be undertaken under the plan; (c) figures illustrating the proposed operational site layout and the location of the closest sensitive land use(s); (d) a program for ongoing analysis of the key environmental risks arising from the site establishment activities described in subsection (a) of this condition, including an initial risk assessment undertaken prior to the commencement of site establishment work; (e) details of how the activities described in subsection (a) of this condition will be carried out to:	EWMP

MCoA No.	Condition Requirements	Document Reference
	(f) meet the performance outcomes stated in the documents listed in Condition A1; (g) ensure the accommodation camps comply with conditions B23 and B51; (h) manage the risks identified in the risk analysis undertaken in subsection (b) of this condition; and (i) a program for monitoring the performance outcomes, including a program for construction noise monitoring.	
Water Supply		
B18	The Proponent must ensure that it has sufficient water for all stages of the development, and if necessary, adjust the scale of the development to match its available water supply. *Note: Under the Water Act 1912 and/or the Water Management Act 2000, the Proponent is required to obtain the necessary water licenses before commencing any works which intercept or extract groundwater or surface water (unless an exemption applies).*	Section 7.3.127.3.12 Section 8.4
Erosion and Sedimentation		
B19	The Proponent must: a) minimise erosion and control sediment generation; and	Section 7.2 Section 7.3.2
	b) ensure all land disturbances have appropriate drainage and erosion and sediment controls designed, installed and maintained in accordance with *Managing Urban Stormwater - Soils and Construction Volume 1* (Landcom, 2004), *Managing Urban Stormwater – Soils and Construction Volume 2A Installation of Services* (DECC, 2008) and *Managing Urban Stormwater – Soils and Construction Volume 2C Unsealed Roads* (DECC, 2008).	Section 7.2 Section 7.3.2 Section 7.3.3 Annexure A

MCoA No.	Condition Requirements	Document Reference
Pollution of Waters		
B20	Unless otherwise authorised by an EPL, the Proponent must ensure the development does not cause any water pollution, as defined under Section 120 of the POEO Act.	Section 7.3 Annexure A Annexure D Annexure E Annexure F Annexure H Annexure I
B21	The Proponent must: (a) design, construct and maintain an appropriate water management system at all substations, concrete batching plants, construction compounds and accommodation camps to prevent pollution;	Section 7.1 Section 7.2 Section 7.3.19**Error! Reference source not found.** Annexure A Annexure H ACMP
	(b) ensure that all liquid waste captured by the substation's spill oil containment system is classified, transported, and disposed of at a facility that can lawfully accept the waste; and	Transgrid Operational Environmental Management Plan
	(c) minimise any spills of hazardous materials or hydrocarbons, and clean up any spills as soon as possible after they occur.	Annexure H

MCoA No.	Condition Requirements	Document Reference
Riparian Areas		
B22	The Proponent must ensure all activities on waterfront land are constructed in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPE 2022), *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003) and the *Policy and Guidelines for Fish Habitat and Conservation and Management* (NSW Fisheries, 2013), unless Water Group and DPIRD Fisheries agrees otherwise.	Section 7.3.5
Flooding		
B23	Except for the Gugaa Substation, the Proponent must ensure that the development does not materially alter the flood storage capacity, flows or characteristics in the development area or off-site.	Section 6.2.6 Section 7.3.117.3.11 Design compliance report
Air Quality		
B17	In addition to the performance outcomes, commitments and mitigation measures specified in the EIS, the Proponent must take all reasonable steps to: (a) minimise the off-site dust, fume, blast emissions and other air pollutants of the development; and (b) minimise the surface disturbance of the site	Section 7.2 Section 7.3.2 Section 7.3.10 AQMP
Restrictions on Clearing and Habitat		
B25	Unless otherwise agreed with the Planning Secretary, the Proponent must: (a) ensure that the vegetation and habitat clearing limits specified in Table 2-1, Table 2-2 and Table 2-3 of Appendix 2 are not exceeded; and (b) minimise:	Section 7.3. / Section 7.14 of the BMP

MCoA No.	Condition Requirements	Document Reference
	(c) the impacts of the development on hollow-bearing trees; (d) the impacts of the development on threatened species; and (e) the clearing of native vegetation and key habitat; and (f) not undertake any works that result in ground disturbance within a minimum setback distance of 50 metres from PCT 637 – *Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion* and 30 metres from known locations of *Prasophyllum bagoense*, *Prasophyllum keltonni* and *Pterostylis oreophila* as mapped in the BDAR.	
Heritage		
B31	Prior to carrying out any development within the unsurveyed areas of the development area identified in the EIS, untested areas of moderate and high sensitivity, or any potential archaeological deposits (PADs) identified for impact during detailed design, the Proponent must provide an Addendum Aboriginal Cultural Heritage Assessment Report (Addendum ACHAR), prepared in consultation with the Aboriginal stakeholders and Heritage NSW, to the satisfaction of the Planning Secretary. The report must: (a) include details of consultation with the Aboriginal stakeholders; (b) describe the additional Aboriginal heritage surveys that were undertaken, including test excavations of PADs; (c) describe any potential additional impacts to heritage items; (d) identify further mitigation measures, including avoidance or salvage; (e) include detailed justification where the final transmission line alignment is not able to avoid impacts to heritage items; and (f) provide an updated and consolidated list of sites that would be protected and remain in-situ throughout construction and sites that would be salvaged and relocated to suitable alternative locations.	Section 7.3.147.3.14 HMP

MCoA No.	Condition Requirements	Document Reference
B32	The Proponent must: (a) ensure the development does not cause any harm to any Aboriginal heritage objects/sites or historic heritage items located outside the approved construction area (see Table 3-1 and Table 3-3 of Appendix 3); (b) manage the sites identified in Table 3-2 of Appendix 3 in accordance with the specified mitigation and management measures and in accordance with the requirements of the Heritage Management Plan, as outlined in condition B33, including any subsequent revision of this plan; (c) implement all reasonable and feasible measures to avoid and minimise harm to historic heritage items within the approved construction area (identified in Table 3-4 of Appendix 3); and (d) salvage and relocate items that would be impacted to a suitable location, in accordance with the Heritage Management Plan described in condition B33.	Section 7.3.147.3.14 HMP
B33	Prior to carrying out any development (excluding Enabling Works, if the relevant requirements of this condition are adequately addressed in the Enabling Works Management Plan of condition B64) that could harm heritage values, the Proponent must prepare a Heritage Management Plan for the development to the satisfaction of the Planning Secretary. This plan must: (a) be prepared by a suitably qualified and experienced Aboriginal cultural heritage specialist whose appointment has been endorsed by the Planning Secretary; (b) be prepared in consultation with Aboriginal Stakeholders, NPWS and reviewed by Heritage NSW; (c) undertake an assessment of the unsurveyed areas of the construction areas, in accordance with the Code of practice for archaeological investigation of Aboriginal objects in NSW (DECCW, 2010); (d) include a description of the measures that would be implemented for: (i) protecting heritage items in accordance with conditions B32(a);	Section 7.3.147.3.14 HMP

MCoA No.	Condition Requirements	Document Reference
	(ii) undertaking the management activities specified in Table 3-2 of Appendix 3, including a detailed methodology for each of the approved management activities; (iii) avoiding harm to the heritage items specified in Table 3-1 and Table 3-3 of Appendix 3; (iv) undertaking detailed reporting on the outcomes of management activities including (but not limited to) archival recording and analysis of stone artefact assemblages and other information relevant to addressing research questions; (v) a strategy for the management of any salvaged Aboriginal objects; (vi) a contingency plan and reporting procedure if: • heritage items outside the approved construction area are harmed; • previously unidentified heritage items are found; or • skeletal material is discovered; (vii) ensuring workers on site receive suitable heritage inductions prior to carrying out any development on site, and that records are kept of these inductions; and (viii) ongoing consultation with Aboriginal Stakeholders during the implementation of the plan; and (e) include a program to monitor and report on the effectiveness of these measures and any heritage impacts of the project. Following the Planning Secretary's approval, the Proponent must implement the Heritage Management Plan. *Note: The Heritage Management Plan must incorporate all relevant aspects of the development, including Enabling Works consistent with the requirements of condition B67*.	
Rehabilitation		
B62	Unless the Planning Secretary agrees otherwise, within 12 months of commencing operation of the project, the Proponent must decommission and rehabilitate the accommodation camps to the satisfaction of the Planning Secretary. This rehabilitation must comply with the objectives in	ACMP / ESCP / BMP Annexure G

<table>
<tr><th>MCoA No.</th><th>Condition Requirements</th><th>Document Reference</th></tr>
<tr><td></td><td>Table 3.
Table 3: Rehabilitation Objectives
<table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Accommodation camp</td><td>• Safe, stable and non-polluting
• All infrastructure including above and below ground to be decommissioned and removed to a depth of 500 mm, unless the Planning Secretary agrees otherwise
• Restoring land capability to pre-existing productive capacity
• Ensure public safety at all times</td></tr></table></td><td>Section 7.4</td></tr>
<tr><td>B63</td><td>Unless the Planning Secretary agrees otherwise, within 6 months of the completion of construction, upgrading or decommissioning, the Proponent must rehabilitate the areas where ancillary facilities and earthwork material sites are located. This rehabilitation must comply with the objectives in Table 4.
Table 4: Rehabilitation Objectives
<table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Ancillary facilities</td><td>• Safe, stable and non-polluting
• progressively rehabilitate the site as soon as possible following disturbance
• to be decommissioned and removed, unless the Planning Secretary agrees otherwise</td></tr><tr><td>Land Use</td><td>• Restore or maintain land capability to pre-existing use</td></tr><tr><td>Community</td><td>• Ensure public safety</td></tr></table></td><td>ESCP /
BMP Annexure G
Section 7.4</td></tr>
</table>

3.5. Updated Mitigation Measures

Relevant Updated Mitigation Measures (UMMs), as identified in the Planning Approval Documents, are listed in Table 3-2 below. This includes reference to relevant documents or sections of the environmental assessment influencing the outcome and implementation.

Table 3-2 UMMs relevant to the SWMP

UMM No.	Commitment	Document Reference
Biodiversity		
B26	The key measures proposed to avoid, manage and/or mitigate impacts to surface water, and groundwater and soils will involve:	
	• Preparation of Soil and Water Management Plans (SWMPs) as part of the Construction Environmental Management Plan (CEMP) to manage water quality impacts during construction of HLW.	This Plan
	• Preparation of Erosion and Sediment Control Plans (ESCPs) by a certified professional in erosion and sediment control and Water Quality Monitoring Program (WQMP) within the SWMPs.	ESCPs prepared by certified professional, Cert ID CPESC 00009496
	• Consideration of appropriately designed scour protection at new stormwater management points.	Section 7.3.1
	The SWMP will include a combination of the following plans: • ESCPs • WQMP • Excavation Dewatering Plans • Emergency Spill Plans • Unexpected Finds Protocol - Contamination. • *Best Practice Erosion and Sediment Control* (IECA, 2008)	Annexure A Annexure E Annexure H Annexure B Annexure A Section 7.3.6

UMM No.	Commitment	Document Reference
	• Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	
	ESCPs will be developed for the activities and areas that are considered higher risk. The plans will detail the processes, responsibilities and measures to manage potential soil and water quality impacts in accordance with the principles and requirements in: • *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom, 2004) and Volumes 2A (DECC, 2008a) and Volume 2C (DECC, 2008b), commonly referred to as the 'Blue Book'	Annexure A
B30	The following factors will be considered during the detailed design and micro siting process for waterway crossings to minimise potential impacts to aquatic environments, wherever practicable: • Any existing crossings will be re-used or upgraded in preference to establishing new crossings. • Disturbance to waterways (bed, banks and associated riparian zones), will be avoided or minimised. • The crossing design and construction work sites will minimise disturbance to any native vegetation, including native instream, fringing, and riparian vegetation within the access track alignment. • Waterway crossings will be constructed perpendicular to the flow of the water and be positioned away from channel bends (where erosive forces are typically greatest). Preferably crossings will be located in straight stream sections with well-defined channel geometries and shallow stream gradients, in stable dry reaches.	Section 7.3.5

UMM No.	Commitment	Document Reference
	• Micro-siting will avoid direct and indirect (erosion or sedimentation) impacts to riverine features such as riffles and rapids and sensitive habitat features (ie snags, coarse woody debris, instream macrophytes, boulders). Where instream structures are required, considerations to potential flooding and erosive effects will be made in the design and construction of the crossing.	
B31	Crossing structures will be designed so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible. This will include the following considerations: • Minimise the impact of essential instream structures by mimicking natural flows (DPI, 2005b). • Following Fairfull (2013), for waterway crossings incorporating culverts, a minimum of 300 mm of water should pool through the structure, with a centrally placed low-flow cell being preferable. In line with Cotterell (1998), it is recommended that flow over or through instream crossing structures are designed such that they maintain water velocity of 0.3 m/s or less, which is likely to facilitate passage for native species of fish (velocities exceeding 1 m/s, are likely to prevent upstream migration of native fish).	Section 7.3.5
B32	Any sections of stream or waterway banks that are impacted or modified by HLW will be reformed or remediated to resemble the pre-work condition and form wherever possible or alternatively to a stable design form, as appropriate following the completion of construction work. This may include revegetation to stabilise bank sediments. Waterway banks impacted by HLW will be reinstated such that bank stability at the crossing location is the same or better than prior to construction. Stabilising materials such as rock armouring, hydro mulch, jute matting, or other suitable geotextile materials may be utilised where necessary.	Section 7.4.2

UMM No.	Commitment	Document Reference
	Any temporary stream crossings will be removed and rehabilitated at the completion of their operational use.	
B35	In addition to standard erosion and sediment control measures, the following procedures and considerations will be incorporated into construction methodologies for waterway crossings, where appropriate and practicable: • Minimise disturbance to native vegetation, including instream, fringing and riparian vegetation within the indicative disturbance area. This may include the demarcation of areas of native vegetation to be retained during work. • Any coarse woody debris or boulders located within instream work sites will be temporarily relocated during construction and then returned to the watercourse, at locations where scour risk can be avoided. • Waterway crossing work will be constructed during no or low flow conditions and under calm weather conditions. Work will also be timed to occur outside of any locally high seasonal flow periods. • Silt curtains or coffer dams will be deployed around instream work sites where required, to protect against any impacts to water quality or indirect impacts to retained vegetation. These measures will be situated so to avoid blocking fish passage wherever practical and removed as soon as they are no longer required. • Flow diversion measures will be installed on bunded waterway crossings as appropriate or where construction during no or low flow conditions is not feasible. Flow diversion measures may include pumps to ensure that water can be moved from one side of blockages to the other, with screened inlets to prevent the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel. Where waterways are bunded or flow obstructed, all obstructions to flow will need to be removed as soon as practical after watercourse crossing construction has been completed.	Section 7.3.5

UMM No.	Commitment	Document Reference
	• Appropriate erosion and sediment controls that take into account the potentially flood prone nature of the land will be employed to protect against any impacts to water quality or indirect impacts to retained vegetation. • Waterway bed and bank material excavated during construction will be stockpiled outside of the active channel and avoid riparian vegetation. Any material excavated from the bed of waterways will be stockpiled separately from other materials and returned to the waterway bed following the completion of construction work. • If the stockpiling of sediment or soil is required, it will be located as far away from waterways as practicable and managed so that it is secure against flooding and runoff to prevent any sediment entering waterways. Adequate erosion and sediment control measures will be in place to protect stockpiled sediment against runoff during rainfall or flooding. • Only excavated natural materials (ENM) or virgin excavated natural materials (VENM) will be used as fill during reclamation work, i.e. no contaminated material, building or demolition rubble will be used as fill in any stream crossings. • Chemicals will be stored in adequate bunding (in accordance with Australia Standard 1940 – The storage and handling of flammable and combustible liquids) as far away from streams as practicable and appropriately protected against flooding or runoff. Spill kits will be made available, and a spill response plan developed. • Plant refuelling will occur as far away from streams as possible and appropriate spill prevention measures (such as diversion bunds/cut off drains upslope and drip trays and spill kits) will be implemented when refuelling.	
B29	Access tracks will be used as necessary for the construction work and as far as is practicable, vehicle traffic shall be confined to these tracks. Track construction will be carried out to cause minimum disturbance to soil and	Section 7.3.2

UMM No.	Commitment	Document Reference
	vegetation both on and adjacent to the track. Tracks will be routed to follow the natural contour of the land as far as practicable to minimise the amount of cut and fill and soil disturbance. For any temporary access tracks, the disturbed surfaces and formed areas will be revegetated in accordance with the approved CEMP or *Managing Urban Stormwater: Soils and Construction - Volume 2C Unsealed Roads* (DECC, 2008a). In addition, other erosion control mechanisms will be put in place during the initial track construction work to contain any sediment that may erode from the disturbed surfaces.	
B18	All disturbed lands/areas must be managed throughout the construction work (in accordance with the relevant *Managing Urban Stormwater* (Landcom, 2004) (Blue Book) or comparable best practice guidelines, including: • vegetation removal, restoration, and management • stockpiling, erosion and sediment management • stabilisation / rehabilitation of disturbed lands/areas must be undertaken within suitable timeframes • temporary erosion and sediment controls must be maintained (and not removed) until rehabilitation measures are providing effective stabilisation of disturbed lands/areas. Disturbed areas (including areas not required for operation) will be stabilised/rehabilitated to a standard either: • as agreed with the landowner in accordance with the relevant Managing Urban Stormwater (Blue Book) or comparable best practice guidelines.	Section 7.2 Section 7.3.2 Section 7.3.3 Section 7.4 Annexure A
Soil, geology and contamination		
SC1	Prior to ground disturbance within areas mapped as moderate to high risk saline soils, an inspection will be undertaken for the presence of saline soils. Areas of known or	Section 7.3.177.3.17

UMM No.	Commitment	Document Reference
	suspected salinity will be subject to further testing as required. If salinity is confirmed, excavated soils will be managed in accordance with *Book 4 Dryland Salinity: Productive use of Saline Land and Water* (NSW DECC, 2008c) and the *Salinity Training Manual* (DPI, 2014) to manage salinity impacts. Erosion controls will be implemented in accordance with *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom 2004), and Volumes 2A (DECC, 2008a) and 2C (DECC, 2008b), commonly referred to as the 'Blue Book'. Prior to construction, materials will be selected to withstand acidic or high saline soil and groundwater environment (where applicable). During construction, existing areas of waterlogging and poor drainage will be avoided, where possible, when building access tracks and permanent structures.	
SC2	Disturbance to areas of environmental concern (AECs) identified as having a moderate risk or greater will be avoided or minimised where practicable during construction. Where disturbance cannot be avoided, potential impacts will be minimised during finalisation of the design and construction methodology, where practicable. AECs identified as having a moderate risk that will be disturbed will be further assessed prior to construction. The investigations will be undertaken in accordance with the assessment of site contamination NEPM 2013. Any remediation required for the project will be undertaken based on a site-specific Remedial Action Plan. The Remedial Action Plan will define remedial goals and objectives, performance criteria for remedial effort and remediation methodology. A validation report will be prepared after remedial effort and be in accordance with the NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).	Section 5.2.5 Section 7.3.167.3.16
SC3	Prior to ground disturbance in areas of potential acid sulfate soil or rock occurrence, testing will be carried out to determine the presence of actual and/or potential acid sulfate soils or rocks. If acid sulfate soils or rocks are encountered, they will be	Section 5.2.1 Section 7.3.187.3.18

UMM No.	Commitment	Document Reference
	managed in accordance with the *Acid Sulfate Soil Manual* (ASSMAC, 1998).	
SC4	All chemicals, fuels or other hazardous substances will be stored in accordance with the supplier's instructions and relevant legislation, Australian Standards and applicable guidelines. Environmental spill kits containing spill response materials suitable for the work being undertaken will be available with extras available to be carried in vehicles. A spill response procedure will be developed and implemented. All staff will be trained in emergency spill procedures.	Table 7-1Table 7-1 Annexure H
SC5	Detailed design will consider the risk of encountering naturally occurring asbestos (NOA) within the project footprint Consideration may include movement of footings to areas with less risk of NOA, footing design changes or minimising rock blasting and ripping where practicable. An Asbestos Management Plan will be prepared in accordance with the NSW Government Code of Practice *How to Manage and Control Asbestos in the Workplace* (SafeWork, 2020). The Asbestos Management Plan will include the following measures: • management or isolation of areas mapped as medium to high risk of NOA, where direct disturbance of NOA is confirmed to be required for HLW construction works • placement of suitable signage around the work areas • list of appropriate personal protective equipment, including Respiratory Protective Equipment • implementation of dust suppression controls including wetting surfaces, covering disturbed surfaces and the use of sealed air-conditioned vehicles to minimise potential asbestos impacts to workers	Section 7.3.15 Annexure B Asbestos Management Plan – see Emergency Response Plan

UMM No.	Commitment	Document Reference
	• decontamination of the workers' coveralls, personal protective equipment, equipment and work site • procedures for the disposal of NOA material or waste, if required • implementation of air monitoring using pumps and sample filter grid cowls for asbestos fibres and dusts if it is suspected that exposure to NOA dust during work might exceed safe levels of airborne asbestos. The air monitoring pumps, and reporting, must be undertaken by a licensed asbestos assessor.	
SC6	The contractor will undertake compliance monitoring, keep a record of waste volumes and waste types and keep a stockpiles register where excavations and stripping of surface soil contamination occurs. The contractor will keep all records during construction for waste disposal and for the importation of materials such as engineering fill and ENM or VENM soils. Engineering fill materials for use on site will be validated to confirm they meet the classification of VENM or ENM prior to being transported to site.	Annexure F Waste Management Sub Plan
SC7	The discovery of any unexpected contamination during construction will be managed in accordance with an *Unexpected Finds Protocol – Contamination* which will be prepared prior to construction.	Annexure B
Surface water and groundwater		
SW1	An Erosion and Sediment Control Plan (ESCP) will be developed and implemented in consultation with a Certified Professional in Erosion and Sediment Control during construction for activities and areas that are considered higher risk. The plan will detail the processes, responsibilities and measures to manage potential soil and water quality impacts in accordance with the principles and requirements in:	Section 7.2 Annexure A

UMM No.	Commitment	Document Reference
	• *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom, 2004), and Volumes 2A (DEC, 2008b) and 2C (DECC, 2008a), commonly referred to as the 'Blue Book' • *Best Practice Erosion and Sediment Control* (IESCA, 2008) • TransGrid's Environmental Guidance Notes • *Guidelines for controlled activities* (Riparian corridors (DPE, 2022c) and *Watercourse crossings* (DPE, 2022b)).	
SW2	Consideration of scour protection will be included for any infrastructure that is within a waterway. The design will incorporate features that minimise impact on flow conditions and natural functioning of the waterway, where feasible and reasonable. For work within or near waterways consider and adhere to the following guidelines *Guidelines for Controlled Activity - In-stream works* (DPE, 2022f) *Guidelines for Controlled Activity - Watercourse crossings* (DPE, 2022e) *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (DPI, 2003) *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013).	Section 7.3.5
SW3	Water quality monitoring will be implemented to establish baseline water quality conditions in waterways of high sensitivity that may be impacted by nearby construction and to detect any changes in water quality that may be attributable to the HLW during construction. The frequency, location and duration of sampling will be detailed in a monitoring program. Monitoring locations will include: • at a minimum two monitoring locations (one located upstream and one downstream of the transmission line crossing) for waterways with a Strahler 4th order or higher within the SDWC where construction activities within 200 metres of the waterway will be carried out and could result in impacts	Section 7.3.5 Annexure E

UMM No.	Commitment	Document Reference
	• monitoring for total dissolved solids, total suspended solids, total nitrogen, and total phosphorus.	
SW4	Water supply management will be undertaken in accordance with agreements between the construction contractors and relevant water users and suppliers. Groundwater and surface water allocations purchased from existing registered bores/users must be extracted in accordance with the conditions stated in the associated Water Access Licences(s) (WAL(s)) and Water Supply Works approval(s).	Section 7.3.127.3.12
SW5	Alternative construction methodologies will be investigated and implemented as required to minimise impacts to groundwater dependent ecosystems (GDEs) and registered groundwater bores, if identified to be directly impacted during detailed design. Make good provisions will need to be made to the groundwater user(s) for bores that will be affected in line with the minimal impact criteria listed within the NSW Aquifer Interference Policy. Where groundwater dewatering is required, the following will be conducted: • Dewatering assessment (including dewatering volume estimates) • Dewatering procedures will be included in the Soil and Water Management Plan (SWMP) in line with the minimal impact criteria listed within the NSW Aquifer Interference Policy, relevant water sharing plans (WSPs) and licencing requirements where relevant • Water Supply Works Approval (where needed) • Water Access Licence (WAL) (if dewatering volumes exceed 3 ML/year).	Section 7.3.6

UMM No.	Commitment	Document Reference
Hydrology and flooding		
HF1	Suitable on-site drainage design and stormwater management strategies and plans will be implemented to limit adverse flood impacts on surrounding properties during construction.	Section 6.2.6 Section 7.3.11
HF2	The detailed design will consider the potential impacts on flooding associated with earthworks for new access tracks and the need for cross drainage culverts or bridge structures. The cross drainage infrastructure will be sized appropriately to minimise adverse flood impacts	Section 7.3.117.3.11
HF3	Where possible, overland flow paths up to the 5% AEP event for construction compounds and 2% AEP for combined worker accommodation facilities and construction compounds are to remain unobstructed from bulk filling, site infrastructure and/or stockpiling. Selective placement of sensitive or vulnerable infrastructure (e.g. electrical equipment, buildings, machinery, stockpiles, pedestrianised areas etc) will be considered in flood prone areas. Where bulk filling of flood prone land is required, a flood impact assessment is required to demonstrate the impact of proposed works with consideration of mitigation measures to minimise any downstream impacts.	Section 6.2.6
HF4	Where possible, existing drainage and overland flowpaths will be maintained at construction compounds, combined worker accommodation facilities and construction compounds and Bannaby 500 kV substation. Where filling is required, suitable drainage design and stormwater management strategies and plans will be implemented to limit adverse flood impacts on surrounding properties. Selective placement of sensitive or vulnerable infrastructure (e.g., electrical equipment, buildings, machinery, stockpiles, pedestrianised areas etc) will be allocated to areas away from drainage lines.	Section 6.2.6. Section 7.3.11

UMM No.	Commitment	Document Reference
	On site detention will be incorporated where increases in site stormwater discharges exceed predevelopment flows, and will be designed in accordance with *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom, 2004), and *Volumes 2A* (DECC, 2008a) and 2C (DECC, 2008b), commonly referred to as the 'Blue Book'.	
HF5	Suitably sized cut-off drains and cross drainage culverts will be designed and constructed to maintain existing flood behaviour up to the 1% AEP event around and downstream of the proposed Gugaa 500 kV substation footprint, unless otherwise approved by NSW Department of Planning, Housing and Infrastructure.	Section 6.2.6
Hazards and Risks		
HR9	All chemicals, fuels or other hazardous substances will be stored in accordance with the supplier's instructions and relevant legislation, Australian Standards and applicable guidelines. The capacity of any bunded area will be at least 130 per cent of the largest chemical volume contained within the bunded area. The location of the bunded enclosure/s will be shown on the site plans.	Table 7-1 (MMSW59)
Waste		
W2	Stockpiled wastes, where required, will be: • appropriately segregated to avoid mixing and contamination • appropriately signposted • appropriately stored in accordance with *Managing Urban Stormwater – Soils and Construction* (Landcom, 2004) • less than three metres in height with an appropriate height to length batter ratio • located as far away as reasonably practicable from sensitive receivers, ecological areas and waterways.	Section 7.3.8 Annexure F Waste Management Sub Plan

4. Consultation

4.1. Consultation for plan preparation

This Plan was provided to Wagga Wagga City Council (WWCC), Snowy Valleys Council (SVC) Biodiversity, Conservation and Science Directorate (BCS) and to DPHI Water. A summary of the consultation undertaken for the development of this SWMP, and the consultation summary on subsequent revisions of the plan is provided in Annexure C.

Additional consultation with the above stakeholders, and organisers will also be triggered as a result of special event planning or as a result of significant or procedural change to the document. Any minor or administrative changes will be made and endorsed by the Environmental Representative and the subsequent revised document will be issued for information.

4.2. Ongoing consultation

Ongoing consultation with the relevant councils and other stakeholders (including affected landowners) will continue to be undertaken, throughout the construction of HLW, regarding the construction soil and water impact and the effectiveness of mitigation strategies. Updates will be provided through regular meetings (at a frequency agreed with key stakeholders) to communicate upcoming changes and impacts in advance of the changes taking place.

5. Existing environment

The HLW is located within a predominantly rural setting and within Forestry Corporation NSW (FCNSW) land.

The following sections summarise what is known about factors influencing soils and water within and adjacent to the HLW corridor.

The key reference documents are:

- *Humelink EIS.*
- *Humelink EIS Technical Report 10 – Contamination.*
- *Humelink EIS Technical Report 11 – Flooding.*
- *Humelink EIS Technical Report 12 - Surface Water and Groundwater.*
- *Humelink EIS Technical Report 1 – BDAR.*
- *Humelink EIS Technical Report 17 - Air Quality.*
- *Humelink Amendment report.*
- *Addendum to EIS Technical Report 16 – Air Quality Impact Assessment.*
- *Revised Biodiversity Development Assessment Report – EIS technical Report 01.*
- *Addendum to EIS Technical Report 11 – Hydrology and Flooding Impact Assessment Addendum EIS Technical Report 11.*
- *Addendum to EIS Technical Report 12- Surface Water and Groundwater Impact Assessment Addendum EIS Technical Report 12.*
- *Addendum to Phase 1 Contamination Assessment EIS Technical Report 10.*

5.1. Topography and soil characteristics

The topography of the HLW footprint is widely variable, ranging from alpine regions near Maragle to alluvial valleys near the Murrumbidgee River. The elevations range from about 220 metres above the Australian height datum (mAHD) to 1,232 mAHD. The HLW footprint includes:

- a relatively flat area near Wagga Wagga, with elevations ranging from about 220 mAHD to 338 mAHD.
- the highest elevations between Batlow and the Maragle State Forest, ranging between about 1,012 mAHD and 1,232 mAHD.

There is a diverse range of soil types across the HLW footprint. The predominant soils underlying the study area according to the Australian Soil Classification (CSIRO, 2021) are either sand or clay based, or a mixture of the two. An extract of the seamless geology map (Department of Regional NSW, 2021) across the HLW project footprint is provided in Figure 5-1, Figure 5-2 and Figure 5-3. The Specific features of soils relevant to the HLW footprint are described in further detail in the *HumeLink EIS Chapter 16*, *HumeLink EIS Technical Report 12* and *Addendum EIS Technical Report 12.*

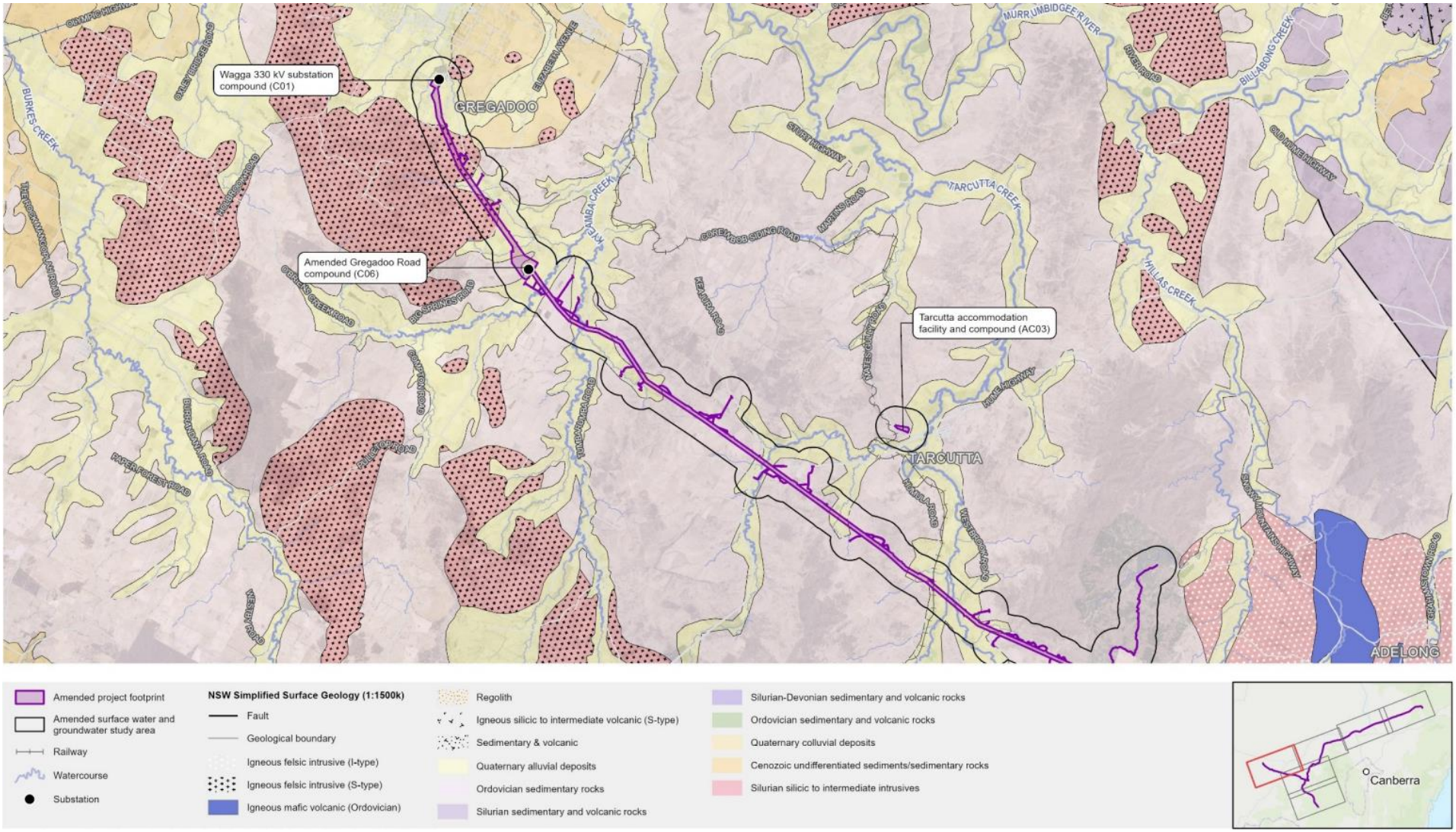

Figure 5-1: Surface geology

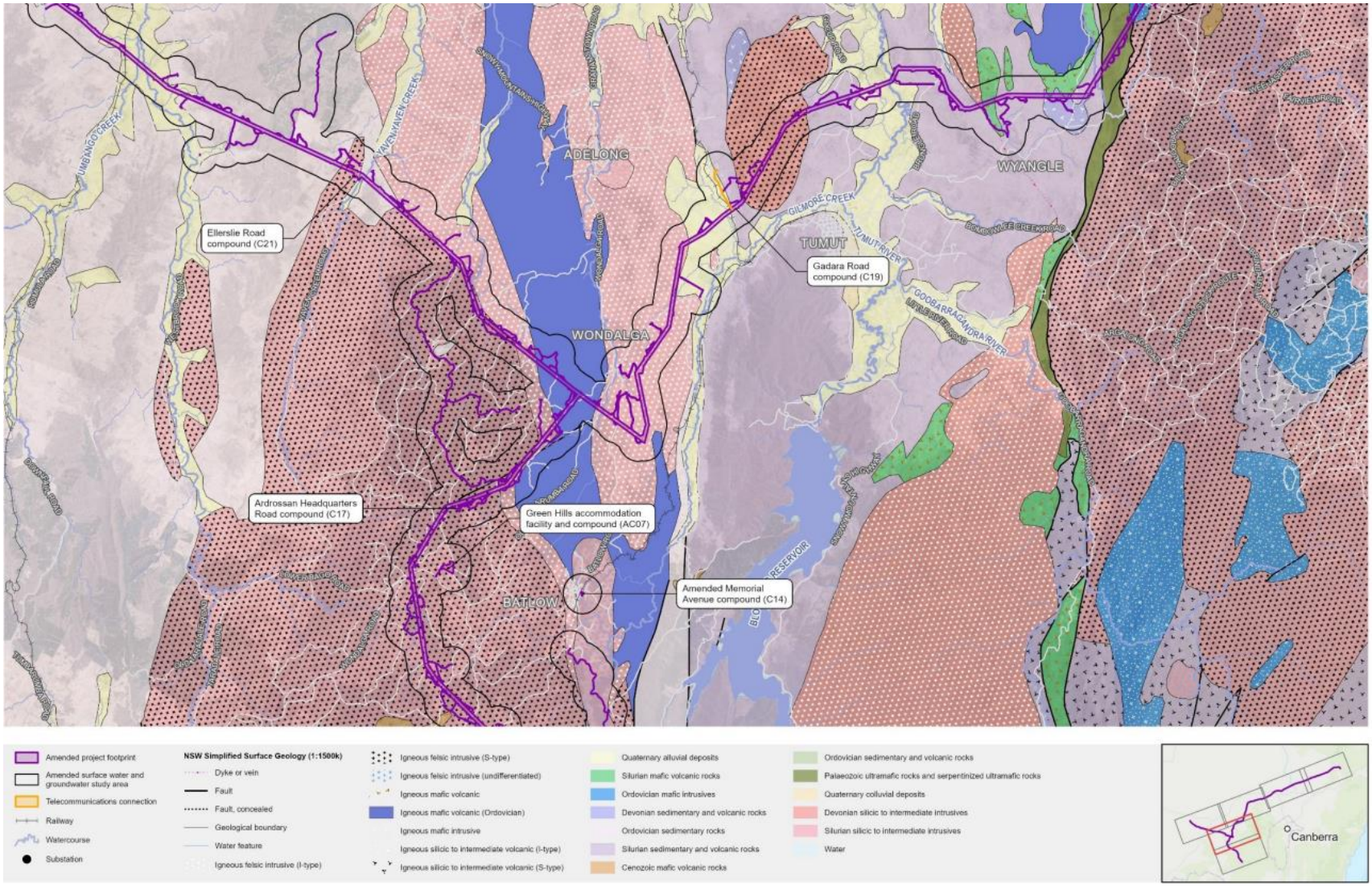

Figure 5-2: Surface geology

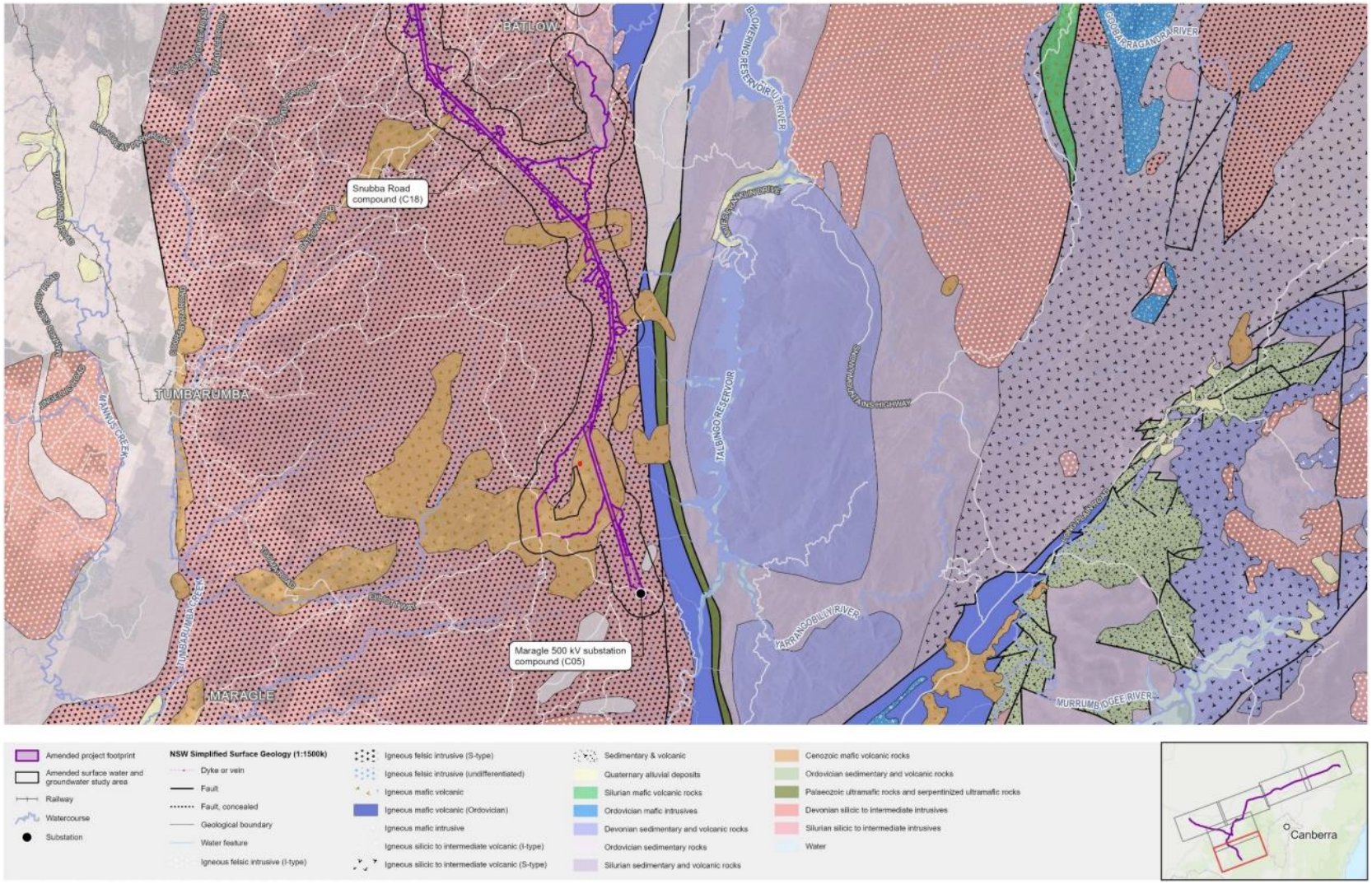

Figure 5-3: Surface geology

Further detail regarding the topography, geology and soils associated with the HLW are provided in Chapter 16 of the EIS and Chapter 6.10 of the EIS Amendment Report.

5.2. Soils

5.2.1. Acid Sulphate Soils

The Australian Soil Resource Information System (CSIRO, 2014) indicates that there is a low or extremely low probability of acid sulfate soils for HLW.

5.2.2. Naturally occurring asbestos

Naturally occurring asbestos are minerals are associated with rock formations that are present within NSW in the Lachlan Fold Belt. Forestry Corporation of NSW (FCNSW) have provided field-based information that there has been no NOA found on or in proximity to their land. Based on the FCNSW and NSW Government's online environmental data portal mapping, NOA is not considered to be present within the HLW footprint. Should NOA occur the unexpected finds protocol (contamination) will be followed.

5.2.3. Saline soils

A review of the Hydrogeological Landscapes of NSW and the ACT dataset (DPE, 2022) revealed that the HLW project footprint is mapped as having salinity hazard ranging from very low to very high as presented in Figure 5-4, Figure 5-5 and Figure 5-6.

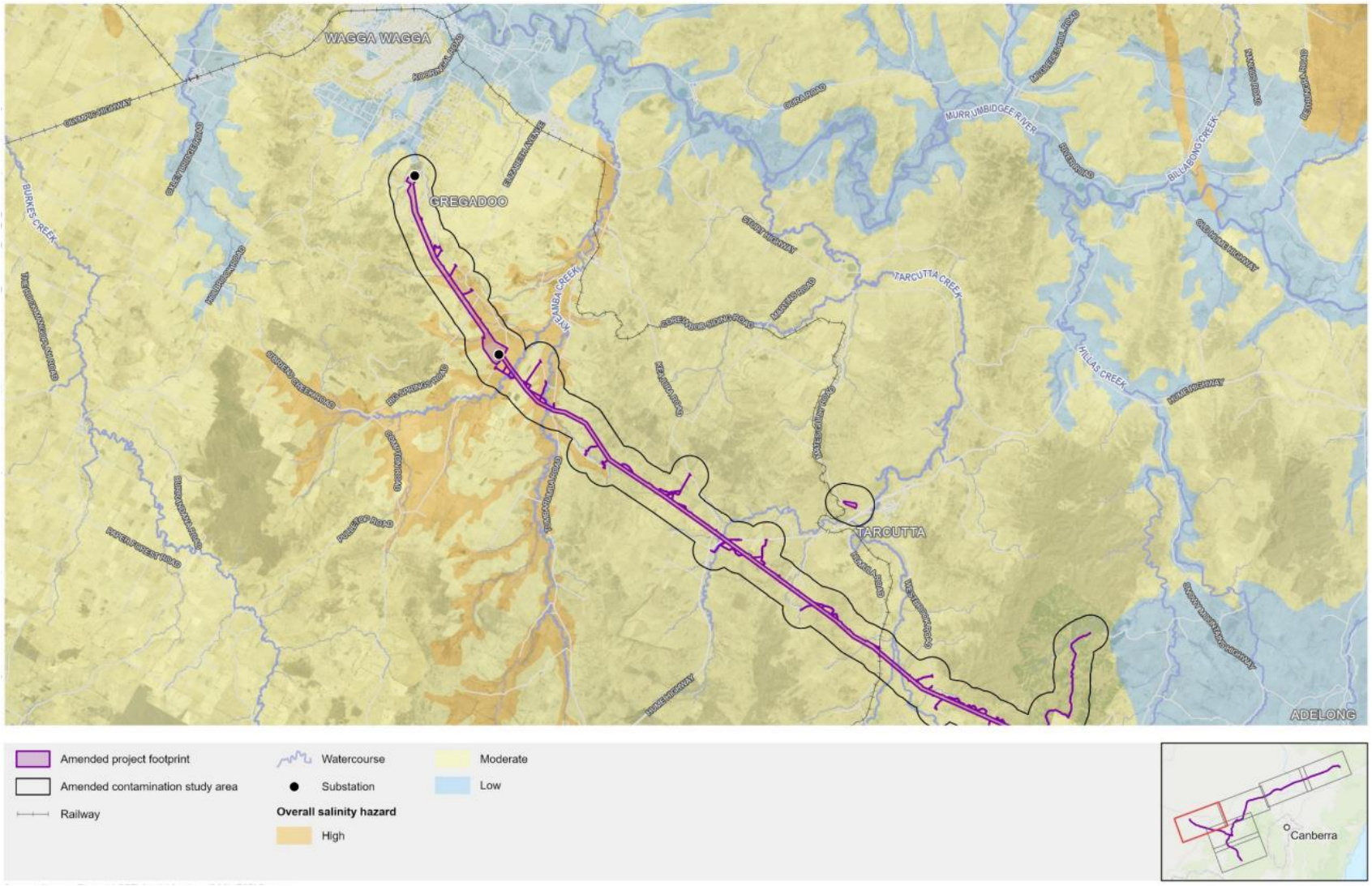

Figure 5-4: Overall salinity hazard

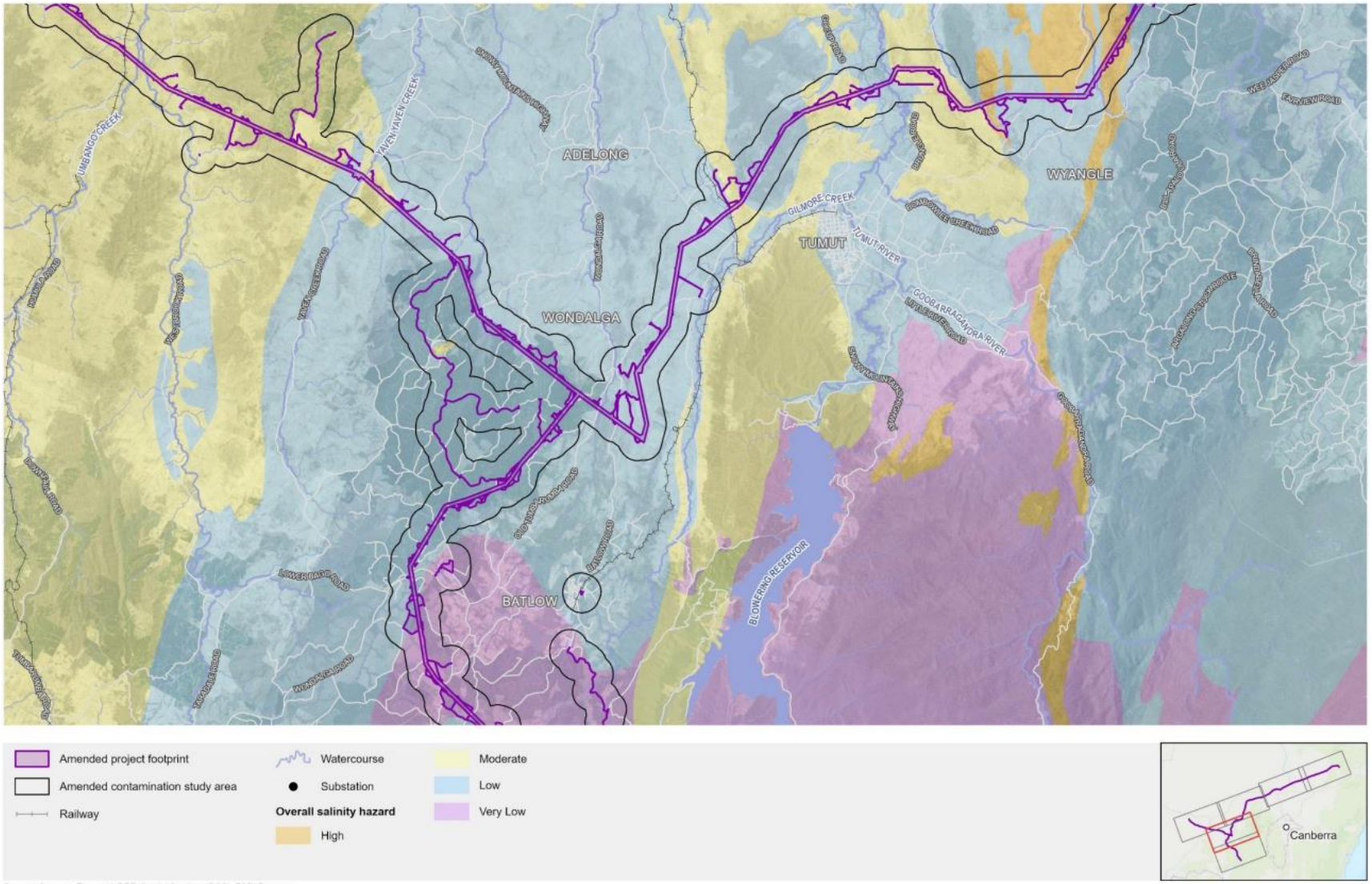

Figure 5-5: Overall salinity hazard

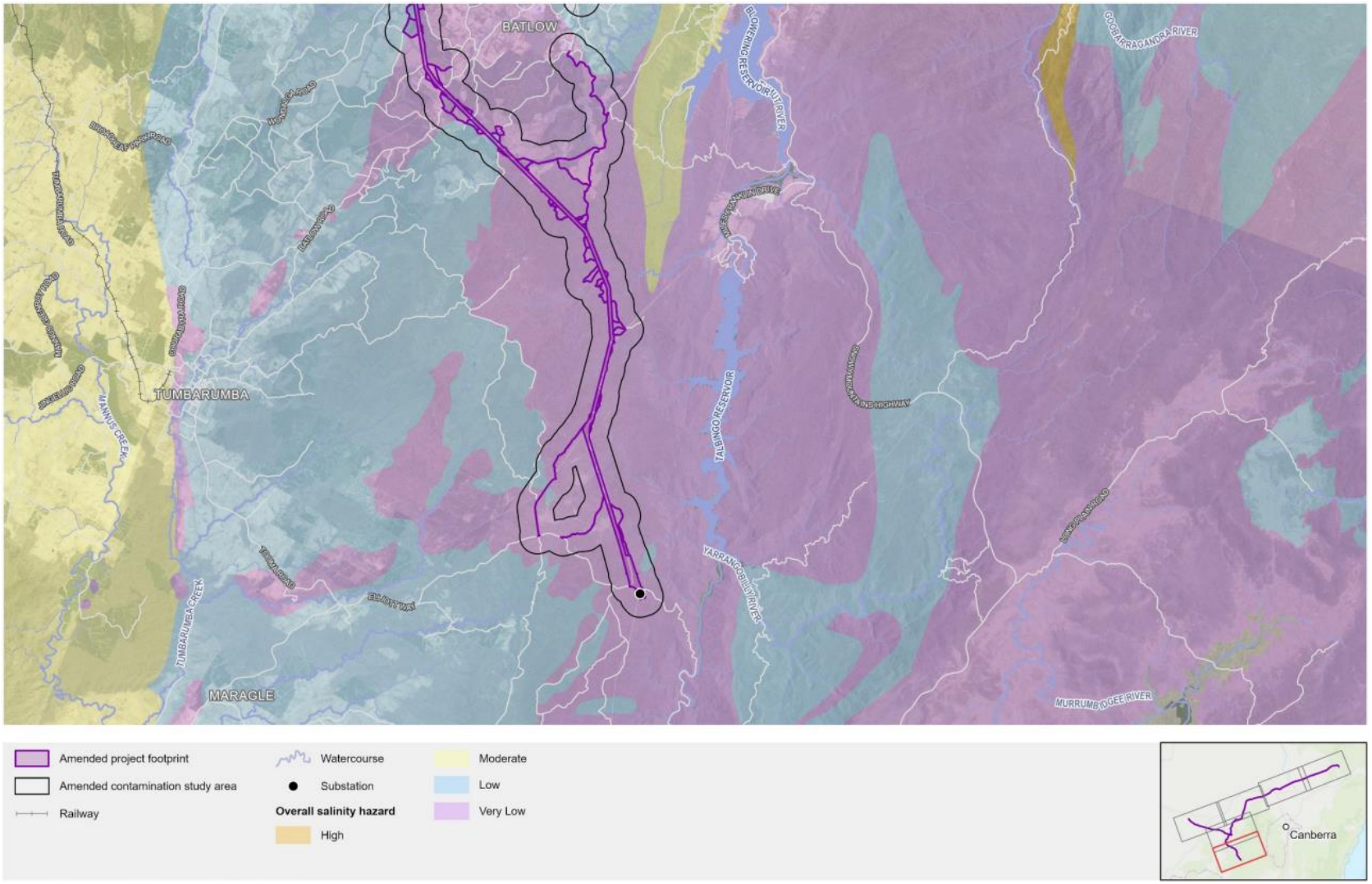

Figure 5-6: Overall salinity hazard

5.2.4. Soil Contamination

The EIS identifies no EPA public register notified sites within HLW, Tables Table 5-1, Table 5-2 and Table 5-3 show the locations of unlicensed contaminated sites in HLW.

Table 5-1 Unlicensed premises regulated by the NSW EPA within the HLW

Site and location	Distance from HLW footprint	Scheduled activities
Wagga 330 kV substation Corner Ashford Road and Boiling Down Road, Gregadoo, NSW, 2651	Within the HLW footprint.	Hazardous, Industrial or Group A Waste Generation or Storage.

Table 5-2 Licensed facilities within HLW footprint

Site and location	Distance to HLW footprint	Scheduled activities
Wagga 330 kV Substation Corner Ashford Road and Boiling Down Road, Gregadoo, NSW, 2650	This site is located within the HLW footprint.	Hazardous, Industrial or Group A Waste Generation or Storage.
Carbon Mate Organic Recycling 132 Ashford Road, Wagga Wagga, NSW, 2650	The HLW footprint passes through this site, but composting activities are undertaken about 500 m to the west.	Composting.
Gregadoo Waste Management Centre 132 Ashford Road, Wagga Wagga, NSW, 2650	The HLW footprint passes through this site, but waste activities are undertaken about 700 m to the west.	Waste storage –waste tyres Waste disposal by application to land.
Zones 1 To 4 Hume Highway Duplication Hume Highway, Tarcutta, NSW, 2652	The HLW footprint is presumed to either run through or be in close proximity to these upgraded sections of Hume Highway in construction zones 1 to 4.	Road construction.

Table 5-3 National Waste Management sites near the HLW footprint

Site and location	Distance to HLW footprint	Class
Gregadoo Waste Management Centre	Gregadoo Waste Management Centre	Gregadoo Waste Management Centre

Other potential sources of contamination include

- Unexploded ordnance.
- Arsenic and dichloro-diphenyl-trichloroethane from cattle dips; and
- Per- and polyfluoroalkyl substances (PFAS).

The closest *Where is Unexplained Ordinance database* (Department of Defence, 2022) registered site

is the Defence Controlled Area Royal Australian Air Force (RAAF) Base Wagga Wagga, 6.3km from HLW.

No information on cattle dips was provided in the EIS. However, with the rural nature of the area it is likely that these sites exist in or near the HLW area, TransGrid's *Property Management Plans* should be consulted for information on the potential locations of these sites.

5.2.5. Areas of Environmental Concern

Table 5-4 Summary of areas of environmental concern

AECs	Rationale for concern	Risk rating
Wagga 330 kV substation.	On-site spills and leaks from maintenance activities, asbestos, lead paints and/or PCBs on existing substation structures.	Moderate
Existing transmission line infrastructure.	On-site spills and leaks from maintenance activities, asbestos and/or lead paints on transmission line structures.	Low
Farm dams (open or infilled)	Areas of potential contaminant sediment build-up (sink).	Low
Cleared improved agricultural land (including cropping and irrigated land).	Historical use of pesticides, herbicides and fertilisers, large scale land clearance and heavy machinery use.	Low
Areas with pesticide use, including Hume Forest and Forestry owned land.	Ongoing use of pesticides, including for pine forests.	Low
Designated hunting grounds.	Lead bullets used within hunting grounds.	Low
Areas of disturbed land, fill, stockpiling and dumping.	Areas with historical and existing stockpiles, filling and dumping, including dumped cars and the presence of potential asbestos containing materials.	Moderate
Built-up areas, including rural residences.	Historical uncontrolled earthworks and building structures previously demolished/ degraded. The building structure may contain asbestos and/or lead paints.	Low
Gregadoo Waste Management Centre and Batlow Landfill.	Operating as a landfill at the Gregadoo site. Composting activities also operating on the site. Historical landfill activities at the Batlow site.	Moderate

AECs	Rationale for concern	Risk rating
Quarries.	Historical spills and leaks from the use of machinery at historical and existing quarries.	Low
Areas with potential for NOA	Mapped with potential for NOA.	Moderate (localised)
Biosolids applied to land for farming and crops, often tilled into the surface soils.	Historical application of resource recovery and biosolids from wastewater treatment systems.	Low
Areas with potential for soil and groundwater salinity.	Mapped with potential for soil salinity.	Low

5.3. Surface water

Surface water investigations were undertaken as part of the EIS and AR and are presented in Chapter 17 of the EIS and Technical Report 12 – Surface Water and Groundwater Impact Assessment.

5.3.1. Existing Catchments and drainage infrastructure

The HLW intersects one catchment area, Murrumbidgee and borders the Upper Murray at Maragle (1 km west of alignment). The main bodies of water within the HLW area are:

- O'Briens Creek.
- Kyeamba Creek.
- Keajura Creek.
- Umbango Creek.
- Tarcutta Creek.
- Gilmore Creek.

A brief description of these waterways is provided in Table 5-5.

Table 5-5 Description of key waterways and catchments relevant to the HLW

Waterway/ catchment	Description	Relevant HLW features
Murrumbidgee River Catchment	• This catchment has an area of 84,000 square kilometres. • The Murrumbidgee River drains much of southern NSW and most of the ACT. • Murrumbidgee, Tumut, Goobarragandra, Gudgenby, Naas, Molonglo, Queanbeyan, Cotter and Yass Rivers are key tributaries.	• Stream crossings. • Construction compounds. • Transmission line structures. • Construction compounds. • Access tracks. • Worker accommodation facilities.

Waterway/ catchment	Description	Relevant HLW features
Upper Murray River catchment	• This catchment has an area of 15,330 square kilometres. • The Murray River flows from the Snowy Mountains, along the NSW-VIC border and through south-eastern SA to Lake Alexandrina where it meets the Southern Ocean. • Major NSW tributaries to the Upper Murray include the Geehi, Swampy Plains and Tooma Rivers and Tumbarumba Creek. • The two largest water storages are Hume Dam and Dartmouth Dam (DPE, 2022i).	• Stream crossings. • Construction compounds. • Transmission line structures. • Construction compound. • Access tracks. • Worker accommodation facilities.

The locations of the waterways and catchments associated with the HLW are shown in Figure 5-7, Figure 5-8, Figure 5-9 and Figure 5-10.

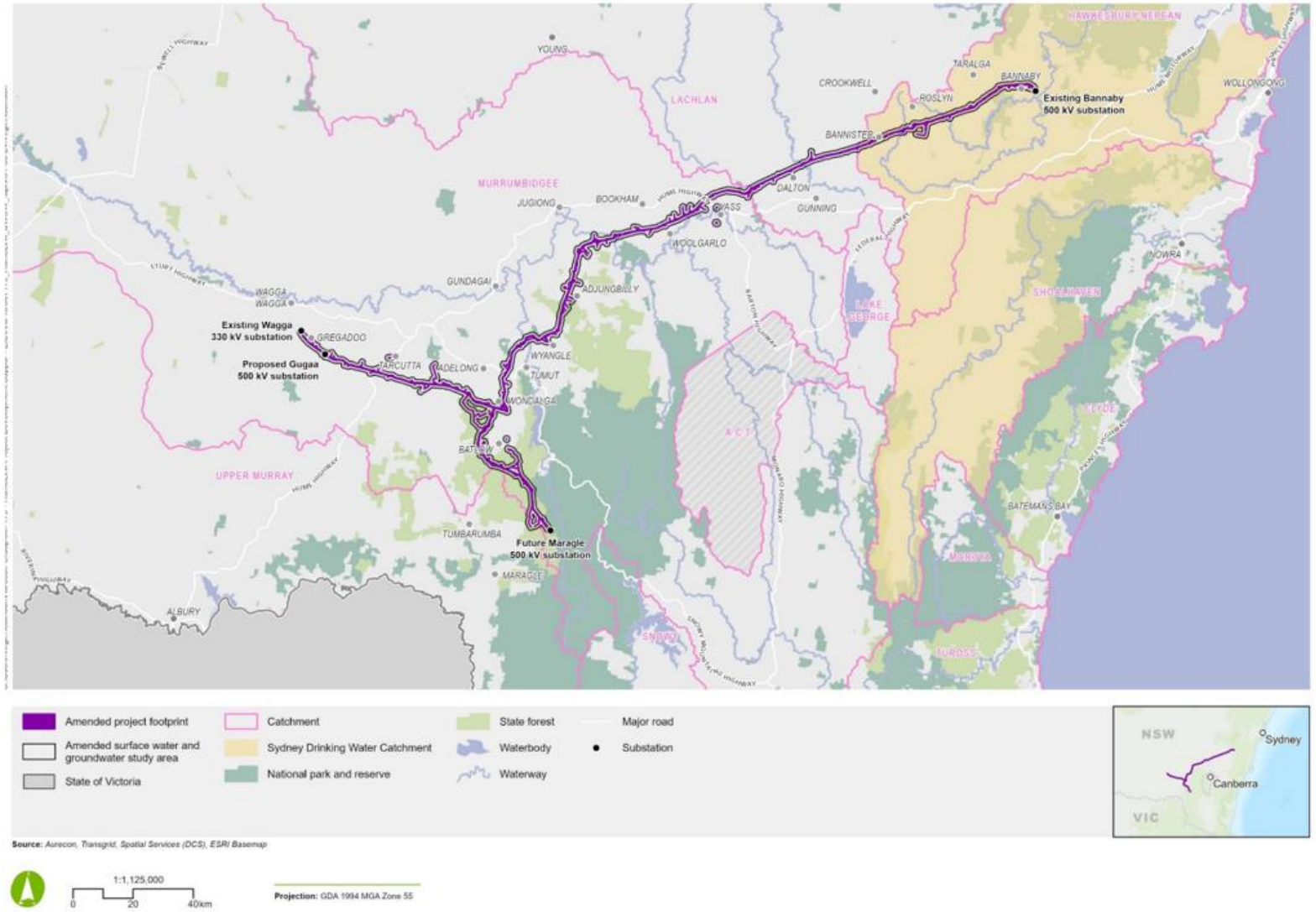

Figure 5-7 Catchment Areas

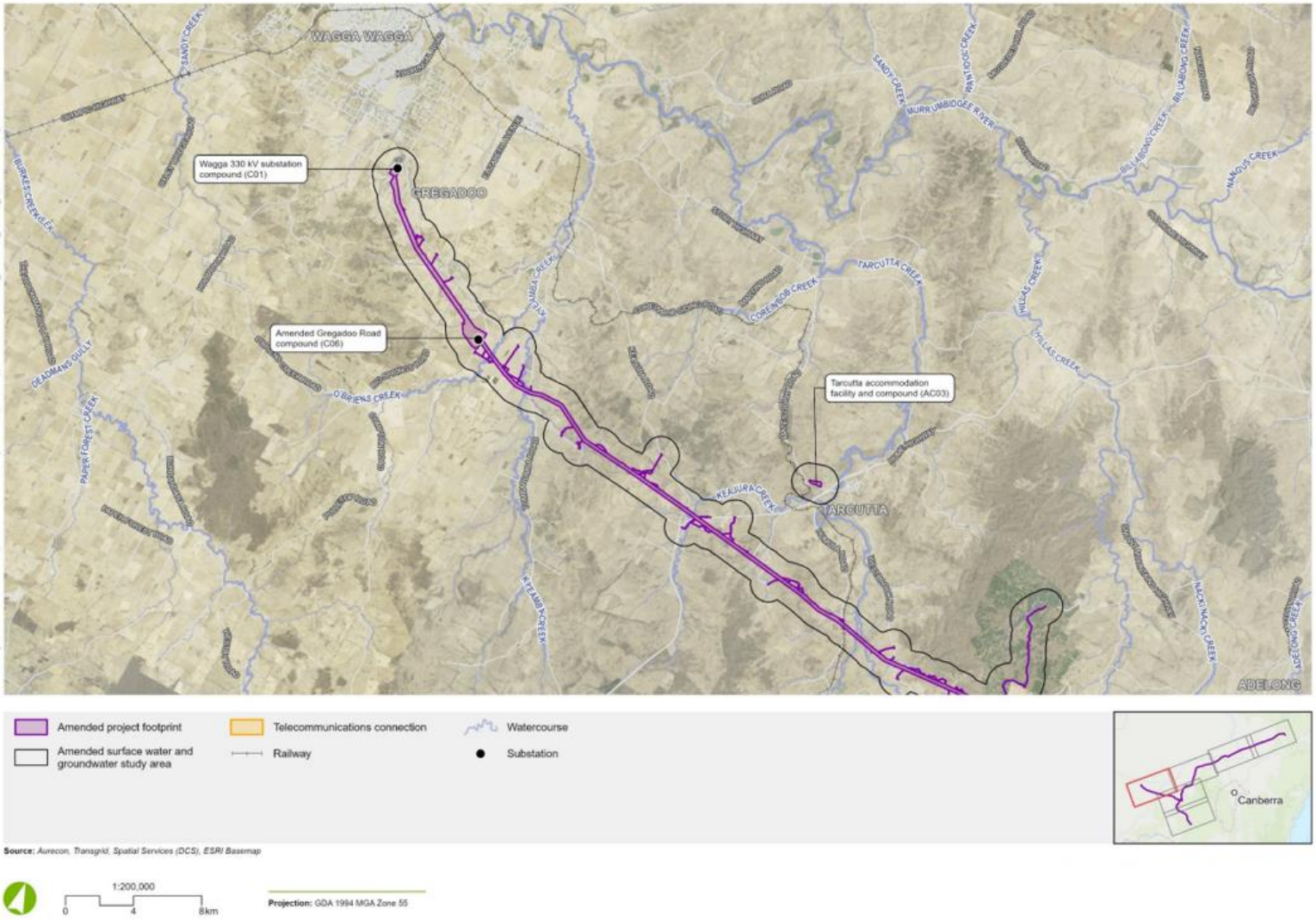

Figure 5-8: Mapped waterways and drainage lines

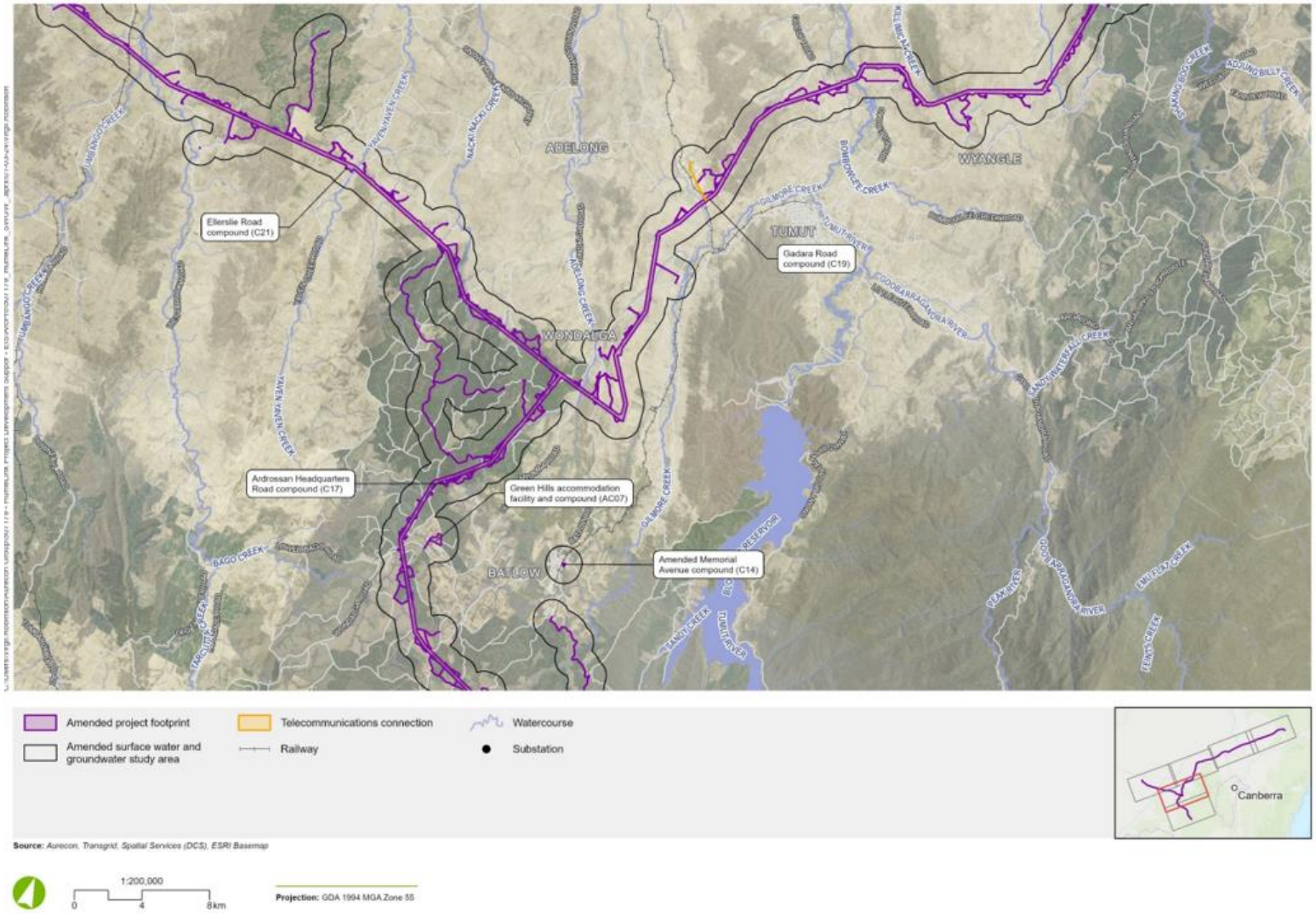

Figure 5-9: Mapped waterways and drainage lines

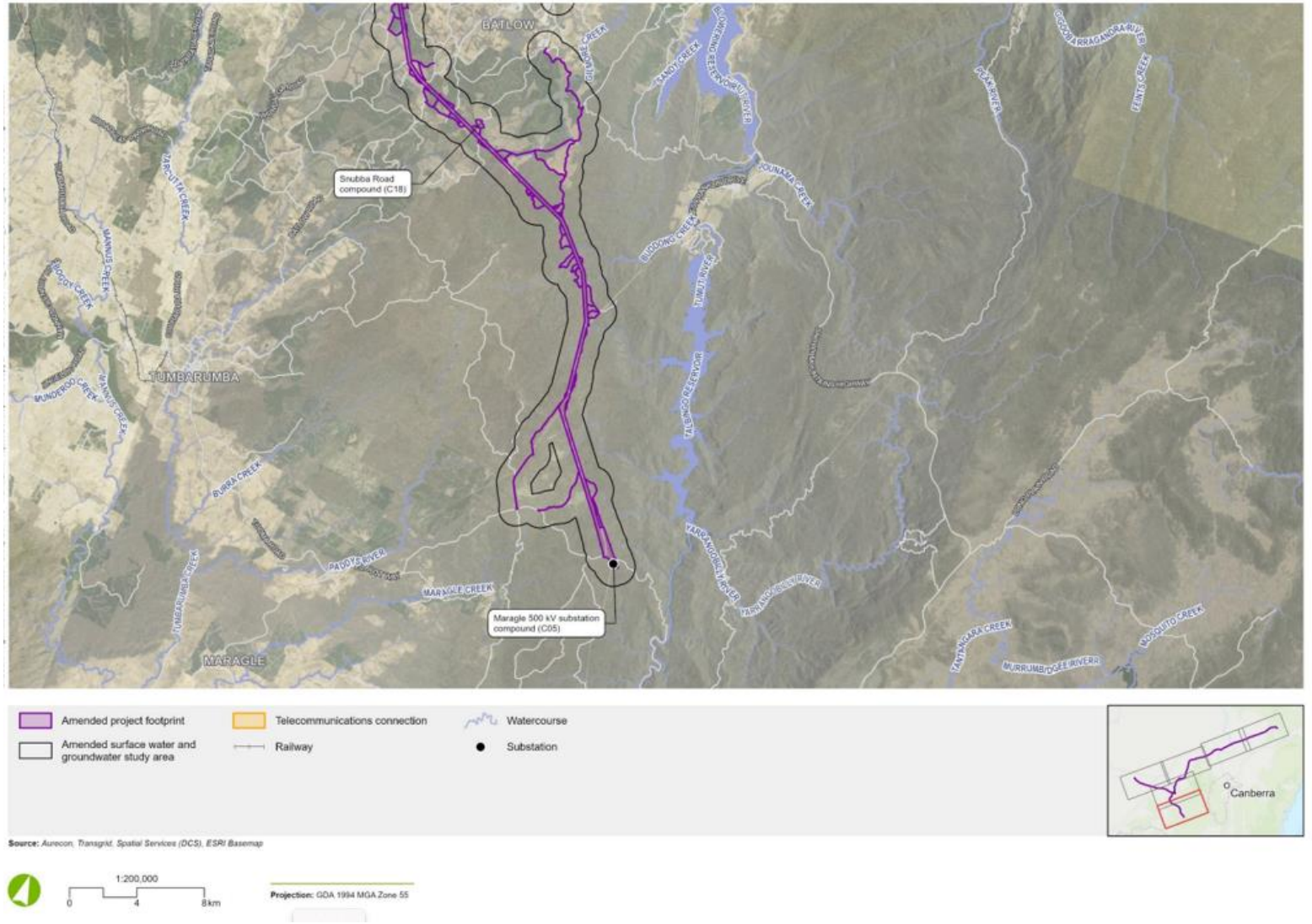

Figure 5-10: Mapped waterways and drainage lines

5.3.1.1. Drinking Water Catchments

As set out in EIS Chapter 17 Surface Water and Groundwater quality, HLW crosses a small section of the catchments for Blowering and Burrinjuck dams which at the nearest location are approximately 1.3km from the nearest point of the alignment. The EIS States that given the distances, the small area of catchment potentially affected, and with the implementation of mitigation measures risk of impact to Blowering and Burrinjuck dams is considered low (*Technical Report 12 – Surface Water and Groundwater Impact Assessment* (Aurecon, 2023a)).

5.3.1.2. Existing flood behaviour

Flood modelling was carried out in the Planning Approval Documentation to assess the existing flood conditions during stormwater events. Regional flood maps are provided in Attachment C of *Technical Report 11 - Hydrology and Flooding Impact Assessment.*

Based on the hydraulic modelling during a 1% AEP event, the downstream area of the Murrumbidgee River catchment experiences widespread floodplain flow. The flood extent is about three kilometres wide with a flood hazard classification of H5 or H6 in accordance with ARR 2019. This extends from the towns of Gundagai to Wagga Wagga – a distance of about 100 kilometres. Murrumbidgee River tributaries such as Tarcutta Creek, Gocup Creek and Tumut River, which intersect the project footprint, experience shallow widespread flooding. Flooding within the upstream area of the Murrumbidgee River catchment during a 1% AEP event does not impact the project footprint given its significant distance south of the project near Billilingra.

5.3.2. Surface water supply and water sources

Section 5.2.3 *of Technical Report 12 - Surface Water and Groundwater Impact Assessment Addendum* (Aurecon, 2024) identified that Water Sharing Plans (WSPs) are in place for all catchments within the amended project footprint. WSPs relevant to HLW are presented in Table 5-6 below.

Table 5-6: Summary of Water Sharing Plans within vicinity of HLW works

Catchment	Water Sharing Plan	Water Source
Murrumbidgee	Murrumbidgee Regulated River Water Source 2016	Murrumbidgee Regulated River Water Source
		Murrumbidgee Central (Burrinjuck to Gogeldrie) Water Source
		Kyeamba Water Source
		Tarcutta Creek Water Source
		Hillas Water Source
		Adelong Creek Water Source
		Gilmore/Sandy Water Source
		Upper Tumut Water Source
Murray	Murray Unregulated River Water	Maragle Water Source

Catchment	Water Sharing Plan	Water Source
	Sources 2011	Tumbarumba Water Source

5.3.3. Surface water quality

The water quality of waterways relevant to the HLW were described in the EIS as follows:

Table 5-7: Summary of surface water quality

Water Catchment	Monitoring location	Description of surface water quality
Murrumbidgee River	Tumut River at Oddys Bridge (# 410073) Murrumbidgee River at Gundagai (#410068)	• Temperatures were generally within guideline conditions at all monitoring locations apart from the Tumut River (#410073) where a median temperature of 12°C was recorded. • Conductivity was within guideline conditions at all monitoring locations. • TP, TN and turbidity were outside guideline values at each monitoring location. • pH was within guideline range at all monitoring locations.
Upper Murray River	Tooma River at Warbrook (#401003) Tumbarumba at Tumbarumba Creek (#401007)	• Temperature was generally within guidelines conditions at Tumbarumba (#401007). • Conductivity was within guideline conditions at Tumbarumba (#401007). • TP values exceeded guidelines and turbidity was generally within guidelines at Tooma River (#401003)

5.3.4. Sensitive receiving environments

Sensitive receivers in the HLW area include:

- KFHs and threatened aquatic species.
- Licensed groundwater users.
- Wetlands, including RAMSAR wetlands and NSW wetlands.
- GDEs.
- Drinking Water Catchments

5.3.5. Key Fish Habitat and threatened aquatic species

A number of waterways mapped as KFH intersect the HLW work area. The construction of waterway crossings for access tracks has been identified as the primary pathway for potential direct impact to aquatic habitats. Areas of KFH potentially impacted by HLW are detailed in *Technical Report 1 – Revised Biodiversity Assessment Report* (NEH, 2024) and the Surface Water Quality Monitoring Program (Annexure E).

Management of potential impacts to KFH and threatened aquatic species is detailed in Section 7.3.5 and the Biodiversity Management Plan.

5.3.6. Groundwater dependent ecosystems

As set out in the amended BDAR, the proposed construction and operational activities associated with the amended HLW footprint are unlikely to pose a significant risk to GDEs given there are expected to be minimal impacts to ground water quality and flow with adequate mitigation measures in place (*Technical Report 12 – Surface Water and Groundwater Impact Assessment* (Aurecon, 2023a)). Potential impacts to GDEs and management measures are detailed in Section 6.2.4 and Section 0.

5.3.7. Groundwater sources

The HLW footprint intercepts the Water Resource Plans (WRPs) and WSPs listed in Table 5-8. Groundwater sources within the HLW footprint are shown in Figure 5-11, Figure 5-12 and Figure 5-13 below.

Table 5-8: Groundwater sources

Groundwater source	Name of plan
Kyeamba Alluvial Groundwater Source	Water Sharing Plan for the Murrumbidgee Alluvial Groundwater Sources Order 2020
Gundagai Alluvial Groundwater Source	Water Sharing Plan for the Murrumbidgee Alluvial Groundwater Sources Order 2020
Lachlan Fold Belt MDB Groundwater Source	Water Sharing Plan for the NSW Murray–Darling Basin Fractured Rock Groundwater Sources Order 2020
Lachlan Fold Belt (GS20)	NSW Murray–Darling Basin Fractured Rock Water Resource Plan (submitted April 2020 but withdrawn September 2021 and resubmitted June 2022)

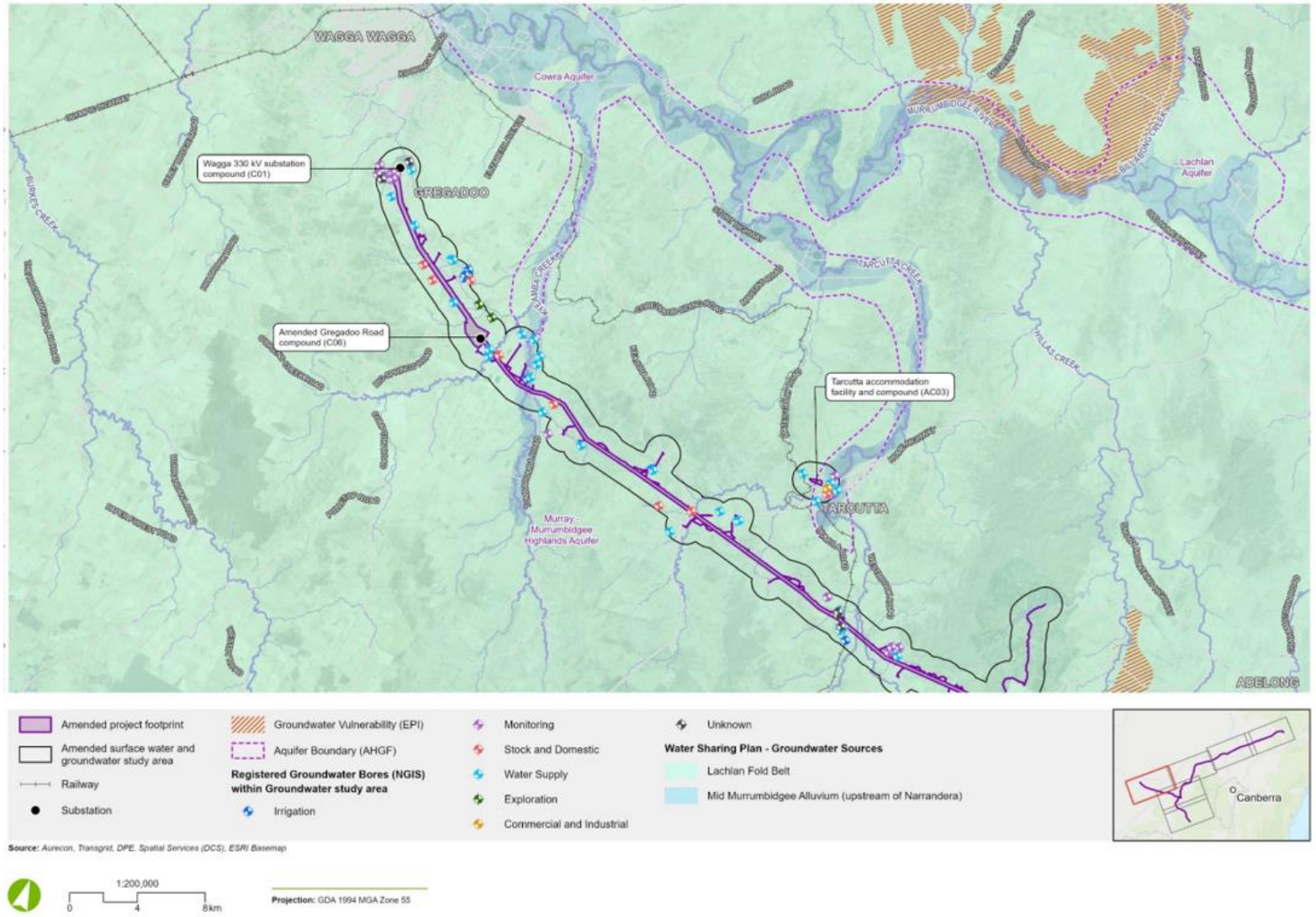

Figure 5-11: Water Sharing Pan - Groundwater Sources (Amendment Report)

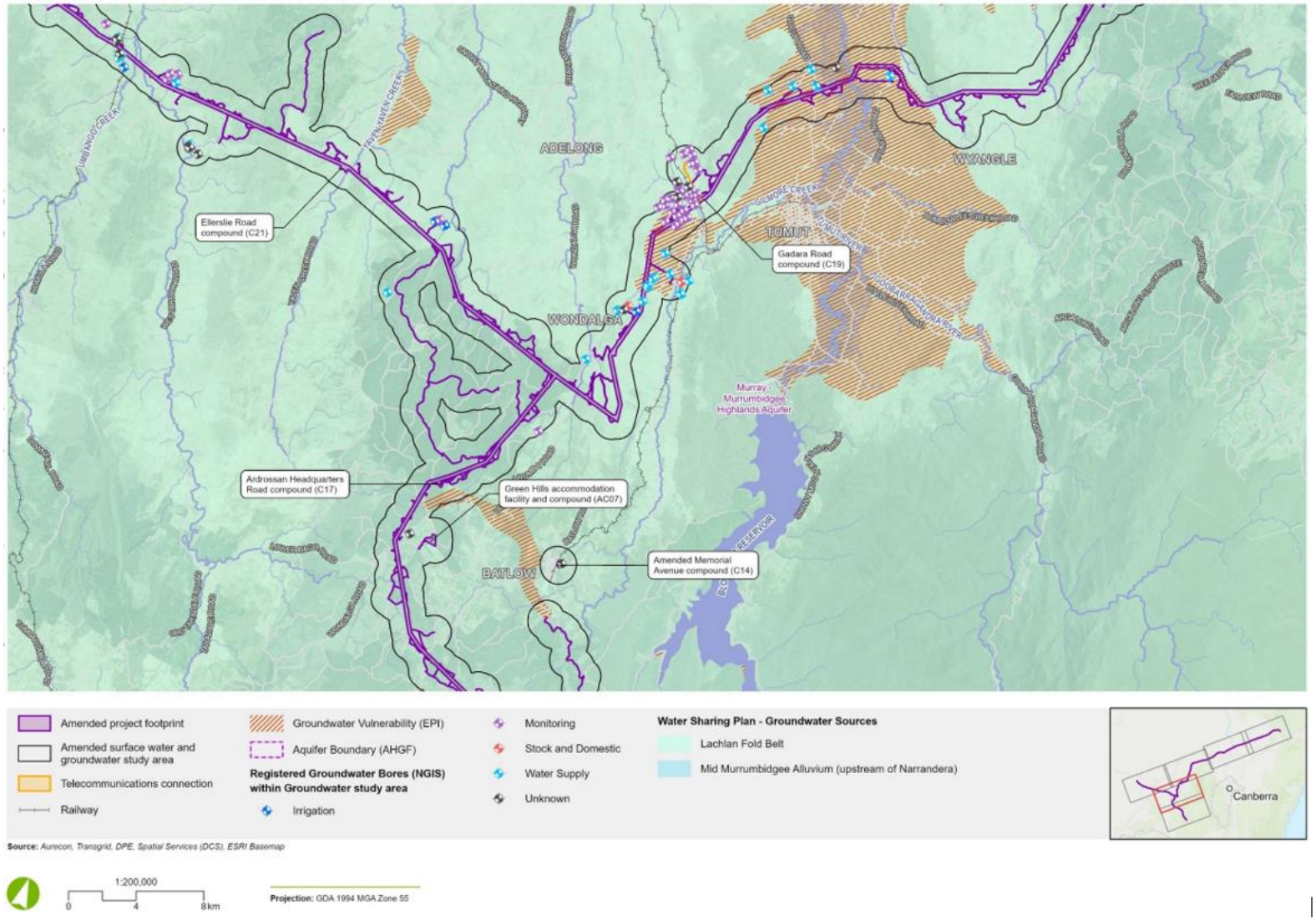

Figure 5-12: Water Sharing Plan - Groundwater Sources (Amendment Report)

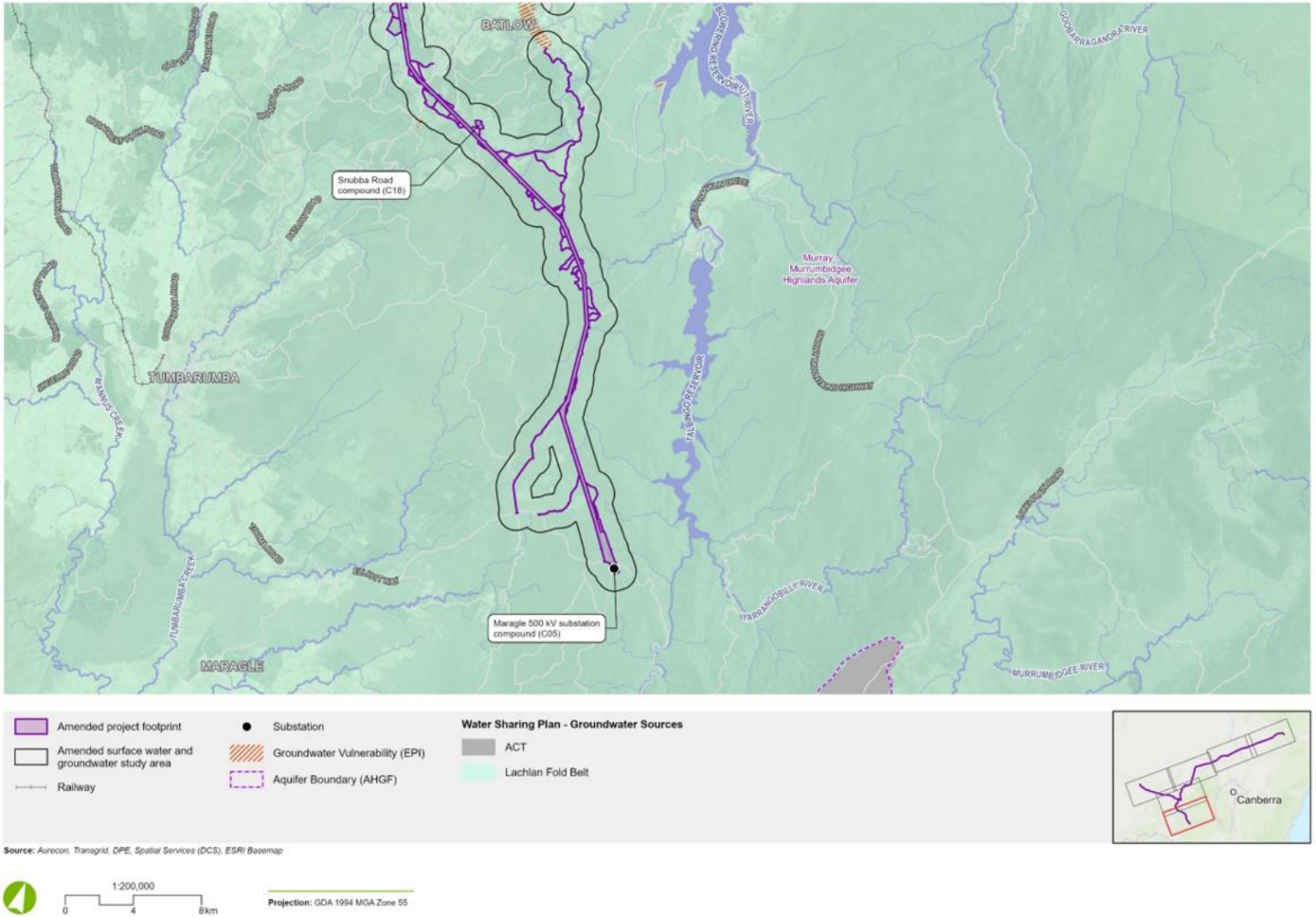

Figure 5-13: Water Sharing Plan – Groundwater Sources (Amendment Report)

5.3.8. Groundwater Contamination Risk

Based on the assessment of known and potentially contaminated sites, most sites within and/or adjacent to the HLW area are considered to represent a low contamination risk to groundwater and are not considered further.

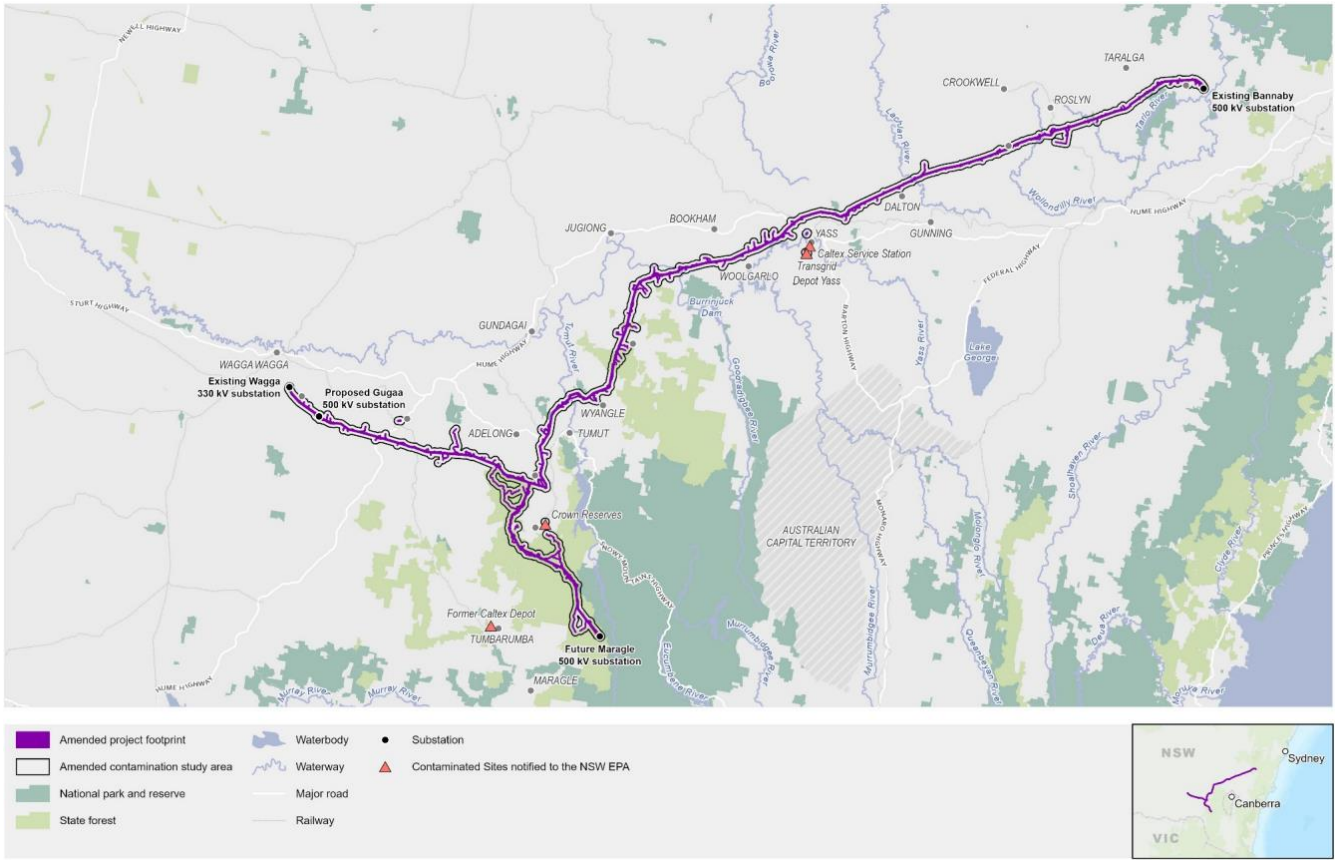

Figure 5-14 Contaminated Sites notified to the EPA

5.4. Rainfall

Rainfall levels in the HLW area vary substantially both year-to-year and month-to-month. Much of the variability in precipitation is due to large-scale climate variations, with El Niño Southern Oscillation being the most important. Monthly climate data records (BOM 2019-2023).

Table 5-9 Wagga Wagga climate records 2019-2023

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	41.7	39.7	46.8	40.4	50.6	50.6	53.1	50.5	48.6	56.5	49.4	46.2	573.0
Lowest	0.0	0.0	0.0	0.5	4.6	0.8	1.8	6.4	3.4	0.6	0.0	0.5	245.2
5th %ile	3.8	2.6	0.8	6.6	8.0	8.4	14.2	8.2	8.7	11.3	7.6	3.0	358.4
10th %ile	7.0	4.1	1.8	7.9	8.2	19.6	21.9	10.7	16.0	14.7	12.0	5.1	396.8
Median	31.9	25.8	33.8	29.5	40.4	45.8	50.3	49.7	45.8	47.2	43.5	38.0	566.1
90th %ile	92.2	85.0	114.7	86.7	100.0	88.9	93.1	88.8	82.1	112.4	96.6	91.0	772.0
95th %ile	102.7	108.2	142.0	98.3	141.0	97.4	100.2	92.2	105.6	145.8	117.9	120.0	824.7
Highest	174.4	187.2	249.2	216.9	190.3	138.8	130.0	101.4	171.0	181.7	158.4	213.4	1019.2

Table 5-10 Tumbarumba climate records

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	61.4	52.8	72.0	80.0	56.3	86.3	93.5	115.2	77.4	95.8	109.6	80.1	1122.1
Lowest	16.0	0.0	36.4	13.4	1.2	35.8	17.4	49.2	16.4	24.0	1.2	12.0	788.9
5th %ile	17.4	0.5	36.6	19.3	12.6	36.3	22.4	55.6	26.2	27.9	22.9	18.4	803.5
10th %ile	18.7	1.1	36.9	25.3	24.1	36.7	27.3	62.1	36.1	31.3	38.7	26.4	818.1
Median	48.5	46.9	64.2	58.4	56.0	89.4	79.1	90.0	73.6	62.2	99.4	74.2	1208.0
90th %ile	120.4	98.9	115.4	170.2	98.2	129.7	174.1	181.2	133.2	216.0	189.4	140.3	1385.5
95th %ile	147.5	112.7	120.6	172.1	100.0	135.8	182.9	194.1	134.4	237.1	216.8	161.0	1404.4
Highest	174.6	126.6	125.8	174.0	101.8	142.0	191.6	207.0	135.6	259.6	256.2	179.9	1423.4

Table 5-11 Tarcutta climate records

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	48.1	41.4	48.3	47.6	56.7	67.6	62.9	64.7	55.2	64.2	55.9	47.0	658.4
Lowest	0.0	0.0	0.0	0.0	0.0	3.6	6.5	3.5	2.5	0.8	0.0	0.0	226.8
5th %ile	3.1	0.0	2.0	3.0	7.4	15.3	18.3	14.9	14.6	8.8	8.2	3.4	416.1
10th %ile	5.5	2.1	5.8	7.0	11.4	25.3	20.9	20.0	18.6	17.0	11.0	6.8	466.2
Median	32.7	32.2	32.8	37.3	48.1	60.0	55.4	63.2	53.8	59.0	50.1	39.3	655.5
90th %ile	111.0	95.5	114.8	100.0	116.2	117.8	111.7	112.1	91.4	114.4	109.2	91.9	880.2
95th %ile	137.7	106.8	147.9	116.6	147.1	129.6	126.1	123.7	109.9	152.8	122.5	115.3	975.9
Highest	237.8	223.8	234.5	245.9	232.1	267.6	156.4	188.3	176.2	190.8	180.8	229.0	1061.5

Table 5-12 Yarrangobily Caves climate records

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	80.2	61.7	71.1	65.4	89.9	120.8	123.8	132.5	122.8	104.7	99.1	96.7	1162.1
Lowest	0.0	0.8	8.4	5.6	3.3	10.2	27.5	8.9	26.0	13.3	11.4	9.4	552.3
5th %ile	11.7	3.7	11.1	14.1	17.1	33.6	43.2	36.1	48.7	20.3	21.9	21.3	827.0
10th %ile	24.5	6.8	18.5	24.1	34.4	49.2	48.9	47.0	53.5	27.3	43.6	30.2	911.0
Median	66.5	52.7	62.2	58.8	79.3	114.6	118.7	121.6	117.5	105.4	89.7	86.3	1157.7
90th %ile	152.9	124.9	123.1	118.7	161.7	200.6	202.4	204.9	203.6	184.0	179.9	157.3	1515.2
95th %ile	182.4	142.8	158.4	143.9	176.2	228.9	241.1	235.4	212.8	200.0	219.6	183.4	1533.2
Highest	287.6	256.4	264.4	173.1	313.4	314.4	300.4	305.5	257.7	265.1	238.0	324.9	1902.4

5.5. Rainfall erosivity factor

The rainfall erosivity factor is a measure of the ability of rainfall to cause erosion (referred as “R” in the Revised Universal Soil Loss Equitation (RUSLE). The rainfall erosivity factor is used to determine the soil loss in tonnes per hectare over one year and is used in calculations when sizing construction sediment basins.

The HLW footprint from the Wagga 330 kV substation to the proposed Gugaa 500 kV substation and the proposed Gugaa 500 kV substation to Wondalga is generally situated within low erosion risk areas.

However, the transmission line from Wondalga to the future Maragle 500 kV substation traverses through moderate to high erosion risk areas, where appropriate site specific ESCPs will be implemented for sites in this area.

The HLW has a Rainfall Erosivity Factor range between 1067 at Wagga Wagga (Yand and Yu, 2015) and 1483 at Albury. Albury is the closest location with the detailed R-factor data detailed in the IECA Guidelines (IECA, 2008).

Table 5-13 below.

Table 5-13 Albury Monthly % and annual rainfall erosivity (R – factor) values

Albury Monthly % and annual rainfall erosivity (R – factor) values													
	Dec	Jan	Feb	Mar	Apr	Mar	Jun	July	Aug	Sep	Oct	Nov	Year
%	9.2	8.4	9.4	9.8	8.3	7.6	8.5	6.7	6.7	6.5	10.5	8.4	1483
R – Value	136	125	139	145	123	113	126	99.3	99.3	96.4	156	125	1483

6. Environmental aspects and impacts

6.1. Construction activities

Key aspects of HLW that could result in adverse impacts to soil and water include:

- Vegetation clearing and topsoil stripping.
- Earthwork, including:
  - Construction of tower footings and foundations.
  - Construction benches and brake and winch sites.
  - Access tracks.
  - Compounds and laydowns.
- Demolition.
- Site access.
- Material stockpiles.
- Road improvement works including paving activities.
- Generator use.
- Fuel and chemical storage.
- Concrete batching.
- Refuelling and chemical handling.
- Combustion emissions from use of plant and machinery.
- Piling and concreting.
- Establishment and use of construction support sites including potential impacts on flood behaviour and vehicle wash down.
- Rehabilitation of accommodation sites, ancillary facilities and earthwork material sites.
- Uncontrolled discharge from sediment basins

Blasting has not been identified as required as part of construction. Should blasting be required, a site specific blasting management plan will be produced by a suitably qualified professional to address potential impacts on soil, water, noise and the community.

Refer also to the Aspects and Impacts Register included in Appendix A9 of the CEMP.

6.2. Impacts arising from construction

The potential for impacts on soil and water will depend on a number of factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Potential impacts attributable to construction might include:

- Impacts to soils:
  - Erosion and sedimentation.
  - Soil salinity.
  - Acid sulfate soils.
- Changes in surface water quality from:
  - Spills and incidents.
  - Mobilisation of sediments and pollutants during surface works.
- Scour and changes to channel geomorphology.

- Mobilisation of contaminants.
- Changes in Groundwater.
  - Water supply.
  - Quality.
  - Recharge characteristics.
  - Levels.
- Flooding
  - Inundation of excavated areas.
  - Damage to facilities, infrastructure, equipment, stockpiles and downstream sensitive areas.
  - Increased risk of flooding of adjacent areas due to temporary loss of floodplain storage or impacts on the conveyance of floodwaters.

6.2.1. Potential Impacts to Soils

Erosion and Sedimentation

Potential impacts of erosion and sedimentation on soils will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment and include

- Erosion and sedimentation due to surface and/or ground disturbance.
- Soil disturbance and erosion of exposed soil by wind and rain.
- Sedimentation of waterbodies and impacts to water quality due to soil disturbance in close.
- Proximity to watercourses.
- Reduction of soil and/or water quality from spills or leaks.

6.2.2. Acid Sulfate Soils

While the risk of encountering acid sulfate soils (ASS) is low, ASS may be encountered during excavation. Potential impacts may include:

- Damage to aquatic environments due to the release of sulfuric acid generated from oxidised acid sulfate soils during construction.
- Mobilisation of aluminium, iron and manganese from soils as a result of increased acidity from disturbance of acid sulfate soils.

Further geotechnical testing of underlying sub soil and rock stratum will be carried out to inform detailed design and determine the composition of rock and soil types likely to be present within excavation areas.

6.2.3. Soil salinity

Construction of the HLW has the potential to contribute to salinity through:

- Removal of deep-rooted vegetation or other activities which could raise the groundwater table above normal seasonal levels.
- Soil compaction at areas of surface disturbance, such as at the construction support sites, which can restrict groundwater flow and result in a concentrate of salt in one area.

6.2.4. Potential Impacts to Groundwater

Potential risks during construction include:

- Changes to groundwater flow paths/recharge.
- Changes groundwater levels.
- Impacts to groundwater quality.
- Impacts on registered groundwater users and GDEs.
- Contamination migration from contaminated sites

Aquifer interference could potentially occur as a result of piling activities during construction. In accordance with the requirements of UMM SW5, alternative construction methodologies would be investigated as part of detailed design and will be implemented during construction, as required. Alternative construction methodologies that would be investigated include:

- Tower micrositing to avoid GDEs and aquifers
- Substitution of bored piles with driven piles in high risk areas
- Use of casing where it is determined that water ingress is high-risk

The risk to groundwater from the HLW is considered low, with footings expected to have minimal interaction with groundwater. Additionally, no water take from groundwater sources is anticipated to be required to meet the water use requirements for construction.

Potential contamination risks within the HLW are identified in Section 5.3.8 and Figure 5-14 of this SWMP.

6.2.5. Surface Water

6.2.5.1. Surface Water Quality

The EIS and AR have identified defined waterways within the HLW footprint, however as the HLW traverse a number of rural and agricultural properties it has been identified that there are a number of flow pathways that occur, either as a result of designed water capture or as a result of the development of the land. While protection and management of both waterways and flow paths will be managed to minimise the impact, alterations and changes to flow paths are not considered to be a change to a watercourse in line with the requirements under MCoA /UMM.

Potential impacts to surface water quality as a result of surface works include:

- Erosion and mobilisation of exposed soils and open cuts by stormwater runoff and wind leading to sedimentation of waterways.
- Potential spills of pollutants (chemicals, fuel) flowing to downstream watercourses.
- Transfer of spills and pollutants to adjacent roads.
- Mobilisation or activation of acid sulphate soils.

6.2.5.2. Geomorphology

Construction of the HLW has the potential to impact on geomorphology due to:

- Mobilised sediment which could build up in the streams if not appropriately managed,
- Impervious surfaces created by the HLW, leading to increases in the volume and rate of runoff, which could cause erosion within the instream channel.
- Subsidence below watercourses, potentially impacting on channel bed and bank conditions.
- Erosion around instream crossings.

If unmitigated, impacts to geomorphology as a result of increased mobilised sediment or increased surface runoff (volume or velocity) could occur where activities are near watercourses. Potential for watercourse geomorphology impacts will be mitigated through environmental management measures outlined in Section 17.6 of the EIS. These measures include:

- Scour protection for infrastructure within watercourses.
- Erosion and Sediment Control during construction for the activities and areas that are near watercourses and are considered higher risk.

6.2.6. Flooding

Construction activities have the potential to increase flooding conditions when compared to both present day and operational conditions. This is because construction activities typically impose a larger footprint on the floodplain due to the need to provide temporary structures outside the operational HLW footprint which will be removed following the completion of construction activities.

A flood assessment has been prepared by Turnbull Engineering as part of detailed design of the potential impacts construction activities could have on flood behaviour. The key findings detailed in the are summarised in Table 6-1 below.

Table 6-1: Summary of construction impacts on local flooding

Construction site	Potential flooding impacts
Wagga Wagga Substation construction compound (C01).	The establishment of this construction compound would not have an impact on local or regional flooding. This is because no regional flood risk, local drainage lines or overland flow paths have been identified at the construction compound in a 5% AEP event.
Gugaa Substation construction compound (C06).	The compound consists of an existing overland flood extent that can be impacted as result of construction activities. **Gugaa laydown site** The Gugaa laydown site has been designed to avoid the 5% AEP floodplain. Construction activities within the laydown footprint are not predicted to have an impact on flooding. **Gugaa substation site** Gugaa substation site sits within existing overland flood extent. Post-development modelling results show the diversion drains are sufficiently sized to divert flood water around the substation site for events up to the 0.5% AEP event. Upon completion of major earthworks, the substation site will be unaffected by flooding up to the 0.5% AEP event.
Tarcutta WAF and construction compound (AC03).	Flood modelling indicates minor overland flow path intersect the compound for the 2% AEP pre-development scenario. A post-development flood assessment of the Tarcutta Accommodation Facility and Construction Compound indicates that the HLW works will not materially alter the flood storage capacity, flows or characteristics in the development area or off-site. Refer to ACMP for management of potential flood impacts.
Ellerslie Road construction facility (C21).	Flood modelling indicates that the Ellerslie laydown site remains out of the 1% AEP floodplain. Construction activities within the compound footprint are not predicted to have an impact on flooding. As such, mitigation measures as per UMM HF4 will not be required.

Construction site	Potential flooding impacts
Kunama WAF and construction compound (AC07).	Located on high ground, the site does not have a considerable catchment upstream for flooding. Construction activities within the compound footprint are not predicted to have an impact on flooding.
Lower Bago Road construction compound (AC07a)	The establishment of this construction compound and proposed construction activities at this site would not have an impact on local flooding as the construction compound is located on high ground and near a ridge.
Snubba Road construction facility (C18).	The establishment of this construction compound and proposed construction activities at this site would not have an impact on flooding. This is because the construction compound is located on high ground near a ridge with drainage lines falling away from the construction compound, which means impacts on any local flooding are unlikely and there is no regional flood risk.
Memorial Avenue construction compound (C14).	The north-western part of this construction compound would intercept an existing drainage flow path, which has potential to cause localised flood impacts outside the construction compound boundary if this area is filled for establishment and/or use of this construction compound. At this stage, it is anticipated that only existing buildings and facilities will be used as part of the construction compound as required. Should the need for additional buildings or facilities be identified, further review and assessment of potential flood impacts will be undertaken as required.

There is also the potential for construction activities to impact local catchment runoff, which will be managed through appropriate local stormwater management controls to be implemented during the construction phase of the HLW.

Gugga Substation

The *Gugaa 500 kV Substation Flooding Investigation* (Lyall & Associates, 2022) was completed for the HumeLink Environmental Impact Statement (EIS). This investigation involved the development of hydrologic and hydraulic flood models to define the nature of flooding in the vicinity of the substation and to assess potential flooding impacts from the substation development. Subsequent to this, further flooding investigations to assess a revised substation design was carried out and documented in the *Gugaa 500 kV Substation Addendum Flooding Report* (Lyall & Associates, 2023).

The Gugga substation has been designed to divert flood water around the substation site for events up to the 0.5% AEP events. The proposed substation results in a minor change to the existing flood behaviour with some peak flood level increases occurring outside the substation boundary adjacent the north-eastern corner of the substation but within the land parcel owned by TransGrid. These increases are on rural lands, owned by Transgrid, and a portion of Livingstone Gully Road (a 10 to 15 minute increase in duration of flooding above 0.1 metres in depth). The impact on Trasngrid property is typically limited to 20-50 millimetres and poses no significant increase to the existing flood hazard or risk to life.

6.3. Cumulative impacts

Liaison and coordination measures will be put in place with the proponents of other major construction projects within 500 metres of the HumeLink, to minimise and manage potential cumulative construction impacts.

7. Environmental control measures

7.1. Management and mitigation measures

Specific measures and requirements to meet the objectives of this SWMP and to address impacts on soil and water are outlined in Table 7-1.

Table 7-1 Soil and water management and mitigation measures

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
General						
MMSW01	Training will be provided to relevant HLW personnel, including relevant subcontractors on soil, contamination, surface water and groundwater requirements through inductions, toolboxes or targeted training.	Staff Induction and training packages	Prior to construction Construction	Environmental Manager Construction Manager People manager	Best practice	Induction records Toolbox talk record
MMSW02	All employees, contractors and subcontractors will receive a HLW induction prior to commencing work on site. The environmental component, covered in either the induction or toolboxes, will include (as a minimum): • Existence and requirements of this SWMP • Relevant legislation and guidelines • Erosion and sediment control measures • Emergency spill procedures including location and use of spill kits	Staff induction pack SWMP Environmental Work Method Statements (EWMS)	Prior to construction Construction	Environmental Manager Construction Manager	Best practice	Induction records Toolbox talk record

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	• Flood risk at construction sites and construction support sites • Flood emergency management measures • Location and type of known potential contaminants and management of them • Management of discovery of previously unidentified contaminated material • Construction waste management • Complaints reporting and recording • How to implement soil and water management measures • Specific responsibilities to minimise impacts on soil and water quality by the works					
MMSW03	Weather conditions and forecasts (including rainfall prediction maps) will be monitored daily, and relevant information provided to the site Superintendent/ Foremen to allow for adequate planning for significant rain events.	BOM and weather stations	Construction	Environmental adviser	Best Practice	Record of advice

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
Drainage Controls						
MMSW04	Hydraulic structures and controls will be installed early in the HLW (before clearing and stripping) to promote successful erosion and sediment control during construction.	ESCP	Construction	Environmental Manager	MCoA B19 UMM SW1	Site records including photos
MMSW05	Separation of 'clean' (offsite) run-on water from 'dirty' (onsite) (e.g., turbid) construction area runoff will be maximised by diverting off site run-on water around the works site as much as possible. Permanent cut-off drains will be used to achieve this where possible.	ESCP	Construction	Environmental Manager	MCoA B19 UMM SW1	Site records including photos
MMSW06	Diversion of turbid construction runoff into sediment traps will be maximised.	ESCP	Construction	Environmental Manager	MCoA B19 UMM SW1	Site records including photos
MMSW07	Runoff will be controlled during the construction of embankments (e.g., fill shaping and the construction of temporary dykes and batter drains).	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1 UMM SW2	Site records including photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW08	Formation runoff will be diverted into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos
MMSW09	Slope lengths will be maintained at appropriate lengths to slow flows down and minimise erosion. Catch drains will be used to collect and divert runoff from the slopes.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos
MMSW10	Geotextile linings will be used to provide temporary surface protection in areas where appropriate (e.g., batter drains, culvert construction).	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UM SW1	Site records including photos
MMSW11	Check dams will be placed within diversion drains where required to slow flows down and minimise erosion within the drains.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UM SW1	Site records including photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
Erosion and sediment control						
MMSW12	A Progressive Erosion and Sediment Control Plan will be developed for the HLW.	Primary ESCP	Construction	CPESC	MCoA B19 UMM SW1	Site records including photos
MMSW13	Erosion and sediment control measures will be implemented at all work sites. These measures will be installed: • Prior to soil disturbance occurring • Prior to the commencement of any clearing, stripping or earthworks • To minimise sediment moving off-site • To minimise sediment laden water entering any watercourse, drainage lines, or drain inlets • To reduce water velocity and capture sediment on site • To minimise the amount of material transported from site to surrounding pavement surfaces. • To divert off site water around the site.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW14	Erosion and sedimentation controls will be checked and maintained on a regular basis (including clearing of sediment from behind barriers).	ESCP	Construction	Construction Manager Environmental Adviser	MCoA B19 UMM SW1	Site records including photos
MMSW15	Sediment fencing or suitable alternative sediment controls will be provided downslope of any disturbed areas.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos
MMSW16	Sediment controls will be installed around stormwater inlet pits where appropriate and where they will not cause or exacerbate flooding. Traffic management and safety requirements will be considered if installing such devices on live traffic roads.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos
MMSW17	Records of erosion and sediment control activities will be kept and provided on request.	ESCP	Construction	Environmental Manager Construction Manager Site Foreman	MCoA B19 UMM SW1	Site records including photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW18	Sediment controls will be removed only after adequate stabilisation of disturbed surfaces is achieved.	ESCP	Construction	Environmental Manager Construction Manager	MCoA B19 UMM SW1	Site records including photos Works order
Site de-watering and water re-use						
MMSW19	A Construction Site Dewatering Plan will be developed for the HLW.	Site Dewatering Plan	Prior to construction	Environmental Manager Project Engineer Site Supervisor	MCoA B20	Construction Site Dewatering Plan
MMSW20	Wherever possible, water detained onsite will be re-used for dust control and other non-potable uses. This includes water accumulating within excavations, traps, trenches or at low points on site.	ESCP AQMP	Construction	Environmental Manager Site Supervisor	MCoA B19 MCoA B20	Site records including photos
MMSW21	Water accumulating within any excavation, trap or low point on site that cannot be re-used in construction or dust suppression will be tested and, if necessary, treated prior to release or disposed of to a licenced facility.	WQMP	Construction	Environmental Manager Site Supervisor	MCoA B19 MCoA B20	Site records including photos Transport and disposal records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW22	When necessary, sediment will be settled out of surface water to be discharged using a flocculent such as Gypsum within 24 hours of the conclusion of the last rainfall event.	ESCP	Construction	Environmental Manager Site Supervisor	MCoA B19 UMM SW1	Site records including photos
MMSW23	Necessary approvals and permits/ licences will be obtained prior to any dewatering related to the HLW and records will be maintained throughout the HLW.	ESCP Dewatering Plan	Prior to construction Construction	Environmental Manager Construction Manager Site Supervisor	MCoA B19 MCoA B20	Dewatering approvals Dewatering records
MMSW24	There will be no release of sediment-laden water into drainage lines and/or waterways.	ESCP	Construction	Environmental Manager Site Supervisor	MCoA B19 MCoA B20	Site records including photos
MMSW25	A containment material will to be used to capture/filter water used in wash down.	ESCP (washdown plan)	Construction	Environmental Manager Site Supervisor	MCoA B19	Site records including photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
Stockpile management						
MMSW26	A Stockpile Management Procedure will be developed for the HLW.	ESCP Stockpile Management Procedure(SPMP)	Prior to construction	Environmental Manager Construction Manager	UMM W2	Stockpile Management Plan
MMSW27	Maintenance of stockpile sites during construction will be in accordance with TfNSW Technical Guideline *Stockpile Site Management Guideline (EMS-TG-10).*	ESCP SPMP	Construction	Environmental Manager Construction Manager	UMM W2	Stockpile Management Plan
Stabilisation of disturbed areas						
MMSW28	Stabilisation of waterways, including their beds and banks, will be commenced immediately after the completion of any works within these areas.	SWMP	Prior to construction	Environmental Manager Construction Manager	MCoA B22	Site records including photos
Surface water quality management						
MMSW29	Prior to forecast heavy rainfall events, the Environmental Manager (EM) or delegate will inspect the site and note any areas requiring additional management measures	SWMP	Construction	Environmental Manager Site Supervisor	Best Practice	Site records including photos
MMSW30	Prior to forecast heavy rainfall events, end-of-day controls will be implemented	SWMP ESCP	Construction	Environmental Manager	Best Practice	Site records including

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	throughout the worksite to help reduce erosion and control sediment. These will include one or more of the following: • Check dams • Slope breaks • Batter chutes • Fill windrows • Temporary ground covers.			Site Supervisor		photos
MMSW31	When testing, treating and discharging construction water, the identified water quality criteria will be met. The applicable water quality criteria will be determined in accordance with relevant legislation and guidelines and authorities.	SWMP	Construction	Environmental Manager Site Supervisor	MCoA B20 UMM SW3	Site records including photos
MMSW32	If water is to be re-used for dust suppression this water does not need to be tested or treated providing water does not leave the site (either directly or indirectly via runoff).	SWMP	Construction	Environmental Manager Site Supervisor	Best Practice MCoA B20	Site records including photos
MMSW33	The results of any monitoring will be recorded and maintained: • In a legible form, or in a form that can readily be reduced to a legible form	SWMP Audit Plan	Construction Post Construction	Environmental Manager Construction Manager	UMM SW3	Water quality monitoring results

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	• For at least 4 years after the monitoring or recording event to which they relate took place, and • So that they can be produced in a legible form to any authorised officer of the EPA who asks to see them.					
MMSW34	Vehicles and machinery will be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks.	Plant and Machinery Management Plan	Construction	Construction manager	UMM AQ2	Maintenance records
MMSW35	A Tannin Management procedure for management of tannins from vegetation mulch will be developed for the HLW	Stockpile and Mulch Management Plan	Prior to construction	Environmental Manager Construction Manager	Best Practice	Management of Tannins from Vegetation Mulch Procedure
MMSW36	Residual risk to sensitive receiving environments and environmental values, will be kept low as reasonably practicable through the implementation, maintenance, and monitoring of the proposed management measures.	SWMP BMP	Construction	Environmental Manager Construction Manager	MCoA B20	Site records, photos, audit and inspection records
Construction Wastewater						
MMSW37	Construction runoff treatment trains will	SWMP	Prior to	Environmental	UMM SW2	Design

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	be designed to maintain or improve the water quality of the receiving ambient environment.		construction Construction	Manager Construction Manager		certificate Site records
MMSW38	Wastewater treatment plants will treat water to comply with the wastewater quality objectives derived primarily from: • *Australian and New Zealand Guidelines for Fresh and Marine Water Quality guidelines for irrigation water* (ANZECC & ARMCANZ, 2000) • *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)* (Natural Resource Management Ministerial Council, 2006)	ACMP	Construction	Environmental Manager Construction Manager	MCoA B59	WWTP Monitoring Data Site Records
MMSW39	Treated effluent from the wastewater treatment plants to be reused onsite will comply with the criteria detailed in Section 7.5 of the ACMP. No offsite discharge of treated effluent will be permitted.	ACMP	Construction	Environmental Manager Site Supervisor	MCoA B59	WWTP Monitoring Data Site Records
MMSW40	Treated effluent from the wastewater treatment plants that fails to meet the criteria detailed in Section 7.5 of the ACMP will be assessed, classified, managed, and disposed of in accordance	ACMP	Construction	Site Supervisor	MCoA B56 UMM W3	Waste Records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	with the *Waste Classification Guidelines (NSW EPA 2014b).* Waste will be appropriately transported, stored and handled according to their waste classification and in a manner that prevents pollution of the surrounding environment					
Groundwater Management						
MMSW41	Should further design development identify the need for groundwater dewatering, the following will be conducted in accordance with the requirements of UMM SW5: • Dewatering assessment (including dewatering volume estimates). • SWMP updates to include dewatering procedures in line with the minimal impact criteria listed within the NSW Aquifer Interference Policy, relevant water sharing plans (WSPs) and licencing requirements where relevant. • Water Supply Works Approval (where needed).	SWMP	Prior to construction Construction	Environmental Manager Construction Manager	MCoA B24 UMM SW5	Dewatering Assessment SWMP

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	• Water Access Licence (WAL) (if dewatering volumes exceed 3ML/year).					
Management of Contamination and Acid Sulfate Soils						
MMSW42	An unexpected finds protocol for contaminated land, including acid sulphate soils and Natural occurring asbestos will be developed for the HLW	Unexpected Finds Protocol – Contaminated Land	Prior to construction	Environmental Manager Construction Manager	MCoA B24 UMM SC1 UMM SC3	Unexpected Finds Protocol – Contaminated Land
Flooding						
MMSW43	Specific response measures in the event of flood will be developed as part of the HLW Emergency Response Plan and will be implemented during construction.	HLW Emergency Response Plan	Prior to construction Construction	Safety Manager Environmental Manager Construction Manager	MCoA B23 UMM HF2 UMM HF3	HLW Emergency Response Plan
MMSW44	Measures to manage the diversion of floodwater either through or around the construction areas will be planned, implemented and maintained.	Design Drawings ESCP	Prior to construction Construction	Safety Manager Environmental Manager Design Manager Construction Manager	MCoA B23 UMM HF2 UMM HF3	Design Drawings ESCP Inspection Records

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW45	Spoil management and stockpile areas will be located outside the 10% AEP flood extent	ESCP	Construction	Environmental Manager Site Supervisor	UMM HF3	Site records including photos
MMSW46	The existing Council drainage systems will remain operational and be protected throughout construction	N/A	Construction	N/A	N/A	N/A
Concreting and Saw Cutting						
MMSW47	Concrete mixers, pumps, concrete tools and other equipment will be washed at specially designated washout areas that are constructed in a manner that will prevent stormwater surface run-off from being contaminated.	SWMP ACFMP	Construction	Safety Manager Environmental Manager Construction Manager	UMM SW1	Site records including photos Permit to work
MMSW48	Designated equipment washdown and cleaning areas will be allocated for major asphalt works with appropriate environmental controls in place to prevent washout water from reaching the receiving environment.	ESCP	Construction	Environmental Manager Construction Manager	MCoA B19	Site records including photos
MMSW49	Washout areas will be located within areas that are not subject to natural surface storm water run-off and away from drainage lines. Signs will be posted to advise workers of their locations.	SWMP ACMP	Construction	Safety Manager Environmental Manager Construction Manager	MCoA B19	Site records including photos Permit to work

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW50	Washout areas will be constructed with an impermeable material capable of retaining contaminated water and concrete residue.	SWMP ACMP	Construction	Safety Manager Environmental Manager Construction Manager	MCoA B19	Site records including photos Permit to work
MMSW51	Washout areas will be monitored to ensure that they are draining correctly and washing activity is not contaminating the surrounding area.	SWMP ACMP	Construction	Safety Manager Environmental Manager Construction Manager	UMM SW1	Site records including photos Permit to work
MMSW52	As part of the HLW induction program, all personnel performing concreting or saw cutting activities will be advised of the concrete washout areas and their obligations to: • Clean their plant, tools and equipment within the designated area • Maintain the area in a clean condition • Ensure that contaminated water associated with their activities is appropriately controlled and prevented from reaching natural	SWMP ACMP Induction training	Construction	Safety Manager Environmental Manager Construction Manager	Best practice	Site records including photos Permit to work

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	stormwater surface drainage areas.					
Spill Response and Management						
MMSW53	A Spill Response and Management Procedure will be developed for the HLW.	Spill Response Procedure Spills Kits	Prior to Construction	Environmental manager Construction manager	MCoA B21 UMM SC4	Annexure H
MMSW54	Any spills of fuel or bitumen materials will be promptly contained and collected using spill kits.	Spill Response Procedure Spills Kits	Construction	Environmental manager Construction manager	MCoA B21	Annexure H
MMSW55	Spill kits and fire extinguishers will be maintained at all times on site and in site vehicles.	Spill Response Procedure Spills Kits	Construction	Environmental manager Construction manager	MCoA B21 UMM SC4	Annexure H
MMSW56	All spills will be promptly reported to the Environmental Manager.	Spill Response Procedure Spills Kits	Construction	Environmental manager Construction manager	UMM SC4	Annexure H

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
Storage and Handling of Fuels and Chemicals						
MMSW57	A Safety Data Sheet (SDS) and Hazardous Products Register and copies of all SDS documents will be maintained in the site office within a special SDS folder.	Chemical storage and handling procedure	Construction	Environmental manager	MCoA B49 UMM SC4 UMM HR9	SDS and Hazardous Products Register
MMSW58	Liquid and dry chemicals (including oils and fuels) will be clearly labelled, used and handled in accordance with the instructions provided in the relevant SDS documents.	Chemical storage and handling procedure	Construction	Construction manager	MCoA B49	Site records Photos
MMSW59	All chemicals, fuels or other hazardous substances will be stored in accordance with the supplier's instructions and relevant legislation, Australian Standards and applicable guidelines. The capacity of any bunded area will be at least 130 per cent of the largest chemical volume contained within the bunded area. The location of the bunded enclosure/s will be shown on ECMs.	Chemical storage and handling procedure	Construction	Environmental manager	MCoA B49	Site records Photos

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
MMSW60	Where practicable, storage areas will not be located within 50 metres of natural surface drainage areas, storm drainage systems, poorly drained or flood prone areas or any area with a slope steeper than 10%.	Chemical storage and handling procedure	Construction	Environmental manager	Best Practice	Site records Photos
MMSW61	Where practicable, designated plant refuelling areas, plant service/maintenance areas and concrete/plant wash down areas will be located at least 5 metres from native vegetation and at least 50 metres from: • a natural surface drainage area, and • a built drainage structure such as a storm water pipe or box culvert.	Chemical storage and handling procedure	Construction	Environmental manager	Best Practice	Site records Photos
MMSW62	During site induction, all personnel will be advised of the following: • The location of bunded storage areas, liquid absorbent materials and other spill containment materials and kits. • Storage of large quantities of fuel for construction plant is not permitted. Licensed fuel trucks carrying emergency fuel spill kits	Chemical storage and handling procedure	Construction	Environmental manager	MCoA B49 UMM SC4 UMM HR	Site records Photos Section 7.2.2

ID	Measure/Requirement	Resources needed	When to implement	Responsibility	Reference	Evidence
	must be used to service plant and equipment. • All drums and decanted containers must be labelled and stored within bunded areas whenever they are not in use. Whenever practical, all unattended drums/containers must be returned to the bunded storage area. All personnel will be trained in the Spill Response and Management Procedure and the protocol to be implemented in the event of a spill or leak.					

7.2. Erosion and Sediment Control Plans

Erosion and Sediment Control Plans (Primary and Progressive) (ESCPs) will be prepared for the HLW in accordance with the 'Blue Book' (Landcom, 2004) and the White Book (IECA, 2012), as well as relevant best practice guidelines, where applicable. These plans will include site-specific erosion and sedimentation controls, staging advice and stabilisation measures as well as technical notes to guide the installation, function and maintenance of ESC devices.

An HLW Erosion and Sediment Control Plan Strategy (ESCP Strategy) (Annexure A) will be prepared for HLW by a Certified Professional in Erosion and Sediment Control (CPESC). The ESCP Strategy will outline the principals of soil and water management to be implemented across the HLW, identifying and describing high, medium and low risk sites and how the HLW will manage staging of works, drainage, erosion, sedimentation, stockpiling, water crossings, dewatering, dust control, inspections and site rehabilitation.

Each construction site will have a Primary ESCP setting out the overarching risks and how the site management requirements will be implemented and provide guidance to the development of the progressive ESCPS. Primary ESCPS will identify environmental aspects, or their likelihood, such as NOA, salinity, ecological and heritage features, no go and exclusion areas and other relevant information to prevent unexpected impacts.

Progressive ESCPS will contain the detailed plans of locations, technical specifications for the installation and maintenance of controls, including sediment basins. Copies of ESCPs will be kept on site for reference during construction and will be regularly inspected for effectiveness and to identify maintenance needs.

Both Primary and Progressive ESCPs will be prepared jointly by both the Project Certified Professional in Erosion and Sediment Control CPESC and the environmental team and will include input from field personnel to formulate practical documents for field implementation. The CPESC will have oversight on all ESCP aspects during construction. ESCPs will be revised when work stages and methods change, when greater impacts than anticipated are realised or when control structures or work methods are found to be ineffective or are no longer required. All changes will be recorded and provided to the CPESC for approval.

7.3. Site controls

HLW will implement the site control measures to manage its activities so as not to cause any water pollution (as defined in S120 of the POEO Act 1997). Activities and locations that pose a risk of causing water pollution will be managed through the implementation of the environmental control measures in Section 7.1, above, further details on how these will be managed are contained in Table 7-1 and Annexures A, C, E, F, H and I.

All sites, including substations, accommodation camps. laydowns and ancillary facilities will have Environmental Control Maps (ECMs) which set out how environmental controls will be constructed and maintained to ensure water, waste and chemicals are appropriately managed through the delivery of the HLW Project.

7.3.1. Drainage and flow control

Drainage control is the management of both 'clean' stormwater runoff around and through a site; and 'dirty' site stormwater runoff treatment of sediment prior to release offsite. Clean and Dirty water are defined as:

- **Clean Water** -Water that either enters site from an external source and has not been further contaminated by sediment within site; or water that has originated from the site and is of such quality that it does not need to be treated in order to achieve the required water quality

standard (IECA, 2008).

- **Dirty Water** - Site derived water not defined as clean, thereby requiring treatment with appropriate controls prior to release from site (IECA, 2008).

Drainage control measures (temporary and permanent) will enable management of stormwater within work areas, including to:

- Enable diversion of 'clean' up-slope, run-on water either around or through the site at non-scouring velocities.
- Enable collection of 'dirty' runoff generated within construction areas and the delivery of this water to an appropriate sediment control measure as specified in the ESCP.
- Minimise the risk of soil erosion caused by site-generated flows within the HLW, through the use of 'intermediate' flow treatment and release points.
- Control of the flow velocity, volume and location of water passing through the HLW at drainage line and waterway crossings.

Specific measures, their installation and maintenance will be detailed in the progressive ESCP of each site.

7.3.2. Erosion control

Erosion control is the primary approach for the prevention of adverse impacts associated with sedimentation. Construction activities are to be undertaken to reduce the duration of soil exposure to erosive forces (wind and water), either by holding the soil in place or by shielding it from erosive elements.

Erosion control measures to be adopted include construction practices, structural controls and vegetative measures aimed at managing runoff at a non-erosive velocity, and the protection of disturbed soil surfaces.

The specific measures implemented will be based on seasonal erosion risk and construction activities, including proximity to watercourse and waterfront land. Measures will be documented in the HLW ESCP.

Proposed controls include:

- Progressive management of the works to reduce overall exposed area as far as practical (see Annexure A).
- Promptly stabilising exposed areas once construction stage has been completed (permanent works).
- Protection of soil surface (temporary and permanent) including placement of hardstand surfaces, use of soil binder, vegetation establishment (including landscaping), and protection with mats & blankets (e.g., jute, geotextile).
- For high-risk areas during construction, prior to forecast rainfall of > 50 % chance of 10 mm or more in 24 hours, all exposed batters (excluding rock faces) are to be temporarily ground-covered using fabric, polymer or similar.
- Dust suppression by wetting of exposed surfaces, application of soil binder, and/or application of soil cover.

It is noted that any use of soil binders on site will be in a manner that does not cause any water pollution, as defined under s120 of the POEO Act.

Temporary erosion controls will be maintained (and not removed) until rehabilitation measures are providing effective stabilisation of disturbed lands/areas.

Access tracks will be used as necessary for the construction work and as far as is practicable, vehicle

traffic shall be confined to these tracks.

Track construction will be carried out to cause minimum disturbance to soil and vegetation both on and adjacent to the track. Tracks will be routed to follow the natural contour of the land as far as practicable to minimise the amount of cut and fill and soil disturbance.

For any temporary access tracks, the disturbed surfaces and formed areas will be revegetated in accordance with the approved CEMP or *Managing Urban Stormwater: Soils and Construction - Volume 2C Unsealed Roads* (DECC, 2008a). In addition, other erosion control mechanisms will be put in place during the initial track construction work to contain any sediment that may erode from the disturbed surfaces.

7.3.3. Sediment control

Sediment control measures will be installed in combination with drainage and erosion control measures to provide effective pollution management. The HLW will adopt a 'treatment train' approach, where various control measures are utilised in sequence.

Sediment control measures include systems, procedures and materials to filter, trap and/or settle sediment from sediment-laden waters. In addition to adopting measures as per the Blue Book and IECA (2008) standard drawings and where applicable the *Guidelines for Controlled Activities on Waterfront Land* (2012). Where it can be demonstrated that a variation to the standard drawings would be more effective in meeting or exceeding the outcomes of the guidelines these will be implemented. The use of site-won materials will be prioritised in the establishment of sediment controls, including the use of topsoil and mulch windrows, mulch as groundcover and rock checks in drainage lines. Types of sediment controls used on site and their placements will be site specific, based on the characteristics of the site area and receiving environment, measures will be detailed within the HLW ESCPs.

7.3.4. Staging

Progressive management of works will be undertaken to minimise the amount of ground disturbance occurring at any one-time during construction. This progressive works management will be detailed within the Progressive ESCP.

7.3.5. Works on waterfront land and water crossings

All activities on waterfront land will be constructed in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPE 2022), *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003) and the *Policy and Guidelines for Fish Habitat and Conservation and Management* (NSW Fisheries, 2013), unless Water Group and DPIRD Fisheries agrees otherwise.

Temporary waterway crossings across mapped waterways and drainage lines (Figure 5-8, Figure 5-9, Figure 5-10) will maintain flow in the waterway and will be designed, constructed and maintained in accordance with the requirements of the *'Blue Book'* UMMs and MCoAs. To minimise impacts on waterways, the temporary waterway crossing must comply with MCoAs B22, consider the HLW ESCP Strategy (Annexure A) and mitigation measures, as well as the following measures:

- Where practical existing crossings will be used to minimise further in bed disturbance.
- Fish passage will be maintained in accordance with the DPI Fisheries guideline: "*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*".
- Temporary waterway crossings will be designed and constructed in accordance with the *Guidelines for Controlled Activity - In-stream works* (DPE, 2022) and *Guidelines for Controlled Activity - Watercourse crossings* (DPE, 2022)
- Temporary waterway crossings will be constructed with material that will not result in fine sediment material entering the waterway. Rock used must be hard, sound, durable rock, free of

fine particles and not contaminated with foreign materials.

- Erosion and sediment controls at entry/exit points and banks of the crossing will be installed to minimise mud tracking on the crossing and bank erosion.
- Consideration of appropriate scour protection for any infrastructure that is within a waterway.
- Temporary structures over aquatic vegetation will allow for light penetration by considering structure loads and temporary works designs, with an aim to leave gaps between solid planks or where loads allow utilise mesh, grid or grates.
- Where specific requirements area set out for crossing design in the MCoAs and BMP these will be implemented and maintained on site.
- Vegetation clearing adjacent to crossing sites will be kept to the minimum practical extent required to minimise the impact to vegetation within the waterfront zone.
- Where water crossings impact a waterway classed as high sensitivity (Key Fish Habitat) baseline monitoring up and downstream of the crossing point will be established to monitor for total dissolved solids, total suspended solids, total nitrogen, and total phosphorus will be undertaken.

In addition to standard erosion and sediment control measures, the following procedures and considerations will be incorporated into construction methodologies for waterway crossings, where appropriate and practicable:

- Any existing crossings will be re-used or upgraded in preference to establishing new crossings.
- Minimise disturbance to native vegetation, including instream, fringing and riparian vegetation within the indicative disturbance area. This may include the demarcation of areas of native vegetation to be retained during work.
- Waterway crossings will be constructed perpendicular to the flow of the water and be positioned away from channel bends (where erosive forces are typically greatest). Preferably crossings will be located in straight stream sections with well-defined channel geometries and shallow stream gradients, in stable dry reaches.
- Micro-siting will avoid direct and indirect (erosion or sedimentation) impacts to riverine features such as riffles and rapids and sensitive habitat features (ie snags, coarse woody debris, instream macrophytes, boulders).
- Any coarse woody debris or boulders located within instream work sites will be temporarily relocated during construction and then returned to the watercourse, at locations where scour risk can be avoided.
- Waterway crossing work will be constructed during no or low flow conditions and under calm weather conditions. Work will also be timed to occur outside of any locally high seasonal flow periods.
- Silt curtains or coffer dams will be deployed around instream work sites where required, to protect against any impacts to water quality or indirect impacts to retained vegetation. These measures will be situated so to avoid blocking fish passage wherever practical and removed as soon as they are no longer required.
- Flow diversion measures will be installed on bunded waterway crossings as appropriate or where construction during no or low flow conditions is not feasible. Flow diversion measures may include pumps to ensure that water can be moved from one side of blockages to the other, with screened inlets to prevent the entrapment of aquatic fauna and outlet structures that are designed to avoid scouring of the channel. Where waterways are bunded or flow obstructed, all obstructions to flow will be removed as soon as practical after watercourse crossing construction has been completed.

- Appropriate erosion and sediment controls that take into account the potentially flood prone nature of the land will be employed to protect against any impacts to water quality or indirect impacts to retained vegetation.
- Waterway bed and bank material excavated during construction will be stockpiled outside of the active channel and avoid riparian vegetation. Any material excavated from the bed of waterways will be stockpiled separately from other materials and returned to the waterway bed following the completion of construction work.
- If the stockpiling of sediment or soil is required, it will be located as far away from waterways as practicable and managed so that it is secure against flooding and runoff to prevent any sediment entering waterways. Adequate erosion and sediment control measures will be in place to protect stockpiled sediment against runoff during rainfall or flooding.
- Only excavated natural materials (ENM) or virgin excavated natural materials (VENM) will be used as fill during reclamation work, i.e. no contaminated material, building or demolition rubble will be used as fill in any stream crossings.
- Chemicals will be stored in adequate bunding (in accordance with Australia Standard 1940 – The storage and handling of flammable and combustible liquids) as far away from streams as practicable and appropriately protected against flooding or runoff. Spill kits will be made available, and the Spill Response Procedure (Annexure H) will be implemented as required during construction.
- Plant refuelling will occur as far away from streams as possible and appropriate spill prevention measures (such as diversion bunds/cut off drains upslope and drip trays and spill kits) will be implemented when refuelling.

Crossing structures will be designed so that the existing nominal flow velocity, low flow conditions and fish passage are maintained wherever possible. The design for any waterway crossings will include the following considerations:

- Minimise the impact of essential instream structures by mimicking natural flows (DPI, 2005b).
- Following Fairfull (2013), for waterway crossings incorporating culverts, a minimum of 300 mm of water should pool through the structure, with a centrally placed low-flow cell being preferable.
- In line with Cotterell (1998), it is recommended that flow over or through instream crossing structures are designed such that they maintain water velocity of 0.3 m/s or less, which is likely to facilitate passage for native species of fish (velocities exceeding 1 m/s, are likely to prevent upstream migration of native fish).

The design for temporary crossings will be modelled for its impact on overland and riverine flooding. Strategies for removal or maximising flood flows will be implemented based on the outcomes of the modelling. A Work Method Statement considering these requirements will be prepared prior to undertaking such activities. The WMS will be provided to TransGrid for endorsement.

7.3.6. Surface water dewatering

HLWJV's approach to dewatering will generally follow the below hierarchy:

- Investigate opportunities for reuse. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation, and plant/vehicle wash-down
- Investigate opportunities of discharging water to land to allow the water to infiltrate into the ground, thus avoiding direct discharge to, or pollution of, waters.

- Discharge offsite. Onsite reuse or land discharge may be limited by climatic or site conditions (i.e. saturated ground) and water may need to be discharged to meet the sediment basins requirements (i.e. reinstating capacity) identified in the Blue Book (Landcom, 2004) in accordance with MCoA B19.

7.3.6.1. Reuse

Reuse on site will only occur if:

- There is no visible oil or grease.
- No erosion is caused from the discharge.

Any runoff generated by the reuse is controlled entirely within the site boundary and appropriate sediment controls are installed and maintained in accordance with the Blue Book.

7.3.6.2. Discharge to land

Discharge to land within the site boundary will only occur if:

- There is no visible oil or grease.
- No surface runoff will be generated from the discharge and there is no potential for discharged water to reach any watercourse (within or outside the site).
- No erosion is caused from the discharge and appropriate erosion and sediment control are installed in accordance with the Blue Book (Landcom, 2004).

In addition to the above, discharges to land:

- Over landscaped areas will only occur if pH levels are between 6.5 – 8.5
- Outside the site boundary will only occur if consultation has been undertaken with the landowner and there is no potential for discharged water to reach any watercourse. Otherwise, all discharge water must be wholly contained within the site boundary.

If the discharge water is highly turbid, dewatering through a filter sock (or similar), or via transportable sedimentation tanks will be considered, where appropriate, to minimise sedimentation redistribution. In-situ testing will be performed during irrigation activities, following testing and approval via the Permit provided in Annexure D, and visual monitoring will also be regularly undertaken.

Any water discharged to land that has the potential to leave the HLW boundary via land or water will comply with the Water Reuse and Discharge Permit (Annexure D), and have sufficient measures applied to ensure off-site dewatering does not occur.

7.3.6.3. Sediment basins

Where feasible, on-site detention of stormwater would be introduced where stormwater runoff rates are increased. The design and construction of the sediment basins will be undertaken in accordance with the Blue Book Volumes 1 and 2D (Landcom, 2004 and DECC, 2008). Prior to construction, the design calculations and locations will be determined by the Project CPESC.

Sediment basin locations and sizes will be further refined during detailed design. The sediment basins will be designed to retain a 5-day 80th percentile rainfall event prior to overtopping. This is the rainfall depth after which it is commonly expected that other erosion and sediment controls will be overtopped.

The design storage capacity of each sediment basin will be reinstated within the design management period following the cessation of a rainfall event that causes runoff to occur on or from the HLW Worksite. Records of the available water and sediment storage capacities in each sediment basin will be maintained by the Environmental Advisor.

Sediment Basin Discharge Monitoring

All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the appropriate discharge criteria as detailed in Table 7-3

No water will be discharged from the site without written approval of the Environment Manager (or delegate). A Water Reuse and Discharge Permit (Annexure D) must be issued and signed by all relevant parties prior to discharge.

Discharge of water is permitted from clearly identified and accessible points detailed in Table 7-2. Active discharge and monitoring points will be identified:

- In a Monitoring and Discharge Point Map(s) which will be maintained by the Environment Manager (or delegate).
- In a Monitoring and Discharge Point Register that will include unique identifiers consistent with the Monitoring and Discharge Point Map(s) and will be maintained by the Environment Manager (or delegate).

A copy of the most up-to-date Monitoring and Discharge Point Map(s) and Monitoring and Discharge Point Register will be provided to the ER for information.

Table 7-2: HLW Discharge and Monitoring Points

ID No.	Type	Location description
1	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Gugga (C06) site discharging to Gregadoo Creek
2	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Tarcutta (AC03) site discharging to Tarcutta Creek
3	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Ellerslie Road (C21) site discharging to Yaven Yaven Creek
4	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Ardrossan Headquarters (C17) site discharging to Germans Creek
5	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Kunama (AC07) site discharging to Yaven Yaven Creek or Adelong Creek
6	Discharge and monitoring	The outlet(s) of the sediment basin(s) on the Snubba Road (C18) site discharging to Walkers Creek

For each discharge and monitoring point detailed in Table 7-2, the concentration of a pollutant discharged must not exceed the concentration limits specified in Table 7-3 unless:

- The discharge occurs solely as a result of rainfall measured at the HLW work area exceeding the design rainfall depth value for the corresponding discharge point; and
- The sediment basins and other erosion and sediment controls corresponding to the discharge point(s) have been designed, constructed, operated and maintained in accordance with MCoA B19.

Table 7-3: Concentration Limits

Pollutant	Units	Concentration limit	Sampling method*	Frequency
Oil and grease	Visible	Not visible	Visual inspection	• Less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge, when it is safe to do so • When rainfall causes a discharge from a sediment basin which has not been emptied within the design management period following cessation of a rainfall event, when it is safe to do so.
pH	pH	6.5 – 8.5[1]	Probe	
Turbidity	Nephelometric turbidity units	50[1]	Probe	

1. **Based upon the South-east Australian lowland rivers of the Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand water quality guidelines (ANZECC & ARMCANZ 2000).**

A Discharge Permit Register will be developed and maintained by the HLWJV Environment Team and will record the following information:

- Permit ID
- Relevant discharge and monitoring point (refer Table 7-2)
- Sample date
- Monitoring results
- Date of discharge

The information above will be included in the Monthly Environmental Report.

7.3.7. Groundwater dewatering

As noted in Section 6.2.4, the HLW works will likely have minimal interaction with groundwater. As such, no groundwater dewatering is anticipated to occur during works, and it is noted that no groundwater is permitted to be discharged to watercourses. Should further design development identify the need for groundwater dewatering, the following will be conducted in accordance with the requirements of UMM SW5:

- Dewatering assessment (including dewatering volume estimates).
- This plan will be updated in accordance with the process detailed in Section 9.2 to include dewatering procedures in line with the minimal impact criteria listed within the NSW Aquifer Interference Policy, relevant water sharing plans (WSPs) and licencing requirements where relevant.
- Water Supply Works Approval (where needed).
- Water Access Licence (WAL) (if dewatering volumes exceed 3ML/year).

Make good provisions will be made to the groundwater user(s) for bores that will be affected in line with the minimal impact criteria listed within the NSW Aquifer Interference Policy. Any make good provisions will be determined on a case-by-case basis in consultation with the impacted party.

In the event that groundwater dewatering is required, the relevant site-specific Construction Dewatering Plan(s) (included within each PESCP) will be updated to include any groundwater dewatering requirements.

7.3.8. Stockpiles and Mulch management

Stockpiles will be used for the temporary storage of materials, such as topsoil, mulch and excavated materials. Stockpiles will be managed in accordance with the Stockpile and Mulch EWMS and include such measures as being appropriately located outside of overland flow paths, areas of ponding and will be no closer than 40m from receiving waters. Stockpile management indicators that will be monitored during weekly environmental inspections include:

- Installation of erosion and sediment control measures prior to stockpiling material.
- Location of temporary stockpiles.
- Height of temporary stockpiles.
- Temporary stabilisation of stockpiles.
- Stockpile separation.
- Weed management on stockpiles.
- Visual observation for leachate formation (discoloration to trigger pH testing).

Spoil management, including stockpile management, is addressed in Annexure F of this plan.

Mulch arising as a result of on-site vegetation clearing and mulching will be utilised for erosion and sediment controls, applied as mulch bunds and blankets, wherever possible. Stockpiling of mulch will be minimised to prevent the production of tannin-impacted water on site. Tannin-impacted water captured within bunding, or sumps will be utilised for on-site dust suppression or landscape watering, however will not be discharged from site or to water.

Vegetation stockpiles will be managed to minimise the risk of combustion from internal heat generation by regular turning.

7.3.9. Spoil

A Stockpile and Spoil Management Procedure will be implemented for the HLW is included in Annexure F of this plan. Spoil management will also be managed through the design and implementation of a site-specific ESCP for each site.

The Project's approach to managing soil seeks to minimise our total disturbance footprint, and where disturbance is required, implement controls to preserve the productive capacity of soils. To minimise our impact on the land, our intent is to balance cut/fill designs where possible, such that all excavated topsoil and subsoil is beneficially reused on or nearby to the Project. This will be dictated by the relevant Property Management Plan in accordance with 7.4.

Topsoil and subsoil will be segregated, stockpiled and managed as per the Stockpile and Spoil Management Procedure. To ensure topsoil productivity is maintained, testing may occur and controls will be implemented to manage erosion and prevent contamination (Section 5.2.4 and 7.2). Topsoil reuse targets are shown in Section 2.3.

7.3.10. Air quality

In addition to erosion measures for implementation during periods of rainfall, erosion measures to prevent wind erosion will be employed during the HLW. Site-specific measures and controls for the prevention of wind erosion will be outlined in the HLW ESCP and will include, but not be limited to:

- Identifying potential sources of air pollution.

- Dust mitigation and suppression measures to be implemented.
- Reuse of water from onsite sediment dams.
- Plant and equipment will be switched off when not in use.
- Vehicles, plant and construction equipment will be appropriately sized for the task and properly maintained so as to achieve optimum fuel efficiency.
- Materials will be delivered with full loads and will come from local suppliers where possible.
- Methods to manage work during strong winds or other adverse weather conditions.
- Progressive rehabilitation of disturbed areas and midspan areas left with a mulch covering.

The prevention of erosion remains the primary approach for prevention of adverse impacts relating to dust-related air quality. Reducing the time of exposure and prioritising rehabilitation, in combination with dust-suppression measures during bulk earthworks, will minimise the impact of construction activities on HLW air quality.

7.3.11. Flooding

Potential flood impacts identified during detailed design are summarised in Section 6.2.6.

Any mitigation measures, suitable drainage design and stormwater management strategies required to minimise any downstream flooding impacts due to the following activities will be included in the relevant site Erosion and Sediment Control Plan:

- Earthworks for new access tracks
- Construction compounds
- Combined worker accommodation facilities and construction compounds.
- A flood assessment has been prepared by Turnbull Engineering as part of detailed design of the potential impacts construction activities could have on flood behaviour. As part of this assessment, 10% AEP flows have been considered at the location of all identified waterway crossings to inform cross-drainage design in accordance with Managing Urban Stormwater – Soils and Construction Volume 2C Unsealed Roads (DECC, 2008).

Flood hazard classification ratings have been applied to waterways within the HLW area as per Table 7-4Table 7-4.

Table 7-4 NSW flood classifications (DPE, 2022)

Classification	Description	Limiting still water depth (m)	Limiting velocity (m/s)
H1	Generally safe for people, vehicles and buildings	0.3	**2.0**
H2	Unsafe for small vehicles	0.5	**2.0**
H3	Unsafe for vehicles, children and the elderly	1.2	**2.0**
H4	Unsafe for vehicles and people	2.0	**2.0**

Classification	Description	Limiting still water depth (m)	Limiting velocity (m/s)
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.	4.0	**2.0**
H6	Unsafe for vehicles and people. All building types vulnerable to failure**.**	>4.0	

Specific response measures in the case of flood for the HLW is included in Appendix 10 of the HLW Emergency Response Plan. A system for daily monitoring of flood alerts will be implemented by the HLW team so that in the event of a flood warning being issued, all unsecured material on the floodplain can be efficiently removed and other appropriate precautionary measures can be taken.

The potential risk for flooding around the Project is low and in most of the cases, warning from authorities on river water level will be relayed to effective organisations. Specific response measures to be implemented as detailed in the HLW Emergency Response Plan would include:

- In case of river level raising above danger levels the following requirements shall be put in place:
  - The Chief Warden is to daily and prior to commencing work each day monitor SES website, Bureau of Meteorology (BOM) and the Hazards near me App and follow all advice for early evacuation as directed by the Emergency Services.
  - Notify the SES if there are likely to be significant delays in the operation of the roads affected by the road upgrades or traffic control.
- In Case of a flood warning:
  - HLW JV will monitor the rate of rise of water level in the adjacent area and liaise with local landholders.
  - HLW JV will liaise with the Emergency Control Organisation (ECO) for information to be made available, to keep staff fully informed of the situation during daily prestart meetings.
  - If HLW JV determines that situation could necessitate evacuation of the premises, then HLW JV should contact ECO to discuss the initiation of evacuation procedure prior to any flood emergency.
  - If evacuation is required, HLW JV will initiate the evacuation prior to any flood emergency.
  - Liaise with Local Emergency Services and Local Emergency Management Officer for specific emergency exit routes to be used in the case of flood.
  - During declared flood emergencies the project will redeploy workers to alternative office and accommodation locations not impacted by a flood emergency within the project footprint.

7.3.12. Water use

Table 7-5Table 7-5 below provides a summary of the estimated water use requirements for HLW over the course of construction.

Table 7-5: Estimated water use requirements for HLW

Construction activity	Estimated water use (kL)
Offices and camps	56,172

Construction activity	Estimated water use (kL)
Soil compaction	102,764
dust suppression	83,854
Concrete washout	130
Total	**242,920**

Expected water sources are shown in Table 7-6.

Table 7-6: Expected water sources and quantities

Source	Purpose	Supplier	Volume (kL)[1]	Status
Forest Hill potable water filling station	Potable water supply	Riverina Water	46,101	Agreement in place
Tarcutta potable water filling station	Potable water supply	Riverina Water	22,162	Agreement in place
Tarcutta Camp effluent	Non-potable uses	HLWJV	39,283	Agreement in place
Adelong Creek (raw water)	Non-potable uses	Snowy Valleys Council	34,219	Agreement in place
Paddy's River WAL (WAL 45548)	Non-potable uses	HLWJV	32,643	Legally available
Batlow bore (raw water)	Non-potable uses	Snowy Valleys Council	28,437	Agreement in place
Batlow treated potable water filling station (SVC)	Potable water supply	Snowy Valleys Council	25,076	Agreement in place
Tumbarumba (Raw Water)	Non-potable uses	Snowy Valleys Council	0[2]	Agreement in place
Kunama Camp effluent	Non-potable uses	HLWJV	14,999	Agreement in place
		Total	**242,920**	

Note:

1. The volume provided in table above are the anticipated volumes required for the Project from each source. Each water source has capacity to increase supply if needed.
2. This water filling station is available in the event that Paddy's River falls below the limit that allows extraction. The contract with Snowy Valley Council allows for extraction of 32,643kL.

Water supply management will be undertaken in accordance with agreements between HLW and the relevant water supplier.

No water take from groundwater sources is anticipated to be required to meet the water use requirements for construction. Surface water allocations purchased from existing registered bores/users will be extracted in accordance with the conditions stated in the associated Water Access Licences(s) (WAL(s)) and Water Supply Works approval(s). Snowy Valleys Council and Riverina Water will maintain responsibility for monitoring compliance for any WALs and Water Supply Works approval(s) that water they have supplied may be extracted under.

Contractors transporting water from the supplier to the HLW worksite will maintain records of each trip including fill location, and volume. Contractors will be required to provide tracking records. All water use will be tracked in the HLW Water Take Register (Annexure G).

7.3.12.1. Wastewater treatment plants (WWTP)

In line with the HLW sustainability plan and HLW commitments to reduce potable water use and the requirements associated with MCoA B59, wastewater from the accommodation sites will be treated and where appropriate reused in the construction process.

The operation of the WWTPs will treat water to comply with the relevant wastewater quality objectives as detailed in Table 7-2 of the Accommodation Camp Management Plan (ACMP).

The criteria detailed in Table 7-2 of the ACMP will be dependent on the implementation of on-site preventative measure which will be determined by the HLW occupational hygienist and may include, but not be limited to:

- No access after irrigation, until dry (1 - 4 hours)
- Minimum 25-30m buffer to the nearest point of public access
- Spray drift control, e.g. through low throw sprinklers (180 degree inward throw), vegetation screening, or anemometer switching.

The use of treated wastewater in construction activities will be undertaken with consideration of the following:

- Water quality meets the criteria in Table 7-2 of the ACMP including implementation of appropriate on-site preventative measures
- Existing soil conditions and appropriate application rates.
- Proximity to waterways and farm dams
- Proximity to food crops and food crop pastures.
- Soil salinity and flood prone areas.
- Avoiding use in environmentally sensitive areas.
- Climate conditions and the potential for runoff.

In addition to the above considerations, site specific requirements in relation to the reuse of treated effluent within the HLW footprint will be determined in consultation with asset owners and landowners where required. Site specific requirements for the reuse of treated effluent for the WWTPs will be detailed within Property Management Plans (PMPs) where relevant.

Treated effluent would not be reused with areas of the HLW footprint that drain into waterways upstream of Kunama Dam as depicted in Figure 7-1 below.

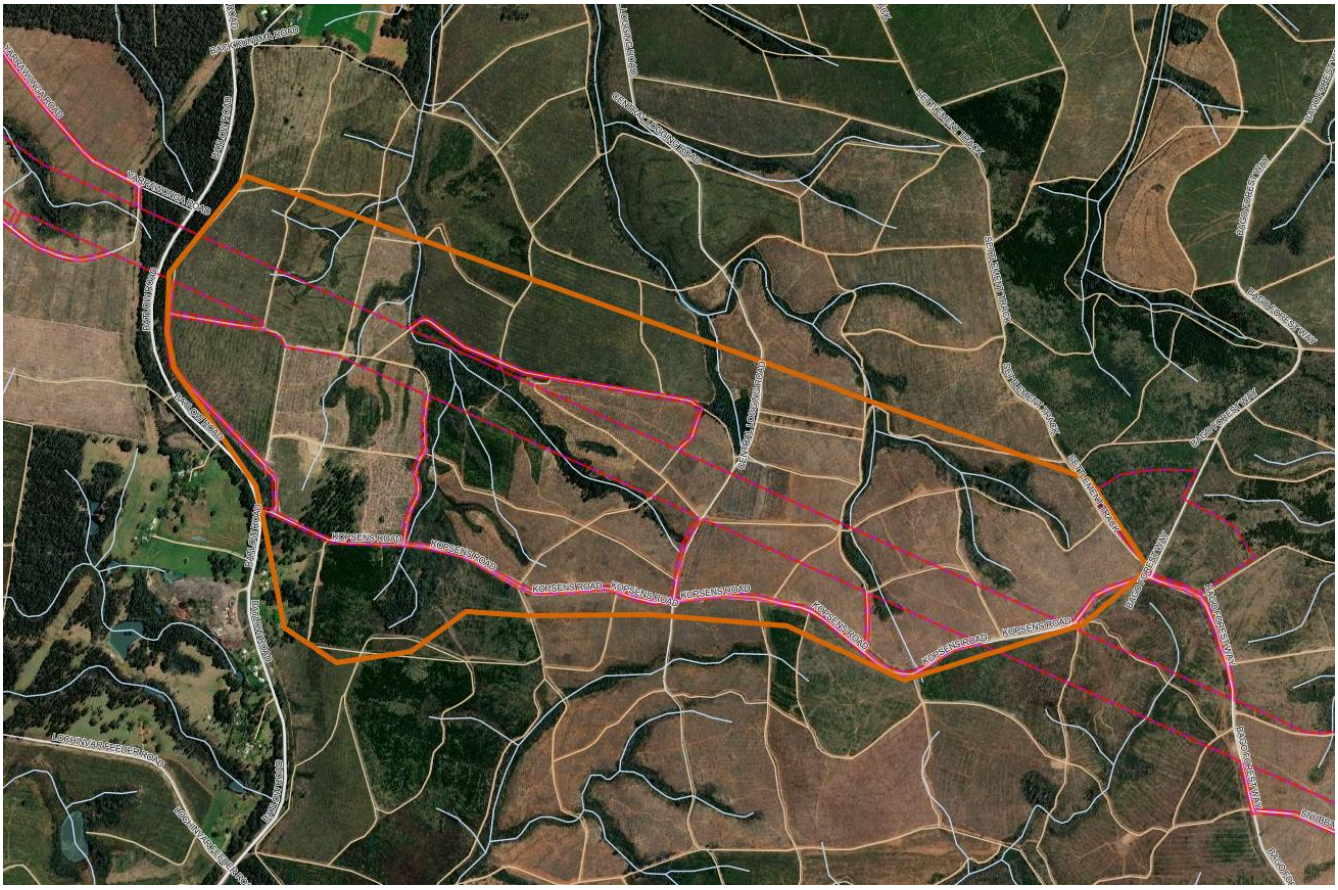

Figure 7-1: HLW Footprint upstream of Kunama Dam

7.3.13. Biodiversity

During works associated with soil and water management, including clearing, general earthworks and the installation of erosion and sediment control devices, biodiversity impacts will be managed in accordance with the HLW Biodiversity Management Plan (BMP), Section 7.14 and all relevant appendices. All clearing activities will be managed in accordance with the Clearing Protocol (BMP Annexure B), including the demarcation of exclusion zones and footprint boundaries. All biosecurity management measures, come clean leave clean, will be identified, installed, tracked and recorded in accordance with the HLW Biosecurity Management Plan (Annexure E of the BMP) and the relevant Property Management Plan (PMP). This includes any required washdown measures, pest management and weed control measures specific to the location.

7.3.14. Heritage

During works associated with soil and water management, including clearing, general earthworks and the installation of erosion and sediment control devices, Aboriginal and historic Heritage impacts will be managed in accordance with the HLW Heritage Management Plan (HMP). All clearing activities will be managed in accordance with the Aboriginal Cultural Heritage Assessment Report (ACHAR) and *Unexpected Finds Protocol - Heritage* (HMP Annexure 1) including the demarcation of exclusion zones and footprint boundaries.

Any unexpected finds will be managed through the *Unexpected Finds Protocol - Heritage* set out in the HMP.

7.3.15. Naturally Occurring Asbestos

Should NOA be present on site, disturbance will be minimised, and an Asbestos Management Plan

implemented.

The Asbestos Management Plan has been prepared in accordance with the *NSW Government Code of Practice How to Manage and Control Asbestos in the Workplace* (SafeWork, 2020) as part of the HLW Emergency Response Plan. The Asbestos Management Plan will include the following measures:

- management or isolation of areas mapped as medium to high risk of NOA, where direct disturbance of NOA is confirmed to be required for project construction works
- placement of suitable signage around the work areas
- list of appropriate personal protective equipment, including Respiratory Protective Equipment
- implementation of dust suppression controls including wetting surfaces, covering disturbed surfaces and the use of sealed air-conditioned vehicles to minimise potential asbestos impacts to workers
- decontamination of the workers' coveralls, personal protective equipment, equipment and work site
- procedures for the disposal of NOA material or waste, if required
- implementation of air monitoring using pumps and sample filter grid cowls for asbestos fibres and dusts if it is suspected that exposure to NOA dust during work might exceed safe levels of airborne asbestos. The air monitoring pumps, and reporting, must be undertaken by a licensed asbestos assessor.

Any Asbestos that is identified on site will be managed using the Unexpected Finds Protocol (Annexure B). Information received from FCNSW indicates that NOA has not been found on their lands.

7.3.16. Soil Contamination

With the exception of the area around the Wagga Wagga Substation, there are no areas of known soil contamination within the HLW footprint. Table 5-4 lists the low and moderate risk sites of potential soil contamination.

In accordance with UMM SC2, before commencement of any construction that would result in the disturbance of AECs identified as having a moderate risk, further investigations will be undertaken in accordance with the assessment of site contamination NEPM 2013.

Any remediation required for the project will be undertaken based on a site-specific Remedial Action Plan. The Remedial Action Plan will define remedial goals and objectives, performance criteria for remedial effort and remediation methodology. A validation report will be prepared after remedial effort and be in accordance with the *NSW EPA Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

As noted in *Technical Report 10: Phase 1 Contamination Assessment,* broad scale sampling programs within low risk land uses of the contamination study area such as forestry, national parks and agricultural lands with no or minimal structures or uncontrolled filling is not considered necessary.

Should potentially contaminated soil be unexpectedly encountered on site then the *Unexpected Finds Protocol – Contamination* (Annexure B) will be implemented.

7.3.17. Saline soils

Prior to ground disturbance within areas mapped as moderate to high risk saline soils, an inspection will be undertaken for the presence of saline soils. Areas of known or suspected salinity will be subject to further testing as required.

If salinity is confirmed, excavated soils will be managed in accordance with *Book 4 Dryland Salinity: Productive use of Saline Land and Water* (NSW DECC, 2008c) and the *Salinity Training Manual* (DPI, 2014) to manage salinity impacts. Erosion controls will be implemented in accordance with *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom 2004), and Volumes 2A (DECC, 2008a) and 2C (DECC, 2008b), commonly referred to as the 'Blue Book'.

Prior to construction, materials will be selected to withstand acidic or high saline soil and groundwater environment (where applicable).

During construction, existing areas of waterlogging and poor drainage will be avoided, where possible, when building access tracks and permanent structures.

7.3.18. Acid Sulphate Soils

The probability of Acid Sulphate Soils (ASS) occurring within the HLW footprint is considered low or extremely low. Prior to ground disturbance in areas of potential acid sulfate soil or rock occurrence, testing will be carried out to determine the presence of actual and/or potential acid sulfate soils or rocks.

If acid sulfate soils or rocks are encountered, the Unexpected Finds Protocol (Annexure B) will be implemented. Acis sulfate soils will be managed in accordance with the Acid Sulfate Soil Manual (ASSMAC, 1998). Should ASS be confirmed an ASS Plan will be developed in accordance with the Water Quality Australia national guidance documents and the EPA Waste Classification Guidelines.

7.3.19. Concrete batching plants and concreting activities

Water management systems at concrete batching plants will include the installation of washout bays, wedge pits (settling pond) and holding ponds for the capture and treatment of batch plant and agitator wash water which will be reused for washout purposes.

Concreting activities will be managed in accordance with the Concrete and Concrete Washout EWMS. Plant and equipment used for concrete activities will be washed out at designated washdown and cleaning areas with controls to prevent the discharge of washdown water.

Washdown areas will be bunded, clearly signposted, located outside of stormwater, surface water drainage lines and no less than 40m from any watercourse. Washdowns will be constructed of with an impermeable material able to contain contaminated water and concrete residue, monitored for correct drainage and condition. Site inductions will include the location and appropriate usage of the washdown areas including maintenance and spill response procedures.

7.4. Rehabilitation

7.4.1. Accommodation camp sites, ancillary facilities and earthwork material sites

Within 12 months of the completion of construction, accommodation camp sites, ancillary facilities and earthwork material sites will be rehabilitated to the original condition so that rehabilitation sites are returned in a safe, stable and non-polluting condition.

Unless otherwise agreed with the Planning secretary and relevant landholders, in accordance with the relevant Managing Urban Stormwater (Blue Book), as soon as possible, land will be:

- Temporary erosion and sediment controls will be maintained (and not removed) until rehabilitation measures provide effective stabilisation of disturbed areas.
- Restored to its pre-existing productive capacity.
- All temporary buildings and structures removed.

- All infrastructure removed to 500mm below ground level.
- Made safe, stable and non-polluting.
- Where areas have been cleared of vegetation in accordance with Annexure G of the BMP.

Where temporary access tracks are to be removed, the disturbed surfaces and formed areas will be revegetated in in accordance with land owner agreements and the approved BMP Annexure G, in accordance with *Managing Urban Stormwater: Soils and Construction - Volume 2C Unsealed Roads* (DECC, 2008a) as appropriate.

7.4.2. Temporary waterway crossings

At the completion of construction, temporary stream crossings will be removed and rehabilitated. Stream crossing sections and banks impacted by construction will:

- Be reformed or remediated to resemble the pre-work condition and form wherever possible. or
- Reinstated to a stable condition using materials such as:
    - Rock armouring.
    - Hydro mulch.
    - Jute matting, or other suitable geotextile materials.

8. Compliance management

8.1. Roles and responsibilities

The HLWJV Team's organisational structure and overall roles and responsibilities are outlined in Section 3.4 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 7.1 of this SWMP.

8.2. Training

All employees, contractors and utility staff working on site will undergo site induction training relating to soil and water management issues. The induction training will address elements related to soil and water management including:

- Existence and requirements of this SWMP.
- Relevant legislation.
- Roles and responsibilities for soil and water management.
- Procedures to be implemented in the event of an unexpected discovery of contaminated land.
- Procedures to be implemented in the event of accidental spills or discharges.
- Water quality management and protection measures.
- Flood mitigation measures.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in air quality management. Further details regarding staff induction and training are outlined in Section 3.5 of the CEMP.

8.3. Monitoring and inspection

Monitoring and inspection requirements are outlined in Table 8-1, with the locations identified for review based on the significance of risk associated with the HLW works.

All monitoring of dust deposition and meteorology is to be undertaken in accordance with the NSW DEC *Approved Methods for the Sampling and Analysis of Air Pollutant in NSW*.

Additional requirements and responsibilities in relation to inspections are documented in Section 3.9.1 and Section 3.9.2 of the CEMP.

Table 8-1 Monitoring and inspection requirements

Monitoring details	Location	Record	Responsibility	Frequency
Inspection of environmental controls as detailed in Table 8-2 below.	All	Site inspection records	Environmental Manager	Weekly After heavy rainfall events
Meteorological data including daily rainfall, hourly temperature, relative humidity, wind (direction and speed) and barometric pressure	All	Wagga Wagga (AMO station (ID#72150) Tumbarumba Post Office (ID#072043), Cabramurra SMHEA AWS (ID#072161) HLWJV Weather Stations (locations TBC)	Site supervisor	Daily
Sediment Basin Discharge Monitoring	Refer Table 7-2	Discharge Permit Register Monthly Environmental Report	Environmental Advisor Environmental Manager	Prior to discharge from the monitoring and discharge points identified in Table 7-2.
Surface water monitoring to be as per the Surface Water Monitoring Program	All	Site records	Environmental Manager Site supervisor	When a continuous rainfall event of >20mm is received in the local catchment or quarterly
CPESC Inspection	All	Inspection Report	Environmental Manager HLW CPESC	Determined based on the risk profile of the works being undertaken and the sensitivity of the location of works.

Monitoring details	Location	Record	Responsibility	Frequency
Water usage monitoring	All	Project invoices Water meter reads Monthly Sustainability Report	Sustainability Manager	Monthly

Table 8-2: Monitoring parameters

Monitoring Parameter	Frequency	Performance Criteria
Any visible signs of erosion	Weekly	No erosion No visible pollution
Drainage and erosion & sediment controls are in place and in good working order	Weekly	All structures sound and working correctly No land or soil contamination because of HLW activities.
Soil stockpiles and excavations are being protected	Weekly	Sediment fences/berms erected No land or soil contamination because of HLW activities.
Sediment has been removed following large storm events and controls maintained	Weekly and after storm events	No silt in sediment controls
Effectiveness of landscaping and rehabilitation	Weekly	75% coverage where applicable (refer to either Bluebook or ICEA Guidelines) Rehabilitation of site to existing conditions or better.

Monitoring Parameter	Frequency	Performance Criteria
Visual inspection for indications of sediment-laden waters, waste waters or pollution (e.g., grease/oil, effluent) because of construction.	Weekly and after each rainfall event	No visible pollution No spills or runoff of contaminants or sediments into waterways.
Visual inspection of settled water for contaminants or sedimentation will be made before water is discharged to drains.	Weekly and after each rainfall event	No visible pollution All dewatering off site meets water quality targets and is accompanied by a permit.
Visual inspection of waterway crossings and access tracks	Weekly and after each rainfall event	No additional erosion No sediment-laden runoff No structural damage to crossings or tracks.
Additional clearing and maintenance of sediment controls following heavy rainfall	Following a rain event of >20mm in 24 hours	All structures sound and working correctly No sediment-laden runoff No silt in sediment controls No land or soil contamination because of HLW activities.
Management of unexpected finds (including ASS and NOA)	Weekly	Implementation of unexpected finds procedure Implementation of Asbestos Management Plan (where applicable)
Management of AECs	Weekly	No ground disturbing activities prior to completion of further investigation in accordance with legislative and regulatory requirements

Monitoring Parameter	Frequency	Performance Criteria
Management of potential flood impacts	Weekly	Implementation mitigation measures, suitable drainage design and stormwater management strategies included in the relevant site Erosion and Sediment Control Plan

8.4. Licences and permits

The following licenses and permits are applicable to HLW:

- Water Access Licence under the *Water Management Act 2000* (section 60A)

The application process for the Paddy's River WAL is currently underway at the time of writing. No works to extract surface water from Paddy's River will commence until the WAL has been approved.

8.5. Weather monitoring

Weather conditions and forecasts (including rainfall prediction maps) will be monitored daily, and the relevant information passed on to site personnel to allow for adequate planning for significant rain events.

8.6. Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, MCoA and other relevant approvals, licences and guidelines.

Auditing is to comply with CoMA and MCoA requirements, Audit requirements are detailed in Section 3.9.3 of the CEMP.

8.7. Reporting

Reporting requirements and responsibilities are documented in Section 3.9.4 and 3.9.5 of the CEMP.

Reporting requirements relevant to soil and water management are listed in Table 8-3Table 8-3.

Table 8-3: Reporting requirements relevant to soil and water

Report	Frequency	Responsibility	Recipient
Surface Water Monitoring Report	Six Monthly	Environmental Manager	ER / Transgrid
Monthly Environmental Report	Monthly	Environmental Manager	ER / Transgrid
CPESC Inspection Report	As required (refer Table 8-1)	HLW CPESC	Environmental Manager
Monthly Sustainability Report	Monthly	Sustainability Manager	CIMIC

In addition to the above reporting, environmental inspection checklists will be captured in the UGL-EMS incident management software program (Synergy) to manage, record and report against targets.

8.8. Incidents and non-compliances

Reporting requirements and responsibilities are documented in Section 3.9 of the CEMP.

Details on incident reporting is included in Section 3.8.2 of the CEMP. Environmental incidents relating to soil and water may include but not be limited to:

- Discharges of sediment laden water.
- Accidental discharge of contaminants to watercourses.
- Spills and accidental discharges of contaminated.

HLWJV will promptly advise TransGrid on events that are non-conforming with the MCoA, HLW permits and licences, standards or best practice processes. TransGrid will advise the DPHI accordingly for any notifiable non-conformances.

9. Review and improvement

9.1. Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement; and
- Make comparisons with objectives and targets.

9.2. SWMP update and amendment

The processes described in Section 3.9 to Section 3.13 of the CEMP may result in the need to update or revise this Plan. This will occur as needed.

Only the Environment Manager, or delegate, has the authority to change any of the environmental management documentation.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure (refer to Section 3.11.2 of the CEMP).

Annexure A. Erosion and Sediment Control Strategy

Annexure A

Erosion and Sediment Control Strategy

HumeLink West

Revision: 02

TransGrid

Date 25/07/2025

Document Control

Version Control

Revision	Date	Description	Approval
A	15/05/2024	Initial Draft for TG Review	Ian Irwin
00	25/06/2024	Issued for consultation	Ian Irwin
01	06/12/2024	CPESC Comments	Ron Billyard (CPESC 9496)
02	25/07/2025	Minor update in response to DPHI comments	Chris Millar

Distribution of controlled copies

This HumeLink West Soil and Water Management Sub-Plan Annexure A – Erosion and Sediment Control Strategy is available to all personnel and sub-contractors via the HLW document control management system.

The document is uncontrolled when printed. One controlled hard copy of the CEMP and supporting documentation will be maintained by the Quality Manager at the HLW office (and on the HumeLink website link to be provided).

Copy number	Issued to	Version

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Attachment 1: Example ESCP

1. Introduction

1.1. Purpose of Strategy

This Erosion and Sediment Control Strategy has been prepared to provide an outline of the strategic approach to the management of Erosion and Sediment risks for the HumeLink West Project (HLW). The information in this document will guide the implementation of erosion and sedimentation management and forms part of the Soil and Water Management Sub Plan (SWMP). With the extensive nature of works the purpose of this document is to establish key processes to implement in the field to mitigate erosion and sedimentation impacts of the key construction activities for the HLW.

This document has been prepared by Certified Professional in Erosion and Sediment Control (CPESC) Ron Billyard (CPESC 9496).

1.2. Impacts of Erosion and Sedimentation

The construction activities to be undertaken on the HLW have the potential to impact on soil and water resources during site disturbance and bulk earthworks across areas of agricultural and ecologically sensitivity. Land to be disturbed will require clearing of vegetation which will expose these areas to erosion by stormwater and wind action.

Generally, soil particles eroded by stormwater runoff are transported downslope, usually settling in lower energy environments including depressions, rivers, watercourses, lakes, dams and wetlands etc (i.e. sedimentation). This may result in many adverse environmental impacts including:

- Reduction in water quality, increased turbidity and nutrient enrichment of water bodies.
- Contamination of waterways.
- Damage to vegetation communities through smothering.
- Disturbance to aquatic flora and fauna.
- Increased potential for flooding.
- Reduction in recreational values.
- Reduction in aesthetic values.
- Increased maintenance costs.
- Promotion of weed growth.

Additionally, erosion may be caused by wind moving unprotected soil particles. This action may result in adverse impacts including:

- Loss of valuable soil (e.g. topsoil).
- Safety on and off site (e.g. traffic hazards).

This strategy will form the initial ‘part of the chain’ to minimise on-site erosion and offsite sedimentation and therefore reduce adverse environmental impacts.

2. Scope of this Strategy

This document describes the intentions and fundamental principles to be used for the duration of the entire HLW.

The strategy will be complimented during construction by the preparation of a series of detailed Primary Erosion and Sedimentation Control Plans (ESCP), Site Specific ESCPs, and Progressive ESCPs (PESCP’s) for:

- Successive stages of construction (eg; Clearing and Grubbing; Stripping and Stockpiling of Topsoil; Bulk Earthworks, Reinstatement and Rehabilitation).
- Specific work areas (eg; Bago (old growth)) Forest, Accommodation and Construction Facilities and substation sites

- Sites of elevated erosion and sedimentation risk such as steep terrain, and/or in proximity to sensitive environmental receptors, Cultural Heritage values, or other significant sites for which a Primary ESCP plan may not effectively mitigate risk.

3. Supporting Documentation

This Erosion and Sedimentation Control Strategy is based on the requirements and guidelines contained in the following manuals/documents:

- Department of Housing (1998), Managing Urban Stormwater: Soils and Construction, Vol 1, 4th Edition (i.e. Blue Book).
- Department of Environment and Climate Change (2008a), Managing Urban Stormwater: Soils and Construction, Vol 2B, Waste Landfills (i.e. Blue Book).
- Department of Environment and Climate Change (2008b), Managing Urban Stormwater: Soils and Construction, Vol 2C, Unsealed Roads (i.e. Blue Book).
- Best Practice Erosion and Sediment Control - for building and construction Sites (IECA, 2008)
- Environmental Impact Statement (Transgrid).
- The strategies and techniques detailed in the above documents are appropriate for the protection of the adjacent environment of this HLW.

4. Erosion and Sedimentation Hazard

It is expected that significant erosion and sedimentation hazard will be encountered during the construction of the HLW due to a combination of factors including:

- Extremes of topography present along the HLW alignment.
- Large scale disturbance from bulk earthworks (e.g. cut and fill sections in relation to substation sites and tower pad locations on steep slopes).
- Proximity to water courses, in particular key fish habitat waterways.
- The large number of waterway and flow path crossings required for the HLW.
- Soil types present on the HLW.
- Remote and multiple areas of exposure.
- Weather conditions.
- Limited ability to undertake early revegetation.
- Site constraints restricting available land for controls (e.g. sediment basins).

3.1 Erosion Risk Assessment

Erosion risk across project sites will be assessed using the standards summarised in Sections 4.4.1 and 4.4.2 of the Blue Book (Landcom, 2004).

Section 4.4.1 provides for erosion risk to be assessed based initially on the slope class of each site. Figure 4.6 provides for the Rainfall Erosivity (R Factor) and Slope (%) to provide an initial categorisation of erosion hazard.

The HLW project spans a distance of 110km, from lowland plains in the west to semi-alpine conditions in the southeast. As a result of this topographical variation, rainfall erosivity (R-Factor) is gradational across the project. To better reflect the Blue Book requirements, western project sites including Line 4 and Line 6 and Line 2 from the Gugaa substation to Tower 72 west of Westbrook Rd (approximately 10.3km SE of Tarcutta) will adopt the R Factor for Wagga Wagga (R=1100) and Line 1, Line 3, and Line 2 from Tower 71 east to Wondalga sites will utilise the figure for Albury (R=1483).

For western sites using the erosion risk for Wagga Wagga, Figure 4.6 indicates that sites of slope >18% represent a High Erosion Risk and would require additional erosion controls. For eastern sites

using Erosion Hazard for Albury, (R = 1483), sites of slope >15% are classified as High Erosion Risk and require additional controls.

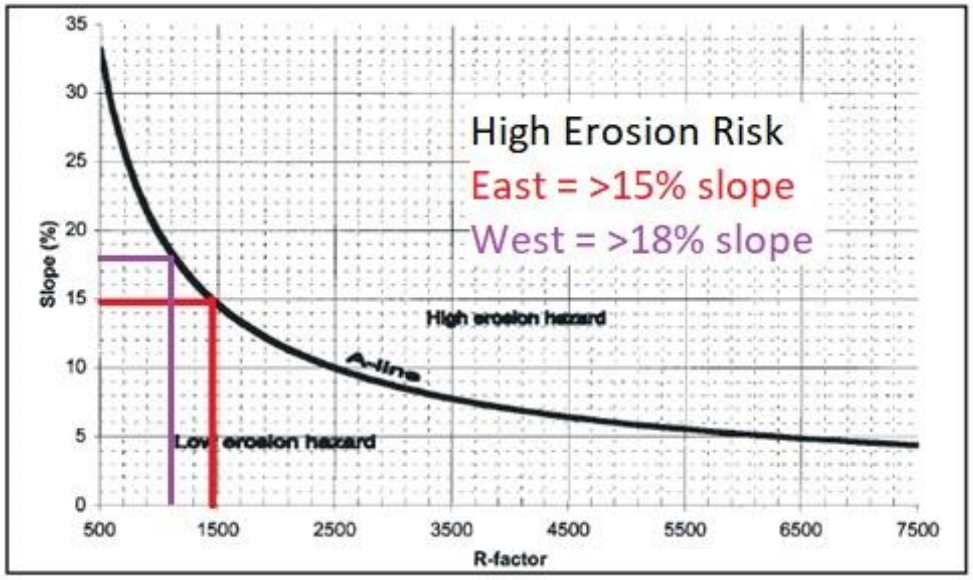


Figure 1: HLW site erosion risk based on Rainfall Erosivity and Slope % (Landcom, 2004; Figure 4.6)

For higher risk sites indicated by Figure 4.6, the Blue Book provides a guide to erosion hazard based on the soil loss from a particular site calculated using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE estimates soil loss based on the rainfall erosivity (R-Factor), the erosion potential of the soil (K-Factor), the Slope characteristics of a site (LS-Factor), the soil use practices evident of the site (P-Factor) and the degree to which soils are covered by vegetation or other stabilisation (C-Factor). The Soil Loss (A) is then calculated by multiplying these factors:

Soil Loss (t/ha/yr) A = R x K x LS x P x V

Soil Loss Class	Calculated soil loss (tonnes/ha/yr)	Erosion hazard
1	0 to 150	very low
2	151 to 225	low
3	226 to 350	low-moderate
4	351 to 500	moderate
5	501 to 750	high
6	751 to 1,500	very high
7	>1,500	extremely high

Erosion hazard for sites across the HLW generally range from Very Low to Moderate, with a limited number of steeper sites classified as High in the east of the project area.

5. Erosion and Sediment Control Plans

Given the variation in erosion hazard across HLW, the risk will be calculated for each site within the HLW and detailed within Erosion and Sediment Control Plans (ESCP).

- ESCP's will identify risks and be prepared prior to the construction activity generally using annotated drainage or general arrangement drawings and indicate (where relevant):

- Catchment areas.
- Construction boundaries.
- Property boundaries
- Runoff capture, treatment and disposal
- Areas of contamination
- Exclusion zones and sensitive areas.
- Contours and drainage paths
- Access points and tracks (e.g., haulage).
- Compounds and storage areas.
- Stockpile sites.
- Temporary work areas.
- Material processing areas.
- Permanent and temporary controls (including order of implementation).

The purpose of ESCPs is to demonstrate:

- The approach to erosion and sediment control (e.g identification of catchments and sub-catchments, runoff control, separation of 'clean' from 'dirty' flows, separation of contaminated runoff).
- Specific erosion and sediment controls with an emphasis on early construction of stable access, perimeter controls, critical temporary and permanent drainage structures (e.g catch drains upslope and dirty water diversions, sediment traps and filters downslope).
- Use of existing onsite materials (e.g vegetation, mulch, rock) and stable ground cover.
- Other effective means of site stabilisation including geotextiles, soil binders, and natural fibre stabilisation and filtration products.

5.1. Primary ESCPs

Primary ESCPs will be developed for both:

- Generic ESC arrangements for application on risk sites for erosion and sediment control and other project values, and
- Site Specific ESCPs for sites with higher risk profiles for erosion and sediment control and other project values.

5.1.1. Primary ESCP: General Arrangement ESCPs

For areas that are generic across the site, General Arrangement ESCPs will be produced and updated as necessary to ensure compliance with this strategy. These will include:

- Tower construction pad installation on varying slopes:
  - Flat and even ground (< 5% slope) (Type A tower pads)
  - Minimal to moderate sites (5-12%slope) and uneven ground (Type B tower pads)
  - Steep and/or rocky slopes (12-25% slope) (Type D1 tower pads)
- Access tracks over varying gradients
- Watercourse Crossings with low environmental risk or constraints

The Primary ESCP's will be frequently updated to reflect changing site conditions, and the erosion hazard within catchments.

5.1.2. Primary ESCP: Site Specific ESCPs

Sites which exhibit higher erosion and sedimentation risk will have site specific ESCPs prepared. This may include sites with:

- Facilities with larger disturbance footprints including Substations, Camps and Laydowns.
- Slope greater than 25%.

- Proximity to sensitive environmental receptors
- Cultural Heritage values, or
- Other characteristics for which a generic Primary ESCP may not effectively capture the ESC risk.

5.2. Progressive ESCPs (PESCP)

Primary ESCPs will be updated as required in Progressive ESCP (PESCP) to reflect current condition of ESC controls to account for:

- Complex processes which may have several stages.
- Identification of new information relevant to ESC risk including environmental and Heritage values.
- Change in the spatial arrangement, construction process, scope of work or work method.
- Controls found to be ineffective following rainfall.

5.3. Preparation and Recording of ESCPs

Both Primary and Progressive ESCPs will be prepared jointly by both the Project Certified Professional in Erosion and Sediment Control (CPESC) and the environmental team and will include input from field personnel to formulate practical documents for field implementation.

Additionally, ESCPs will be developed in consideration of other environmental aspects (e.g sensitive vegetation communities, waterways, contaminated areas).

Sometimes ESCPs will be developed jointly with Environmental Work Method Statements (EWMS) for complex construction areas (e.g. works near MacPherson's Plain).

The ESCPs will be entered onto a Register to maintain version history and updates (maintained on SharePoint). An example of a Primary ESCP is provided in Attachment 1:

6. Key Management Strategies

The following list outlines principles and control measures that will be implemented on the HLW for minimising erosion and sedimentation. They have been identified as key issues and techniques to control erosion and sedimentation on many construction projects over the last 30 years. These points collectively fulfil the principles of sound soil conservation practice as detailed in the previously mentioned manuals/documents. This will ensure a ‘preventative’ rather than a ‘cosmetic or remedial’ approach to erosion and sediment control.

6.1. Professional Expertise

The engagement of CPESC with extensive experience who will co-ordinate and oversee all erosion and sediment control aspects during construction.

6.2. Training

Training in key aspects of erosion and sediment control (ESC) will be implemented in the following way:

- Highlighting the importance of ESC risk and management will be included during site inductions.
- Scheduling half-day awareness seminars early in the HLW for all personnel involved in construction.

The program will cover:

- Environmental impacts.
- Relevant legislation.

- Principles of erosion and sediment control.
- Techniques of erosion and sediment control.

Advanced training programs may be rolled out for relevant personnel and will include:

- Flocculation techniques and water quality.
- Management of water quality treatment infrastructure.
- Preparation of Progressive Erosion and Sediment Control Plans.

Additionally, ongoing training will be provided to continually address relevant matters at regular 'toolbox' pre-start and other meetings. Post rainfall toolbox sessions will be carried out, as required, with construction personnel to review and assess the efficacy of existing controls and consider potential improvements.

6.3. Minimising Extent and Duration of Disturbance

Key aspects to manage the extent of disturbance are:

- Clearly define clearing limits with highly visible flagging/fencing and signage consistent with measures in the CEMP and Sub Plans.
- Staging of clearing operations. - (particularly within Bago State Forest).
- Initially clearing and grubbing mature trees and shrubs to leave the soil surface in a reasonably rough condition with some surface vegetative groundcover.
- Prompt stabilisation of steep slopes and batters prior to rainfall and on completion of works. Minimising disturbance of vegetation along access roads and other construction sites (e.g Site Compounds) with special emphasis on management of construction activities adjacent to watercourses and watercourse crossings.

6.4. Control of Stormwater Flow onto, through and from the site

Key aspects to manage stormwater flows are:

- Separating 'clean' run-on water from 'dirty' (e.g turbid) construction area run-off. Installation of perimeter controls prior to topsoil stripping and active construction works where practicable.
- Constructing permanent drainage structures early in the HLW (where possible) including:
    - Sediment sumps and traps.
    - Catch drains with linings upslope of works
    - Stable accesses.
- Installation of drainage including trafficable cross-berms to minimise runoff velocity and volume on access tracks.
- Completing construction of culverts and associated inlet and outlet protection (e.g rock dissipators and head/wing walls) as soon as possible after pipe/culvert installation.
- Maximising the diversion of turbid construction runoff into suitable Water Quality Improvement infrastructure.
- Controlling run-off during the construction of embankments (e.g fill shaping and the construction of temporary dykes and batter drains).
- Diverting uncontaminated dirty water from formation works through sediment traps into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths and velocities.
- Consider existing stormwater flows when directing water to existing pits and ponds to control potential flooding issues.

6.5. Erosion control measures to limit on-site erosion

The strategies to be used to control erosion on incomplete section of works are:

- Breaking the site into sub-catchment areas and implementing a range of erosion controls (eg weir type structures, diversion banks, progressive revegetation) to reduce flow velocities and to compliment and increase the effectiveness and efficiency of sediment controls in the lower areas.
- Using geotextile or similar linings to provide temporary surface protection in areas of concentrated flows (e.g batter drains, culvert construction, temporary drains etc).
- Application of geotextile, soil binder, mulch, felled vegetation, or other erosion controls on steep slopes and batters.
- Siting stockpiles of soil material in low-hazard areas clear of watercourses (ie at least 50 metres). Additional protection to be afforded with temporary vegetation, upslope diversion banks and downslope sediment control measures as required.
- Stockpiles to be in accordance with CEMP and sub plan requirements including the Stockpile Management Procedure.
- The toes of stockpiles a minimum of 1m from clearing limits.

6.6. Sediment control long-term measures to prevent off-site sedimentation

The strategies to be used to control offsite impacts from works are:

- Installing control measures as close to the potential source of sediment as possible.
- Ensuring management of turbid water within a suitable timeframe after rain with one or a combination of:
    - The location of treatment will ultimately depend on where the excavation/construction water is located.
    - Pump-out for construction purposes or dust control.
- Ensure that dirty water generated by site activities is used on site where possible prior to further treatment and disposal off site. Examples for reuse include:
    - Construction water.
    - Dust suppression.
    - Rehabilitation of vegetated areas.
    - Vehicle washdown.
- Water not to be discharge from site prior to achieving acceptable water quality standards in accordance with SWMP requirements and the Surface Water Monitoring Program.
- Managing water quality during de-watering activities (e.g dust suppression, filtering techniques, flocculation with approved chemical flocculant, pumping for treatment into a water treatment plant), in accordance with a water movement permit system and EWMS/methodology to be implemented for dewatering.
- Controlling the deposition of mud and soil material onto local sealed roads. Maintain hardstand areas as much as practicable to minimise mud/soil generation.
- Dust suppression via water carts, sprays and restricting plant and vehicle movements to designated routes, limiting vehicle speeds and using soil stabilisers or similar products to bind soil particles.

6.7. Stabilisation and Revegetation

Key aspects to manage successful rehabilitation of disturbed areas to be implemented are:

- Ensuring the success of the later revegetation program by implementing a robust topsoil testing and management program.
- Keying-in of topsoil to batters with a suitable depth in accordance with specifications.
- Progressively revegetating disturbed areas utilising appropriate non-invasive species.
- Temporary stabilisation of disturbed areas with a soil stabiliser, cover crops or similar.
- Leaving temporary erosion and sediment controls in place until 90% of a disturbed catchment achieve a minimum of 70% final cover.
- Final removal of ESC to be undertaken in consultation with project CPESC.
- Controlling dust through progressive revegetation techniques.

6.8. Inspection and Maintenance

The following tasks will be undertaken to ensure all aspects of erosion and sediment control are being implemented:

- Arranging periodic inspections by the HLW CPESC and construction personnel to review and update control measures. Frequency will be determined based on the risk profile of the works being undertaken and the sensitivity of the location of works. All inspections will be documented in the site inspection form and records maintained on SharePoint.
- Additional inspections will be conducted:
    - Prior to rain events forecast to exceed a 50% chance of 10mm within 24hrs
    - During prolonged rainfall to monitor the functioning of controls.
    - Within 24 hours of cessation of a rainfall event causing runoff to occur on or from the HLW.
- Dedicated resources to ensure the progressive and continual implementation and maintenance of temporary erosion and sediment controls (eg sediment fences, diversion banks, diversion drains, sediment traps).
- Initiating a program to ensure regular maintenance of all erosion and sediment control measures. Sediment cleaned from structures, including sediment basins, to be deposited in secure locations where further pollution will not occur.

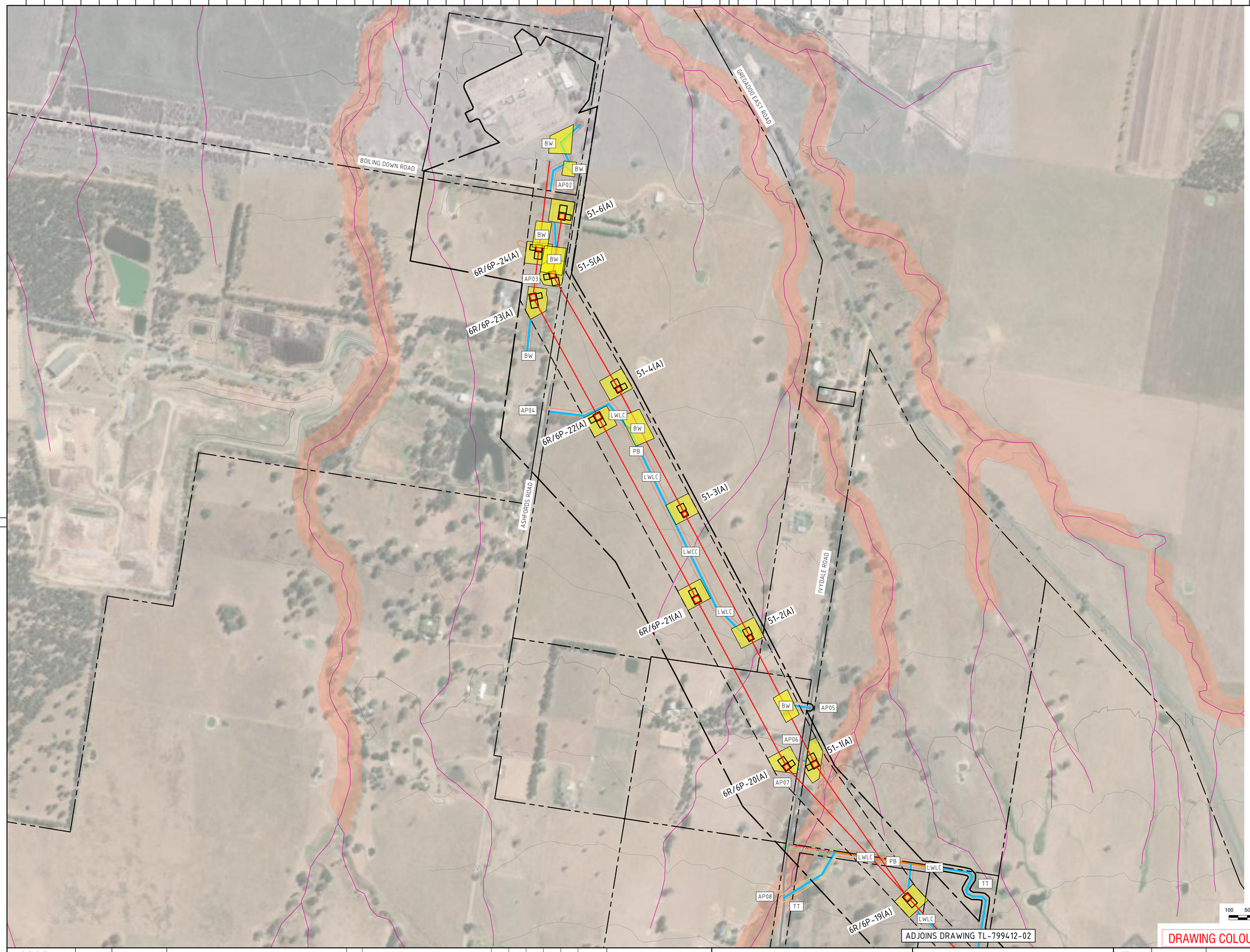
6.9. Documentation and Recording

The following records and reports will be generated by implementation of this Strategy:

- Rainfall / climatic records, using site deployed weather stations or Bureau of Meteorology wearhter station records (eg Wagga Wagga (AMO station (ID#72150) Tumbarumba RFS (ID#250162), Cabramurra SMHEA AWS (ID#072161).
- Pre-Rainfall Inspection and Post-Rainfall Inspection Reports which will include sections for location, control, recommendations/comment, action and ‘close-out’
- Monitoring weather forecasts for planning and site ‘securing’ purposes.
- Primary and Progressive ESCPs.
- Inspection reports completed by the HLW CPESC. The report will include sections for location, control, recommendations/comment, action and ‘close-out’.Register for Inspections and Maintenance to include volumes of sediment removed, surface water captured, treated, reused or disposed of and the method of disposal etc.
- Site notes distributed internally between environmental and construction personnel.

- Dewatering procedure and records.
- Meeting minutes.
- Formal correspondence (e.g Client, Environment Protection Authority).
- Water quality monitoring results (e.g sediment basins, upstream and downstream) in accordance with the Surface Water Monitoring Program.

ATTACHMENT 1. Example ESCP



LEGEND

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ACCESS TRACK CORRIDOR

- V13.2
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- V13.2 - HLWJV PROPOSED REMOVE 13.03.24

ACCESS TRACK TREATMENT

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ACCESS POINTS

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- BM 02 03 — BELLMOUTH, ??, ??

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100 50 0 100 200 300 400 500

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GENERAL ARRANGEMENT PLAN
SHEET 01 OF 43

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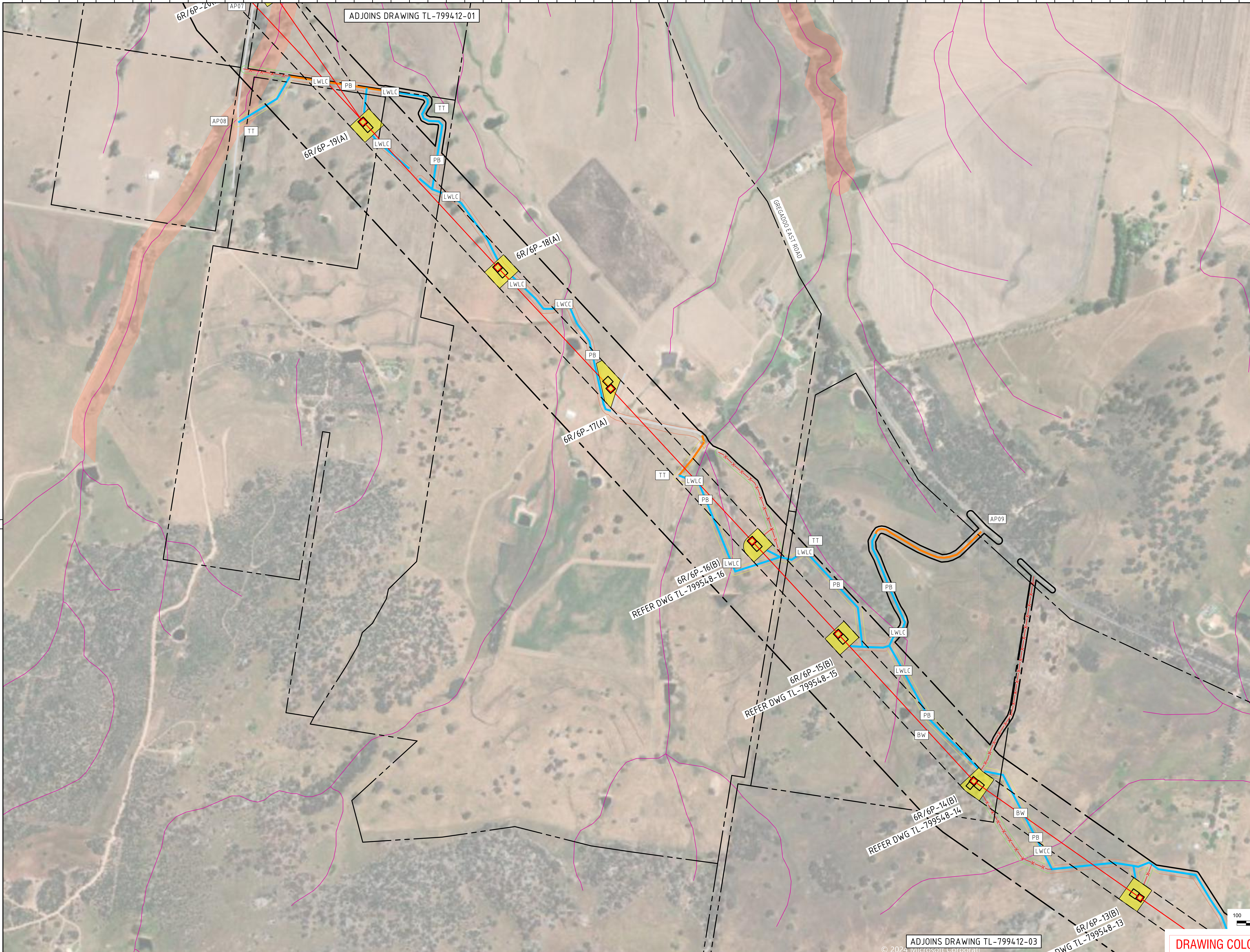

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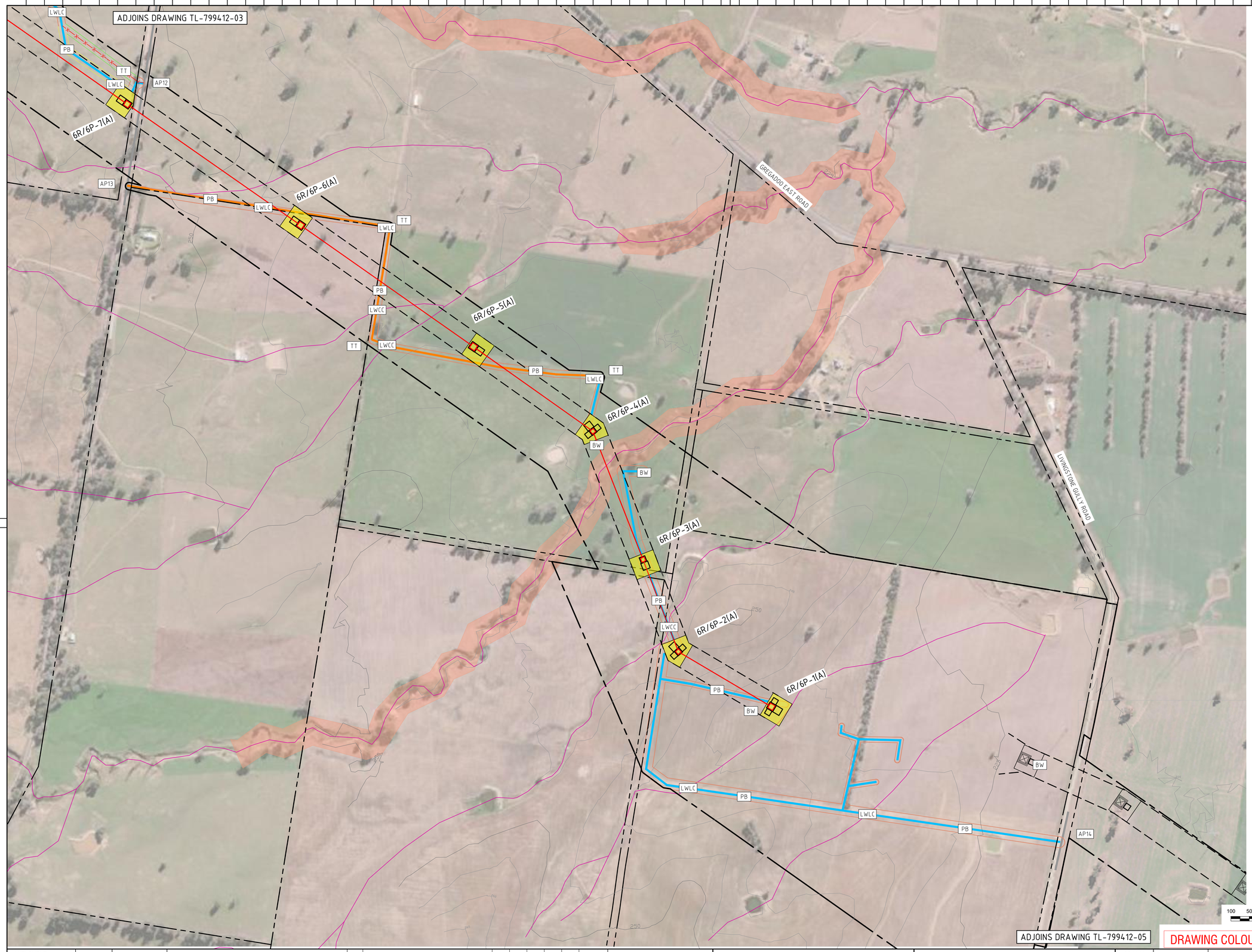

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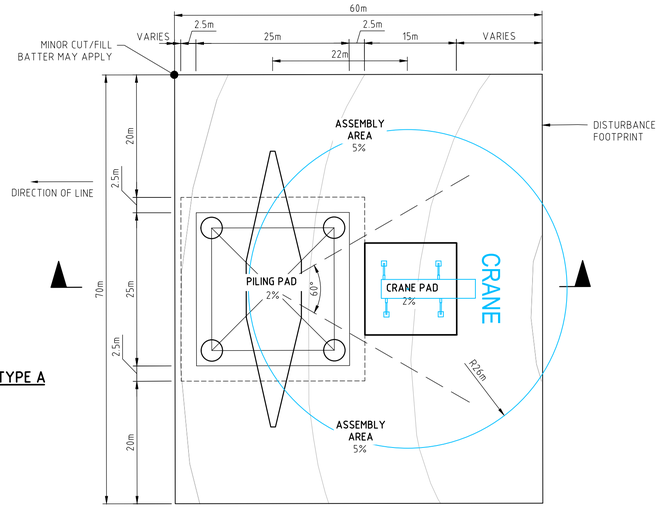
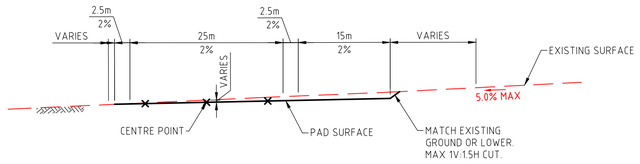
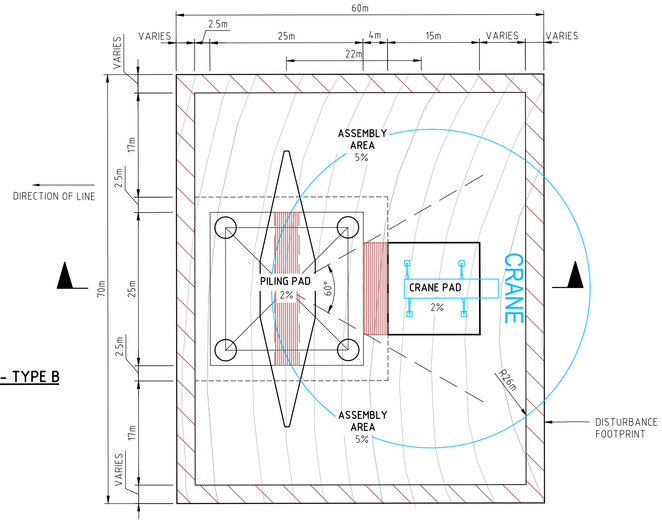


TYPICAL TOWER PAD - TYPE A SUSPENSION TOWERS

SCALE 1:500





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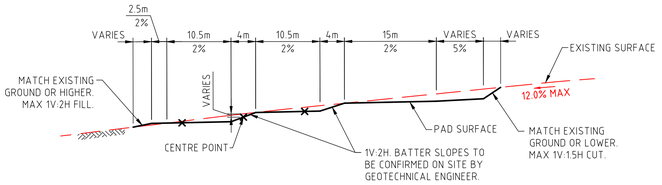

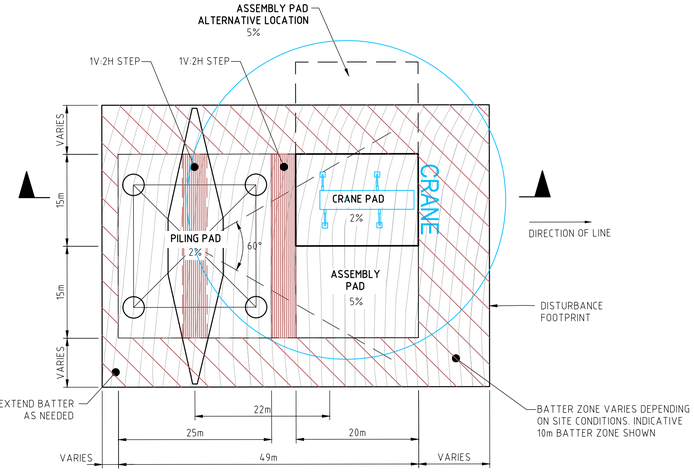

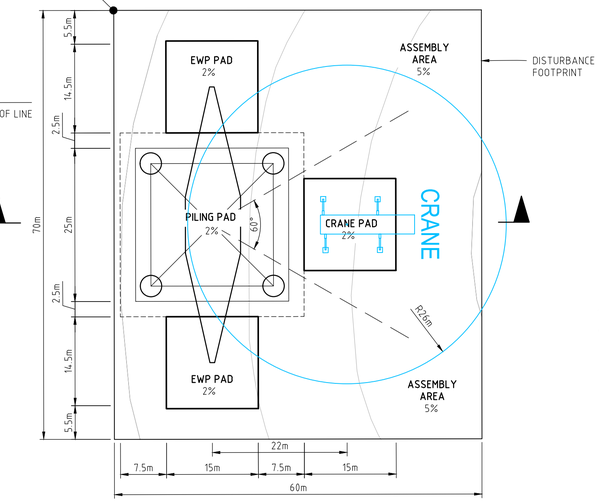

TYPICAL TOWER PAD - TYPE A STRAIN TOWERS

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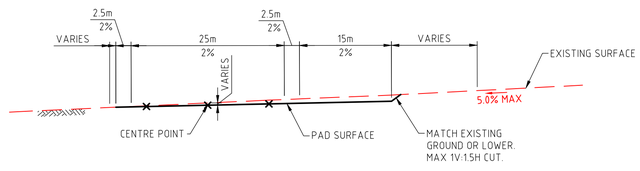

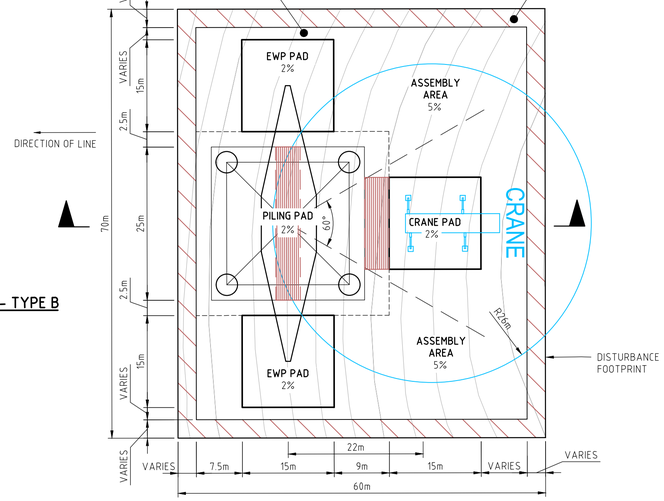

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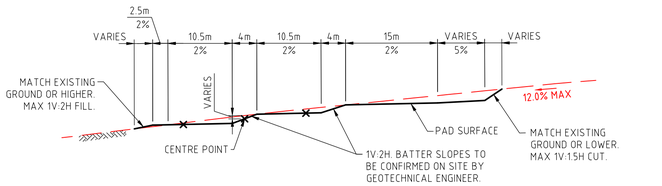

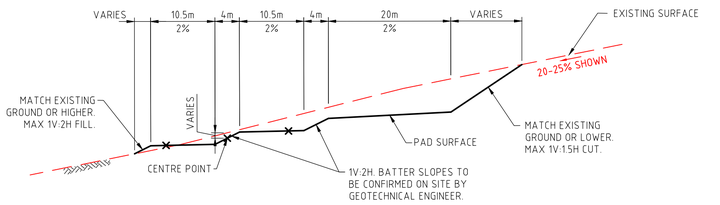

TYPICAL TOWER PAD - TYPE D TENSION TOWERS

SCALE 1:500

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F								
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D	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L2	MN	DH	BB	MN	TS	18/03/2024
C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	03/11/2023
AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE

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SCALE

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
TYPICAL SECTIONS

A1	TL-799414-01	F
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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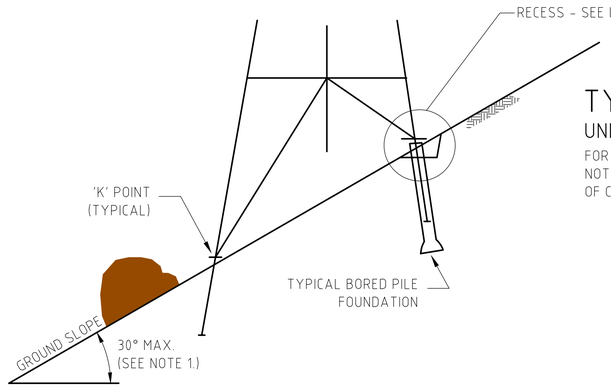
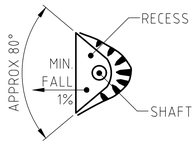


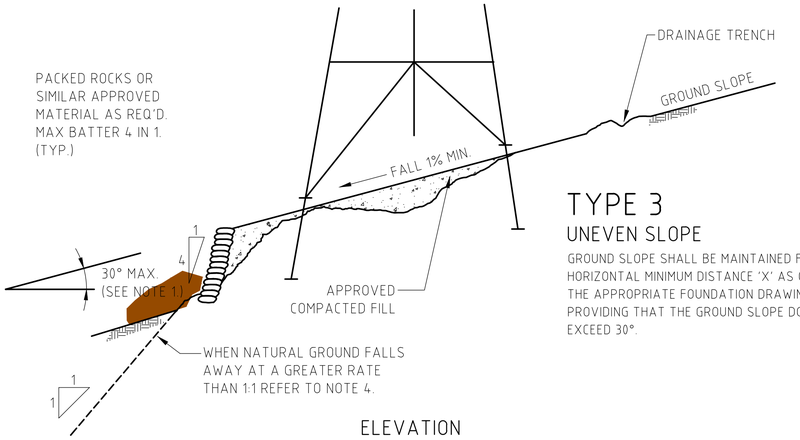
TYPE 1
UNIFORM SLOPE

FOR GROUND SLOPES UP TO 30°, BENCHING MAY NOT BE REQUIRED FOR BORED FOUNDATIONS. TOP OF CONCRETE PIER TO BE MIN 200MM ABOVE GL.

ELEVATION



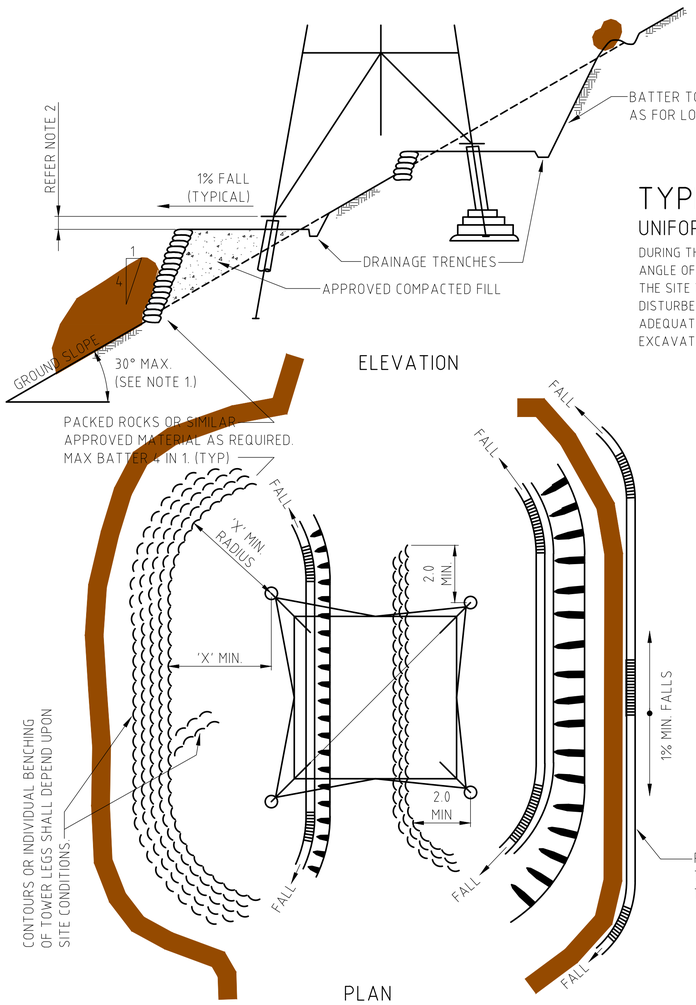
INSET PLAN



TYPE 3
UNEVEN SLOPE

GROUND SLOPE SHALL BE MAINTAINED FOR THE HORIZONTAL MINIMUM DISTANCE 'X' AS GIVEN ON THE APPROPRIATE FOUNDATION DRAWING, PROVIDING THAT THE GROUND SLOPE DOES NOT EXCEED 30°.

ELEVATION



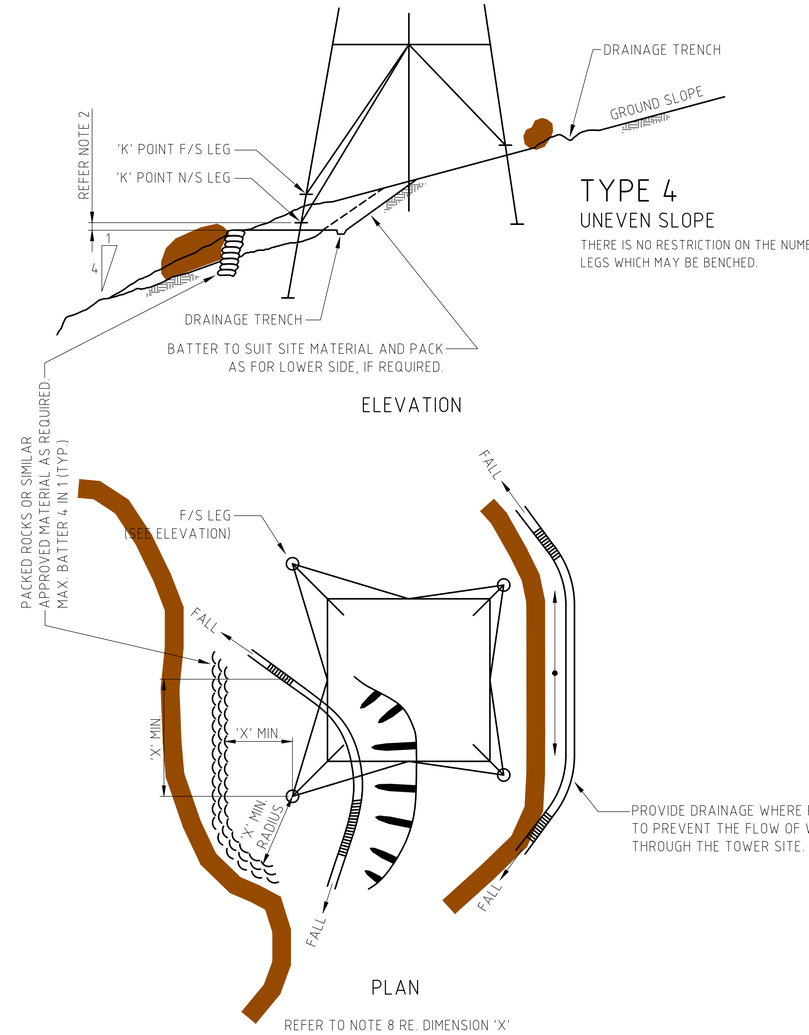
TYPE 2
UNIFORM SLOPE

DURING THE BACKFILLING OF OPEN EXCAVATIONS THE ANGLE OF SLOPE MAY MAKE IT DESIRABLE TO BENCH THE SITE TO PREVENT WATER FLOW SCOURING THE DISTURBED SURFACE AND TO ENSURE THAT THERE IS ADEQUATE MATERIAL ON THE DOWNHILL SIDE OF THE EXCAVATION TO RESIST UPLIFT FORCES.

ELEVATION

PLAN

REFER TO NOTE 8 RE. DIMENSION 'X'



TYPE 4
UNEVEN SLOPE

THERE IS NO RESTRICTION ON THE NUMBER OF LEGS WHICH MAY BE BENCHED.

ELEVATION

PLAN

REFER TO NOTE 8 RE. DIMENSION 'X'

NOTES

1. THIS DRAWING IS SUITABLE FOR SITES RANGING FROM HORIZONTAL UP TO A GROUND SLOPE OF 30°. FOR GROUND SLOPES GREATER THAN 30° SITE REQUIREMENTS AND FOUNDATION DESIGN SHALL BE DETERMINED BY THE CIVIL DESIGNER.
2. WHEN SITE CONDITIONS NECESSITATE BENCHING, THEN THE BENCH LEVEL SHALL BE SELECTED TO COMPLY WITH THE HEIGHT TO THE 'K' POINT ABOVE FINISHED GROUND LEVEL (BENCH LEVEL) AS SHOWN ON THE APPROPRIATE FOUNDATION DRAWING
3. ALL BACKFILL AND BENCHING MATERIALS SHALL BE COMPACTED TO NOT LESS THAN 95% SMDD AND SUFFICIENT QUANTITIES SHALL BE PROVIDED FOR FUTURE SETTLEMENT. SLOPING SITES REQUIRE PARTICULAR ATTENTION TO BE GIVEN TO THE DOWN HILL SIDE OF THE FOUNDATIONS. THEY HAVE THE LEAST VOLUME TO RESIST UPLIFT AND THEREFORE COMPACTION OF BACKFILL OR BENCHING MATERIAL IS OF PRIME IMPORTANCE.
4. WHEN NATURAL GROUND FALLS AWAY AT A GREATER RATE THAN 1:1, IN CLOSE PROXIMITY TO THE MINIMUM 'X' DIMENSION (REFER TO NOTE 3) AND IS OF ANY MATERIAL OTHER THAN SOLID ROCK, IT SHALL BE BROUGHT TO THE ATTENTION OF THE CIVIL DESIGNER. THIS SHALL APPLY IN ALL CASES
5. ON BENCHED SITES ADQUATE DRAINAGE SHALL BE PROVIDED TO DIVERT THE FLOW OF SURFACE WATER AWAY FROM THE DISTURBED SURFACE. BENCHING SHALL BE GRADED SO THAT PONDING AND EROSION DO NOT OCCUR.
6. DIMENSION 'X' SHALL BE 1.4 x DEPTH OF FOUNDATION.
7. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN METRES.
8. TOWER FOUNDATION BENCHING AND GRADIENTS TO BE INSTALLED AS PER INDIVIDUAL TOWER FOUNDATION AND ACCESS DESIGN DRAWINGS.
9. TIMBER MULCH FROM EASEMENT CLEARING TO BE UTILISED FOR WATER DIVERSION MOUNDS AND SEDIMENT CONTROL BUNDS. UPON COMPLETION OF ALL WORKS MULCH IS TO BE SPREAD OVER ALL BATTERS AND DISTURBED AREAS EXCLUDING ACCESS ROADS.
10. MINIMUM STRUCTURAL ADEQUACY OF MATERIALS FOR BENCHING, BATTERS, OR ROCK RETAINING STRUCTURES TO BE CONFIRMED BY ON SITE GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.

LEGEND

MULCH BERMS

0 2500 5000 7500 10000 15000 20000 25000mm

SCALE 1:250 AT ORIGINAL SIZE

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

AMENDMENT:		

11 APR 2024
FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
C	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
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SCALE NTS

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
TRANSGRID STANDARD BENCHING TYPES

A1	TL-799414-02	C
	PREFIX NUMBER SHEET	AMDT

566x801mm

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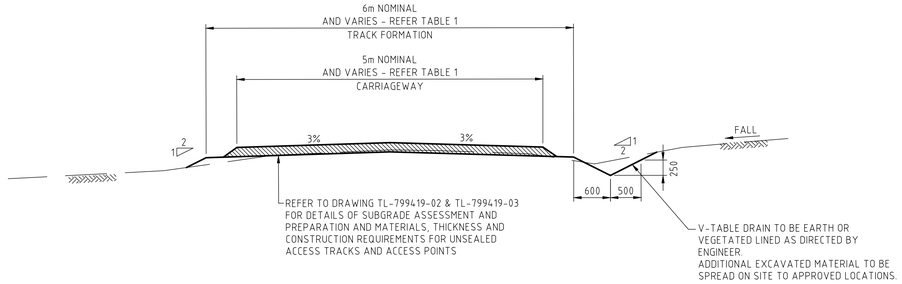
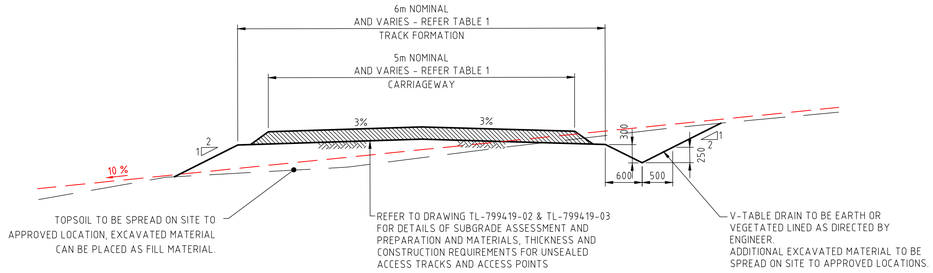


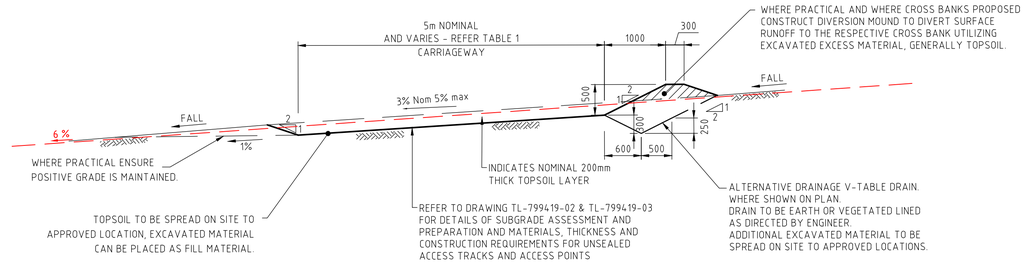
TYPICAL ACCESS TRACK SECTION - TYPE 1A &TYPE 2

UPGRADE / REPAIR EXISTING TRACK
WITH PAVEMENT FORMATION
SCALE 1:50



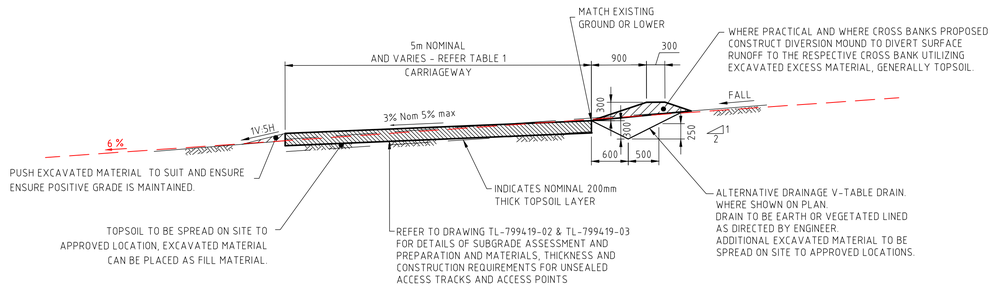
TYPICAL ACCESS TRACK SECTION - TYPE 2 & TYPE 3
TERRAIN SLOPE LESS THAN 10%

CUT TO FILL
WITH PAVEMENT FORMATION
SCALE 1:50



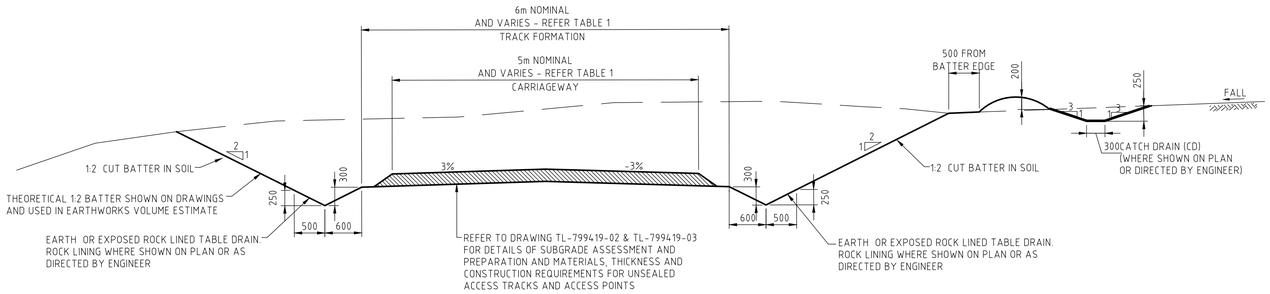
TYPICAL ACCESS TRACK SECTION - TYPE 2 & TYPE 3
TERRAIN SLOPE LESS THAN 6%

CUT TO DIVERSION MOUND - ALTERNATE OPTION
WITHOUT PAVEMENT FORMATION
SCALE 1:50



TYPICAL ACCESS TRACK SECTION - TYPE 2 & TYPE 3
TERRAIN SLOPE LESS THAN 6%

CUT TO DIVERSION MOUND - ALTERNATE OPTION
WITH PAVEMENT FORMATION
SCALE 1:50



TYPICAL ACCESS TRACK SECTION - TYPE 2, TYPE 3 & TYPE 4
CUT ONLY

WITH PAVEMENT FORMATION
SCALE 1:50

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:50

AMENDMENT:

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TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
TYPICAL SECTIONS - SHEET 1 OF 3

A1	TL-799415-01	F
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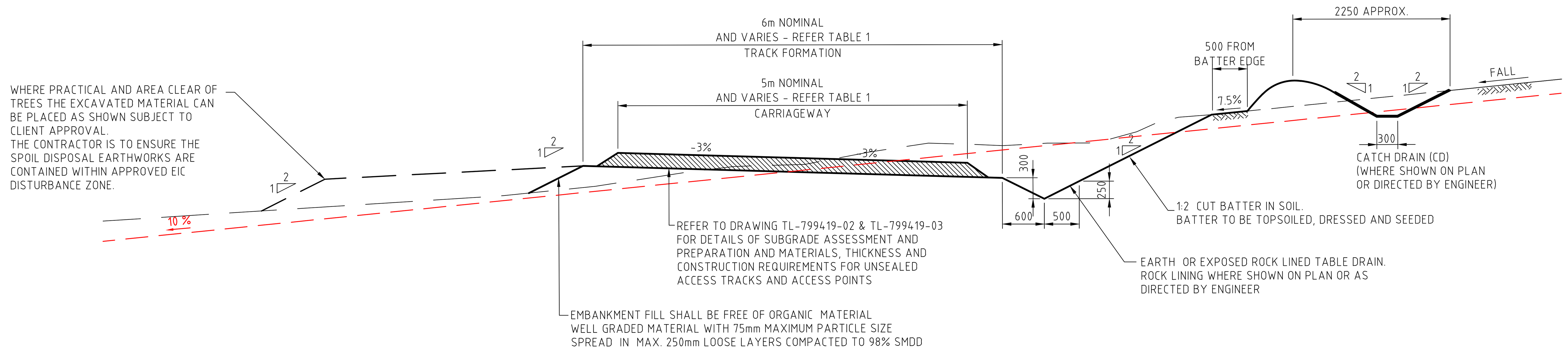
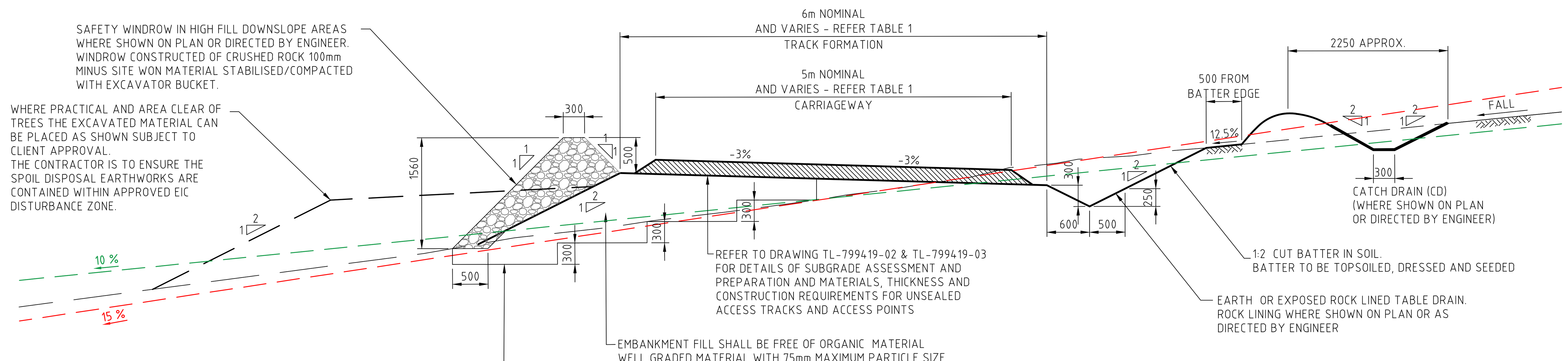


TYPICAL ACCESS TRACK SECTION - TYPE 4A

TERRAIN SLOPE LESS THAN 10%

SCALE 1:50



HILLSIDE EMBANKMENT TO BE KEYED/TERRACED IN EXISTING GROUND IN ACCORDANCE WITH RMS SPECIFICATION R44 AS FOLLOWS:
FOR SLOPES >4H:1V 600mm
FOR SLOPES >10H:1V and < 4H:1V 300mm
FOR SLOPES < 10H:1V TERRACES NOT REQUIRED.

TYPICAL ACCESS TRACK SECTION - TYPE 4B

TERRAIN SLOPE BETWEEN 10% TO 15%

SCALE 1:50

1.0 0.5 0 1.0 2.0 3.0 4.0 5.0

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:50

AMENDMENT:

UGL 11 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
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TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
TYPICAL SECTIONS - SHEET 2 OF 3

A1	TL-799415-02	F
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	INDEX CLASS'N	02-02

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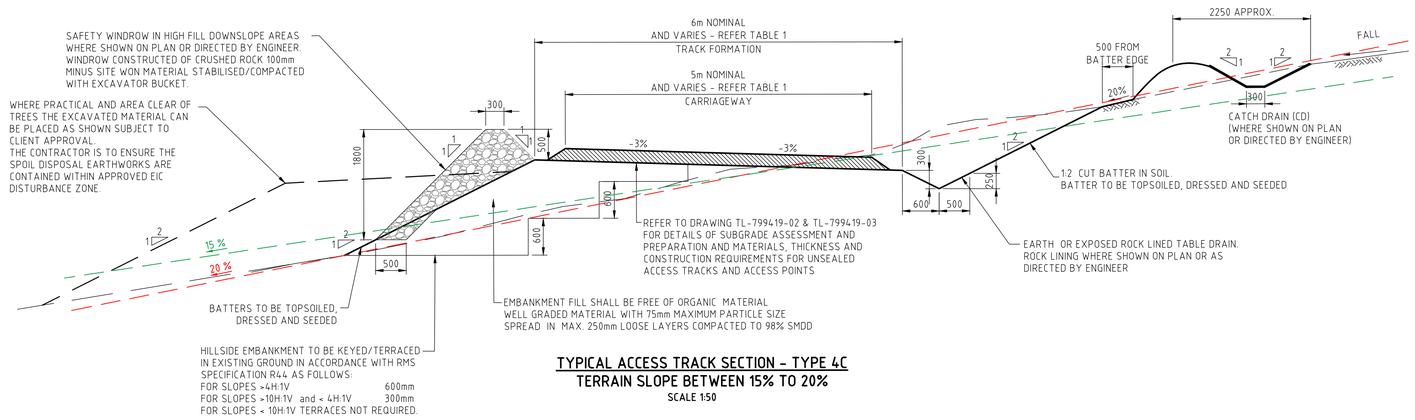
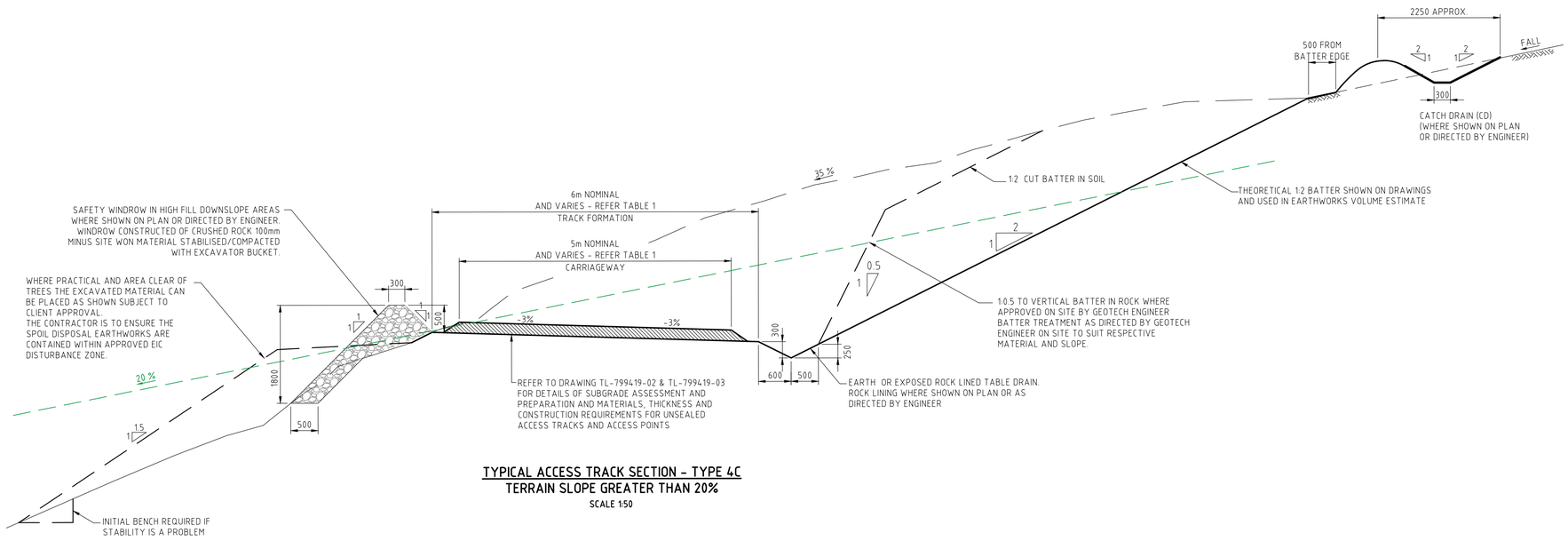


TYPICAL ACCESS TRACK SECTION - TYPE 4C
TERRAIN SLOPE BETWEEN 15% TO 20%
SCALE 1:50



TYPICAL ACCESS TRACK SECTION - TYPE 4C
TERRAIN SLOPE GREATER THAN 20%
SCALE 1:50

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:50

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F							
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C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
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TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
TYPICAL SECTIONS - SHEET 3 OF 3

A1	TL-799415-03	F
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

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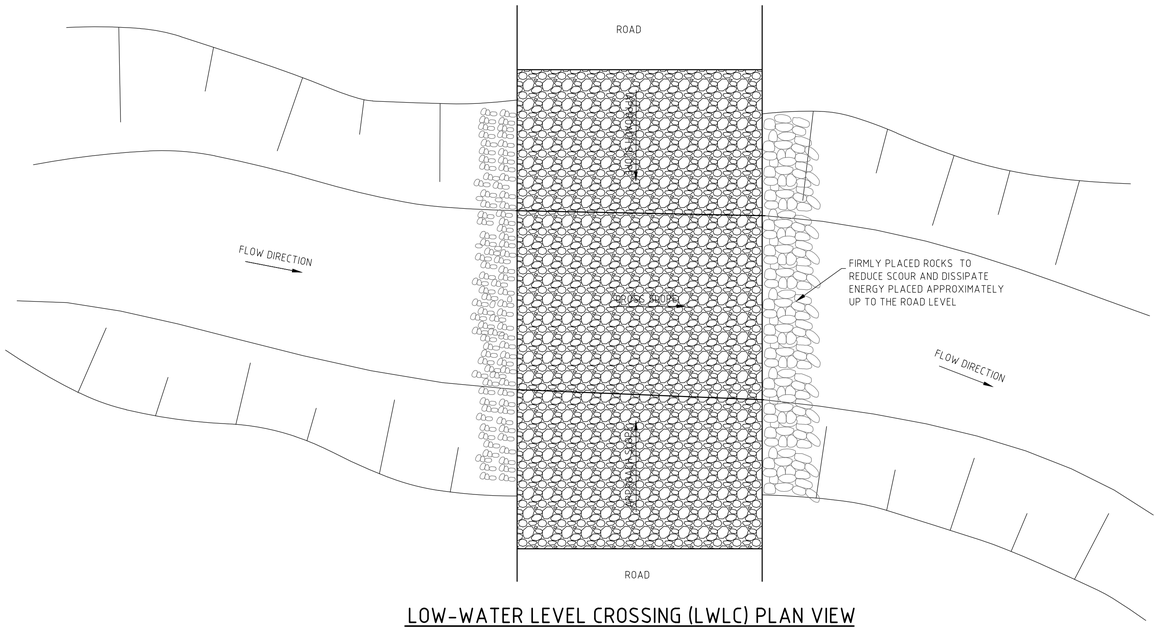
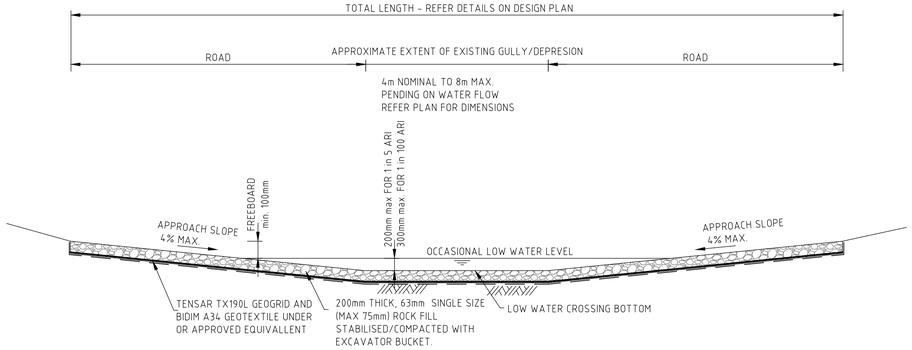
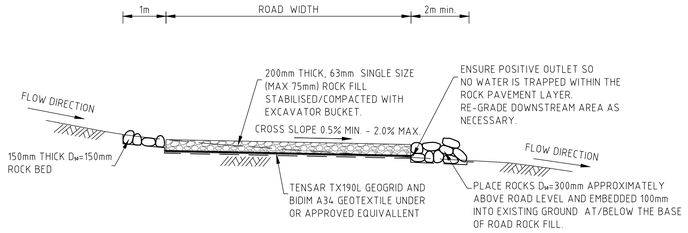


LOW-WATER LEVEL CROSSING (LWLC) PLAN VIEW



LOW-WATER LEVEL CROSSING ELEVATION



LOW-WATER LEVEL CROSSING SECTION

LOW WATER LEVEL CROSSING
DISCHARGE VELOCITY TABLE

Mannings "n"	Approach Slope	Cross Slope	Bed Width	Depth	Discharge	Velocity
	%	m/m		m	l/sec	m/sec
0.020	4.000	0.005	4.000	0.05	109	0.42
				0.10	398	0.61
				0.15	892	0.77
				0.20	1646	0.91
			8.000	0.05	203	0.44
				0.10	690	0.66
				0.15	1453	0.82
				0.20	2560	0.98
		0.010	4.000	0.05	154	0.59
				0.10	563	0.87
				0.15	1261	1.08
				0.20	2327	1.29
			8.000	0.05	287	0.62
				0.10	976	0.93
				0.15	2055	1.17
				0.20	3621	1.39
		0.020	4.000	0.05	218	0.83
				0.10	797	1.23
				0.15	1783	1.53
				0.20	3291	1.83
			8.000	0.05	407	0.88
				0.10	1380	1.31
				0.15	2906	1.65
				0.20	5120	1.97
	2.000	0.005	4.000	0.05	126	0.39
				0.10	511	0.57
				0.15	1232	0.71
				0.20	2383	0.85
			8.000	0.05	218	0.42
				0.10	797	0.61
				0.15	1784	0.77
				0.20	3292	0.91
		0.010	4.000	0.05	178	0.55
				0.10	722	0.80
				0.15	1742	1.01
				0.20	3370	1.20
			8.000	0.05	309	0.59
				0.10	1127	0.87
				0.15	2522	1.08
				0.20	4656	1.29
		0.020	4.000	0.05	251	0.77
				0.10	1021	1.13
				0.15	2464	1.43
				0.20	4765	1.70
			8.000	0.05	437	0.83
				0.10	1594	1.23
				0.15	3567	1.53
				0.20	6584	1.83

AMENDMENT:

UGL 11 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
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TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
LOW WATER CROSSING DETAILS - TYPE 1

A1	TL-799415-05	E
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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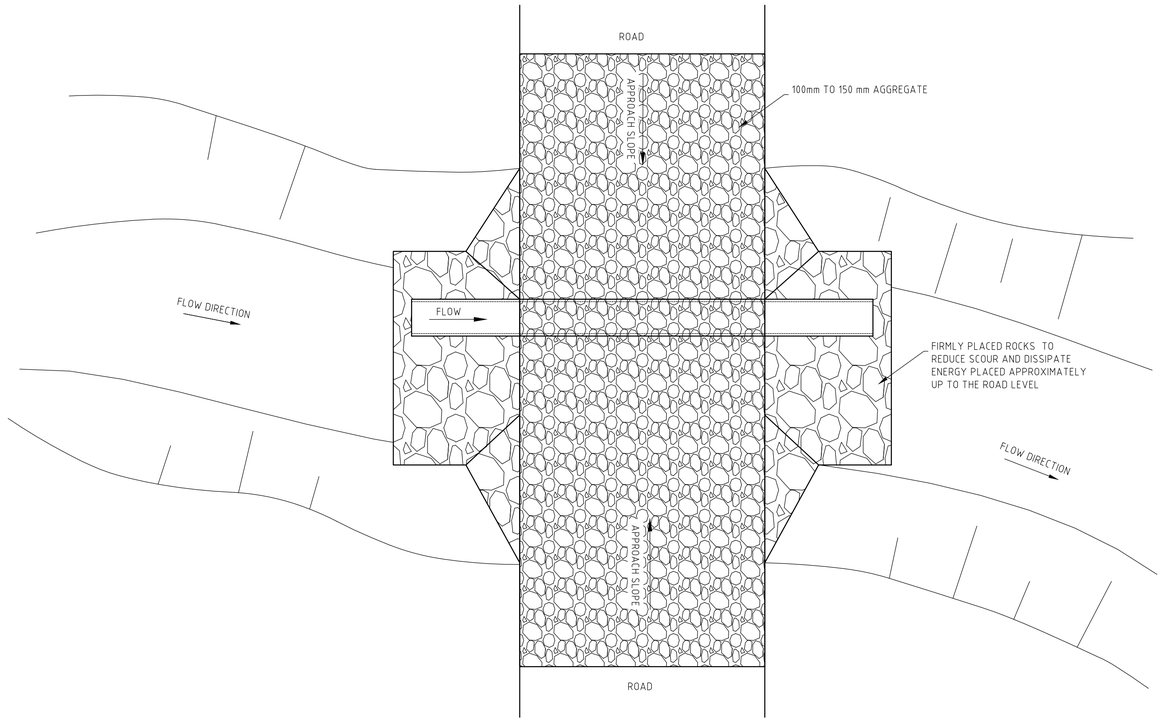
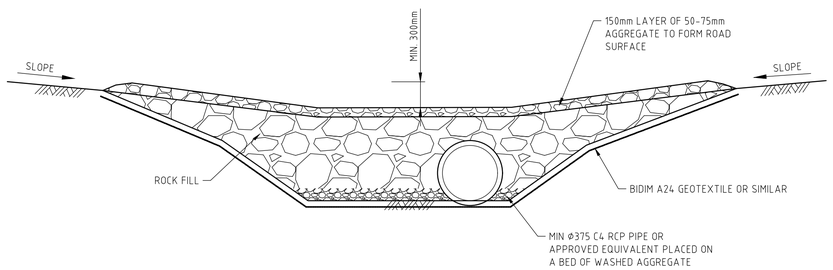
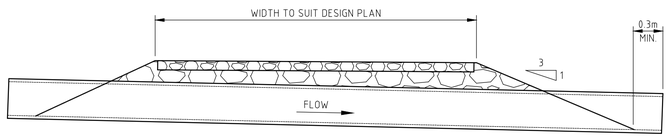


ROAD LOW WATER CROSSING WITH CULVERT
PLAN
NTS



ROAD LOW WATER CROSSING WITH CULVERT
TYPICAL ELEVATION
NTS



ROAD LOW WATER CROSSING WITH CULVERT
TYPICAL CROSS SECTION
NTS

AMENDMENT:

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AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
E	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
D	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L2	MN	DH	BB	MN	TS	18/03/2024
C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	27/10/2023

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REFERENCE DRAWINGS

SCALE

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HUMELINK WEST
TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
LOW WATER CROSSING DETAILS - TYPE 2

A1	TL-799415-06	E
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$

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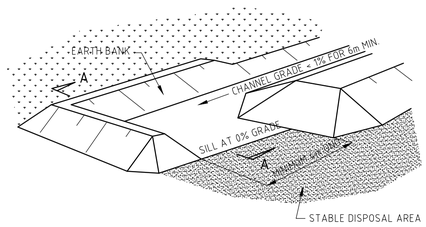
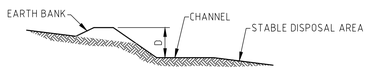


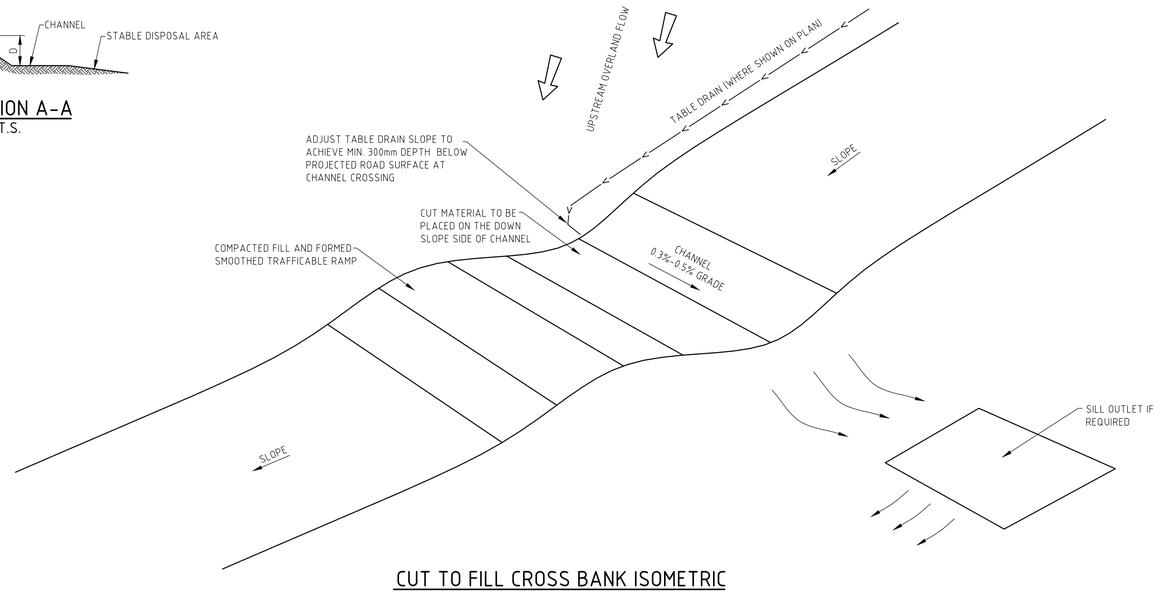
SILL OUTLET
N.T.S.



SECTION A-A
N.T.S.

CONSTRUCTION NOTES:

1. CONSTRUCT AT THE GRADIENT SPECIFIED ON THE ESCP OR SWMP, NORMALLY BETWEEN 1% AND 5%.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V-SHAPED, AT THE DIMENSIONS SHOWN ON THE SWMP.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION FOLLOWING TABLE 5.2 IN LANCOM (2004).
7. WHERE DISCHARGING TO ERODIBLE LANDS, ENSURE THEY OUTLET THROUGH A PROPERLY CONSTRUCTED LEVEL SPREADER.
8. CONSTRUCT THE LEVEL SPREADER AT THE GRADIENT SPECIFIED ON THE ESCP OR SWMP NORMALLY LESS THAN 1% OR LEVEL.
9. WHERE POSSIBLE, ENSURE THEY DISCHARGE WATERS ONTO EITHER STABILISED OR UNDISTURBED DISPOSAL SITES WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED. APPROVAL MAY BE REQUIRED TO DISCHARGE INTO SUBCATCHMENTS.



CUT TO FILL CROSS BANK ISOMETRIC
N.T.S.

ARTICULATED VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

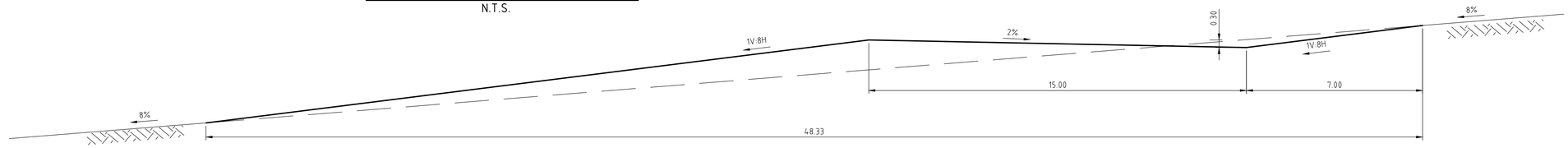
Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.020	0.0050	0.10	358	0.59
		0.20	1585	0.93
		0.30	3713	1.18
		0.36	5657	1.34
	0.0100	0.10	507	0.83
		0.20	2242	1.31
		0.30	5251	1.67
		0.36	8000	1.89
0.018	0.0050	0.10	398	0.65
		0.20	1761	1.03
		0.30	4126	1.31
		0.36	6285	1.49
	0.0100	0.10	563	0.92
		0.20	2491	1.46
		0.30	5835	1.85
		0.36	8888	2.10

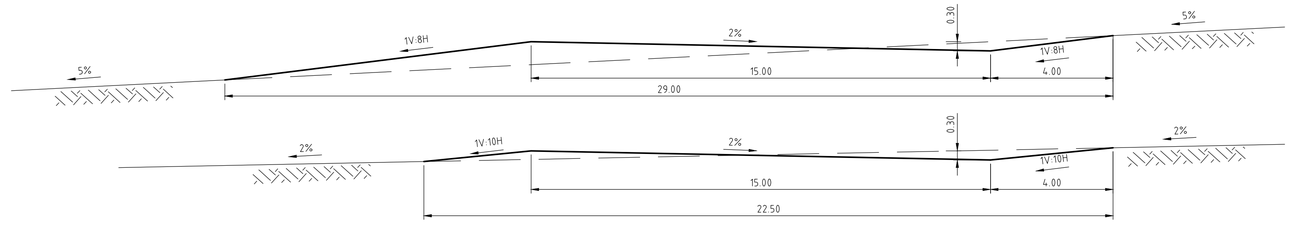
SMALL RIGID VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.018	0.005	0.10	154	0.53
		0.20	981	0.85
		0.30	2892	1.11
	0.010	0.10	218	0.75
		0.20	1387	1.20
		0.30	4090	1.57

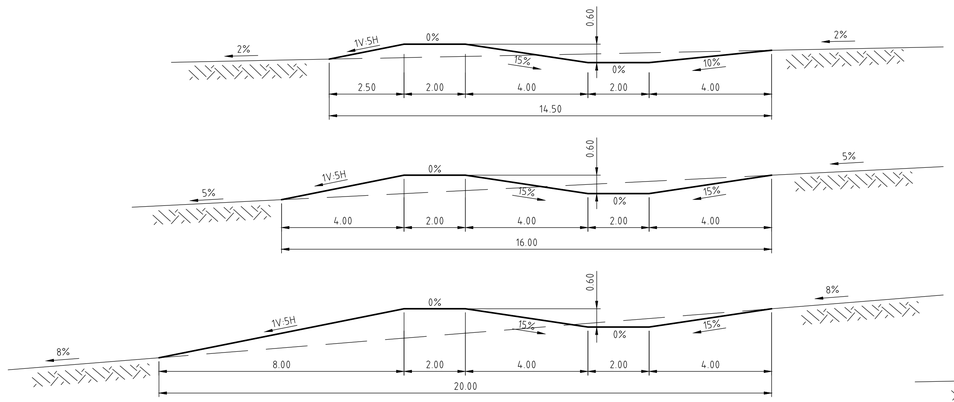
4WD VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.018	0.005	0.10	194	0.73
		0.20	713	1.07
		0.30	1604	1.34
	0.010	0.10	274	1.03
		0.20	1008	1.51
		0.30	2269	1.89

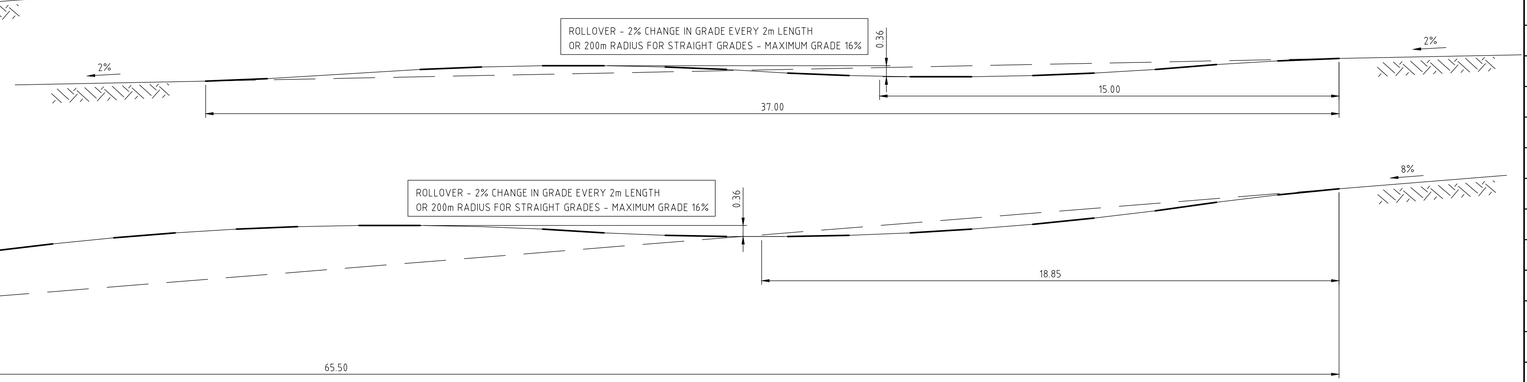




CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY CARS AND SMALL RIGID VEHICLES (WB-SRV)
SCALE 1:100



CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY 4WD ONLY (MIN. 200mm GROUND CLEARANCE)
SCALE 1:100



CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY ARTICULATED VEHICLES (WB-AV)
SCALE 1:100

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:100

AMENDMENT:

UGL 11 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
E	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
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C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	03/11/2023

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SCALE

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HUMELINK WEST
TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
CROSS BANK DETAILS

A1	TL-799415-07	E
	PREFIX NUMBER SHEET	AMDT

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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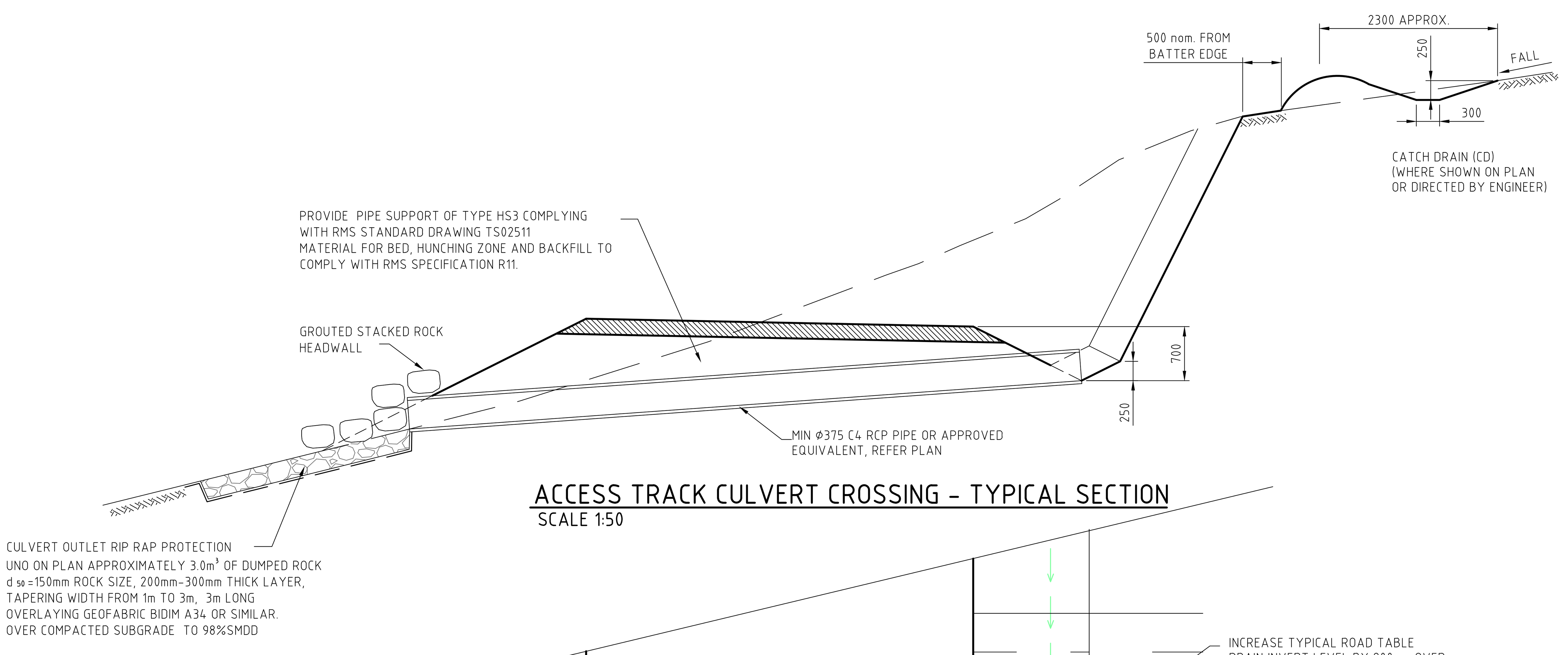
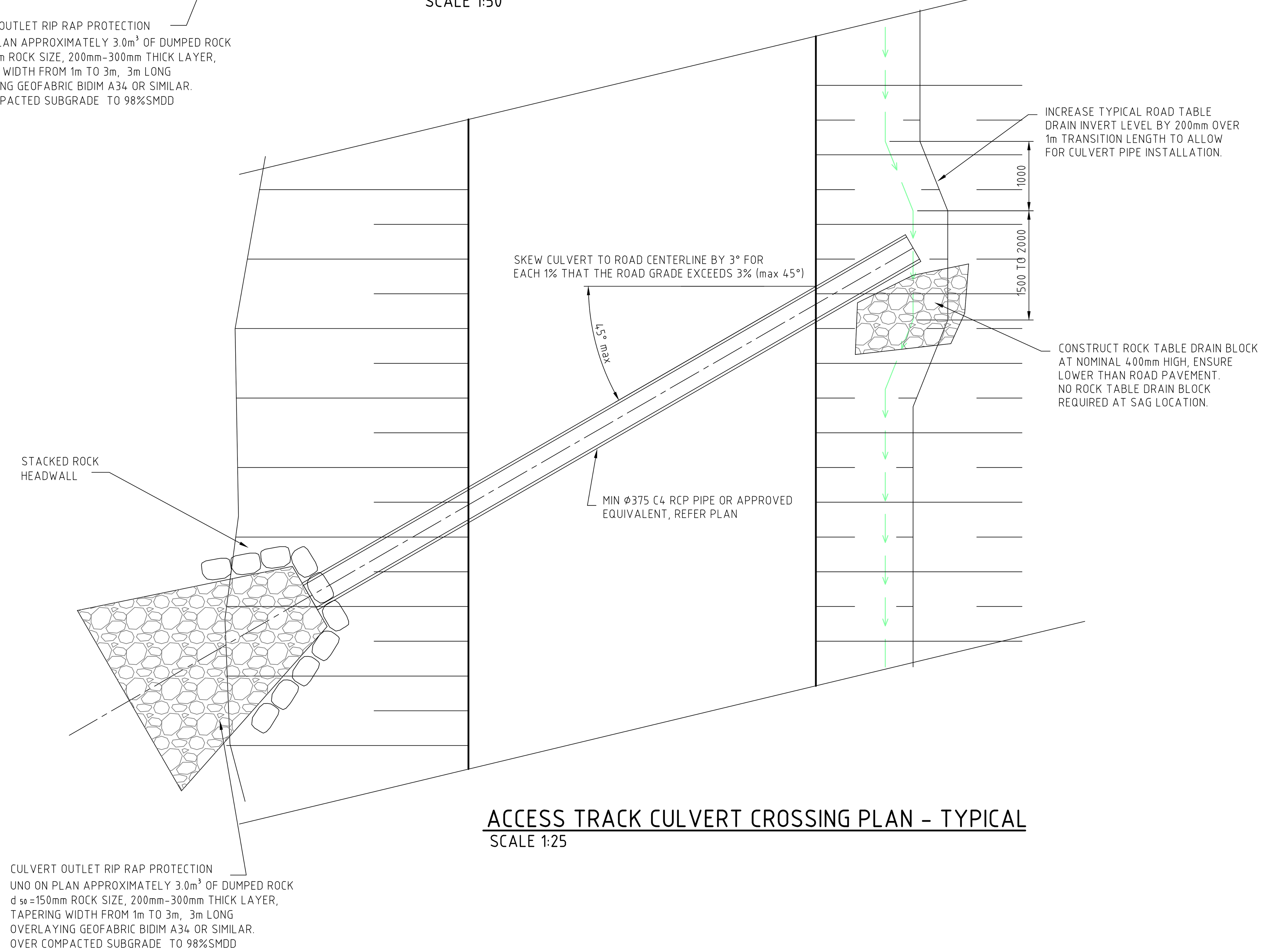


ACCESS TRACK CULVERT CROSSING – TYPICAL SECTION

SCALE 1:50



ACCESS TRACK CULVERT CROSSING PLAN – TYPICAL

SCALE 1:25

ROAD TABLE DRAIN
V-DRAIN GRASS LINED WITH 1 in 3 BATTER SLOPES
DISCHARGE/DEPTH/VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.035	0.010	0.100	11	0.37
		0.200	71	0.59
		0.300	210	0.78
		0.400	453	0.94
		0.500	821	1.09
	0.020	0.100	16	0.53
		0.200	101	0.84
		0.300	297	1.10
		0.400	640	1.33
		0.500	1161	1.55
	0.030	0.100	19	0.65
		0.200	124	1.03
		0.300	364	1.35
		0.400	784	1.63
		0.500	1422	1.90
	0.040	0.100	22	0.75
		0.200	143	1.19
		0.300	421	1.56
		0.400	906	1.89
		0.500	1642	2.19
	0.050	0.100	25	0.84
		0.200	159	1.33
		0.300	470	1.74
		0.369	817	2.00
		0.400	1013	2.11
		0.500	1.836	2.45
	0.060	0.100	28	0.92
		0.200	175	1.46
		0.300	515	1.91
		0.322	623	2.00
		0.400	1109	2.31
		0.500	2011	2.68
	0.070	0.100	30	0.99
		0.200	189	1.57
		0.287	494	2.00
		0.300	556	2.06
		0.400	1198	2.50
		0.500	2172	2.90
	0.080	0.100	32	1.06
		0.200	202	1.68
		0.260	404	2.00
		0.300	595	2.20
		0.400	1281	2.67
		0.500	2322	3.10
	0.090	0.100	34	1.12
		0.200	214	1.78
		0.238	339	2.00
		0.300	631	2.34
		0.400	1359	2.83
		0.500	2463	3.28
	0.100	0.100	36	1.18
		0.200	226	1.88
		0.220	290	2.00
		0.300	665	2.46
		0.400	1432	2.98
		0.500	2596	3.46
	0.110	0.100	37	1.24
		0.200	237	1.97
		0.204	251	2.00
		0.300	697	2.58
		0.400	1.502	3.13

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.035	0.120	0.050	6	0.82
		0.100	39	1.30
		0.150	115	1.70
		0.192	220	2.00
		0.200	247	2.06
		0.250	448	2.39
	0.130	0.050	6	0.85
		0.100	40	1.35
		0.150	119	1.77
		0.180	195	2.00
		0.200	257	2.14
		0.250	466	2.49
	0.140	0.050	7	0.88
		0.100	42	1.40
		0.150	124	1.84
		0.171	175	2.00
		0.200	267	2.22
		0.250	484	2.58
	0.150	0.050	7	0.91
		0.100	44	1.45
		0.150	128	1.90
		0.162	158	2.00
		0.200	276	2.30
		0.250	501	2.67
	0.160	0.050	7	0.94
		0.100	45	1.50
		0.150	132	1.96
		0.154	143	2.00
		0.200	285	2.38
		0.250	517	2.76
	0.170	0.050	7	0.97
		0.100	46	1.54
		0.147	130	2.00
		0.150	137	2.02
		0.200	294	2.45
		0.250	533	2.84
	0.180	0.050	8	1.00
		0.100	48	1.59
		0.141	120	2.00
		0.150	140	2.08
		0.200	303	2.52
		0.250	549	2.93
	0.190	0.050	8	1.03
		0.100	49	1.63
		0.136	110	2.00
		0.150	144	2.14
		0.200	311	2.59
		0.250	564	3.01
	0.200	0.050	8	1.05
		0.100	50	1.67
		0.131	102	2.00
		0.150	148	2.19
		0.200	319	2.66
		0.250	578	3.08
	0.210	0.050	8	1.08
		0.100	51	1.72
		0.126	95	2.00
		0.150	152	2.25
		0.200	327	2.72
		0.250	593	3.16

NOTE: VALUES IN RED INDICATE FLOW VELOCITY EXCEEDS ALLOWABLE FLOW VELOCITY FOR PROPOSED DRAIN LINING.
U.N.O. ON PLAN DRAIN TO BE ROCK LINED.

ROAD TABLE DRAIN
V-DRAIN ROCK LINED 1 in 3 BATTER SLOPES
DISCHARGE/DEPTH/VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.025	0.050	0.100	35	1.17
		0.200	223	1.86
		0.300	658	2.44
		0.400	1418	2.95
		0.410	1509	3.00
		0.500	2570	3.43
	0.060	0.100	39	1.28
		0.200	245	2.04
		0.300	721	2.67
		0.357	1148	3.00
		0.400	1553	3.24
		0.500	2816	3.75
	0.070	0.100	42	1.39
		0.200	264	2.20
		0.300	779	2.88
		0.318	911	3.00
		0.400	1677	3.49
		0.500	3041	4.05
	0.080	0.100	44	1.48
		0.200	282	2.35
		0.288	746	3.00
		0.300	833	3.08
		0.400	1793	3.74
		0.500	3251	4.33
	0.090	0.100	47	1.57
		0.200	300	2.50
		0.263	625	3.00
		0.300	883	3.27
		0.400	1902	3.96
		0.500	3.448	4.60
	0.100	0.100	50	1.66
		0.200	316	2.63
		0.243	533	3.00
		0.300	931	3.45
		0.400	2005	4.18
		0.500	3635	4.85
	0.110	0.100	52	1.74
		0.200	331	2.76
		0.227	462	3.00
		0.300	976	3.62
		0.400	2103	4.38
		0.500	3812	5.08
	0.120	0.050	9	1.14
		0.100	54	1.82
		0.150	161	2.38
		0.200	346	2.88
		0.212	406	3.00
		0.250	627	3.34
	0.130	0.050	9	1.19
		0.100	57	1.89
		0.150	167	2.48
		0.200	360	3.00
		0.250	653	3.48
	0.140	0.050	9	1.24
		0.100	59	1.96
		0.150	173	2.57
		0.189	322	3.00
		0.200	374	3.11
		0.250	677	3.61
	0.150	0.050	10	1.28
		0.100	61	2.03
		0.150	180	2.66
		0.180	290	3.00
		0.200	387	3.22
		0.250	701	3.74
	0.160	0.050	10	1.32
		0.100	63	2.10
		0.150	185	2.75
		0.171	263	3.00
		0.200	399	3.33
		0.250	724	3.86
	0.170	0.050	10	1.36
		0.100	65	2.16
		0.150	191	2.83
		0.163	240	3.00
		0.200	412	3.43
		0.250	746	3.98
	0.180	0.050	11	1.40
		0.100	67	2.22
		0.150	197	2.91
		0.200	424	3.53
		0.250	768	4.10
	0.190	0.050	11	1.44
		0.100	69	2.28
		0.150	204	3.00
		0.200	435	3.63
		0.250	789	4.21
	0.200	0.050	11	1.48
		0.100	70	2.34
		0.145	189	3.00
		0.150	207	3.07
		0.200	447	3.72
		0.250	810	4.32
	0.210	0.050	11	1.51
		0.100	72	2.40
		0.140	175	3.00
		0.150	212	3.15
		0.200	458	3.81
		0.250	830	4.42

NOTE: VALUES IN RED INDICATE FLOW VELOCITY EXCEEDS ALLOWABLE FLOW VELOCITY FOR PROPOSED DRAIN LINING.
U.N.O. ON PLAN DRAIN TO BE ROCK LINED.

CATCH DRAIN
TRAPEZOIDAL DRAIN 0.3m BASE WIDTH 1 in 3 BATTER SLOPES -GRASS LINED
DISCHARGE/DEPTH/VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.035	0.010	0.050	7	0.31
		0.100	27	0.46
		0.150	64	0.57
		0.200	121	0.67
		0.250	201	0.77
		0.300	292	0.80
		0.400	588	0.90
		0.500	1066	1.03
	0.020	0.050	10	0.44
		0.100	39	0.65
		0.150	91	0.81
		0.200	172	0.95
		0.250	284	1.08
		0.300	413	1.13
		0.400	831	1.28
		0.500	1507	1.45
	0.030	0.050	12	0.54
		0.100	48	0.79
		0.150	112	0.99
		0.200	210	1.17
		0.250	348	1.33
		0.300	505	1.38
		0.400	1018	1.57
		0.500	1.846	1.78
	0.040	0.050	14	0.63
		0.100	55	0.92
		0.150	129	1.15
		0.200	243	1.35
		0.250	402	1.53
		0.300	584	1.60
		0.400	1175	1.81
		0.478	1885	2.00
		0.500	2132	2.05
	0.050	0.050	16	0.70
		0.100	61	1.02
		0.150	144	1.28
		0.200	271	1.51
		0.250	450	1.71
		0.300	652	1.79
		0.391	1240	2.00
		0.400	1314	2.02
		0.500	2383	2.30
	0.060	0.050	17	0.77
		0.100	67	1.12
		0.150	158	1.40
		0.200	297	1.65
		0.250	493	1.88
		0.300	715	1.96
		0.320	825	2.00
		0.400	1440	2.22
		0.500	2611	2.52
	0.070	0.050	19	0.83
		0.100	73	1.21
		0.150	170	1.52
		0.200	321	1.78
		0.244	504	2.00
		0.250	532	2.03
		0.300	772	2.11
		0.400	1555	2.39
		0.500	2820	2.72
	0.080	0.050	20	0.89
		0.100	78	1.29
		0.150	182	1.62
		0.200	343	1.91
		0.218	415	2.00
		0.250	569	2.17
		0.300	825	2.26
		0.400	1662	2.56
		0.500	3015	2.91
	0.090	0.050	21	0.94
		0.100	82	1.37
		0.150	193	1.72
		0.196	349	2.00
		0.200	364	2.02
		0.250	603	2.30
		0.300	875	2.40
		0.400	1763	2.71
		0.500	3198	3.08

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.035	0.100	0.050	22	0.99
		0.100	87	1.45
		0.150	204	1.81
		0.179	300	2.00
		0.200	384	2.13
		0.250	636	2.42
		0.300	923	2.52
		0.400	1895	2.86
		0.500	3371	3.25
	0.110	0.050	23	1.04
		0.100	91	1.52
		0.150	214	1.90
		0.164	261	2.00
		0.200	402	2.23
		0.250	667	2.54
		0.300	968	2.65
		0.400	1949	3.00
		0.500	3535	3.41
	0.120	0.050	24	1.09
		0.100	95	1.59
		0.150	223	1.98
		0.152	230	2.00
		0.200	420	2.33
		0.250	697	2.65
		0.300	1011	2.77
		0.400	2036	3.13
		0.500	3692	3.56
	0.130	0.050	25	1.13
		0.100	99	1.65
		0.142	205	2.00
		0.150	232	2.06
		0.200	437	2.43
		0.250	725	2.76
		0.300	1052	2.88
		0.400	2119	3.26
		0.500	3843	3.70
	0.140	0.050	26	1.17
		0.100	103	1.71
		0.133	185	2.00
		0.150	241	2.14
		0.200	454	2.52
		0.250	753	2.87
		0.300	1092	2.99
		0.400	2199	3.39
		0.500	3988	3.84
	0.150	0.050	27	1.22
		0.100	106	1.77
		0.125	168	2.00
		0.150	249	2.22
		0.200	470	2.61
		0.250	779	2.97
		0.300	1130	3.09
		0.400	2276	3.50
		0.500	4128	3.98
	0.160	0.050	28	1.26
		0.100	110	1.83
		0.117	153	2.00
		0.150	258	2.29
		0.200	485	2.70
		0.250	805	3.07
		0.300	1167	3.19
		0.400	2351	3.62
		0.500	4263	4.11
	0.170	0.050	28	1.29
		0.100	113	1.89
		0.111	141	2.00
		0.150	266	2.36
		0.200	500	2.78
		0.250	829	3.16
		0.300	1203	3.29
		0.400	2423	3.73
		0.500	4395	4.24
	0.180	0.050	30	1.33
		0.100	106	1.94
		0.106	130	2.00
		0.150	273	2.43
		0.200	515	2.86
		0.250	853	3.25
		0.300	1238	3.39
		0.400	2493	3.84
		0.500	4522	4.36

NOTE: VALUES IN RED INDICATE FLOW VELOCITY EXCEEDS ALLOWABLE FLOW VELOCITY FOR PROPOSED DRAIN LINING.
U.N.O. ON PLAN DRAIN TO BE ROCK LINED.

DRAINS LINING TYPE LEGEND TO BE USED ON PLAN DRAWINGS

- ACCESS TRACK TABLE DRAIN -VEGETATED
- ACCESS TRACK TABLE DRAIN -INTO EXPOSED NATURAL ROCK
- ACCESS TRACK TABLE DRAIN -ROCK LINED
- CATCH DRAIN - VEGETATED

0 500 1000 1500 2000 3000 4000 5000mm
SCALE 1:50 AT ORIGINAL SIZE

AMENDMENT:

UGL
11 APR 2024
FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
E	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
D	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L2	MN	DH	BB	MN	TS	18/03/2024
C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	27/10/2023

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REFERENCE DRAWINGS

DRAWN
REVIEWED
VERIFIED
APPROVED
APPROVAL STATUS
SCALE

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HUMELINK WEST
TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
CULVERT CROSSING AND EARTH DRAINS FLOW CAPACITY TABLES

A1	TL-799415-08	E
	PREFIX NUMBER SHEET	AMDT

566x801mm
PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$
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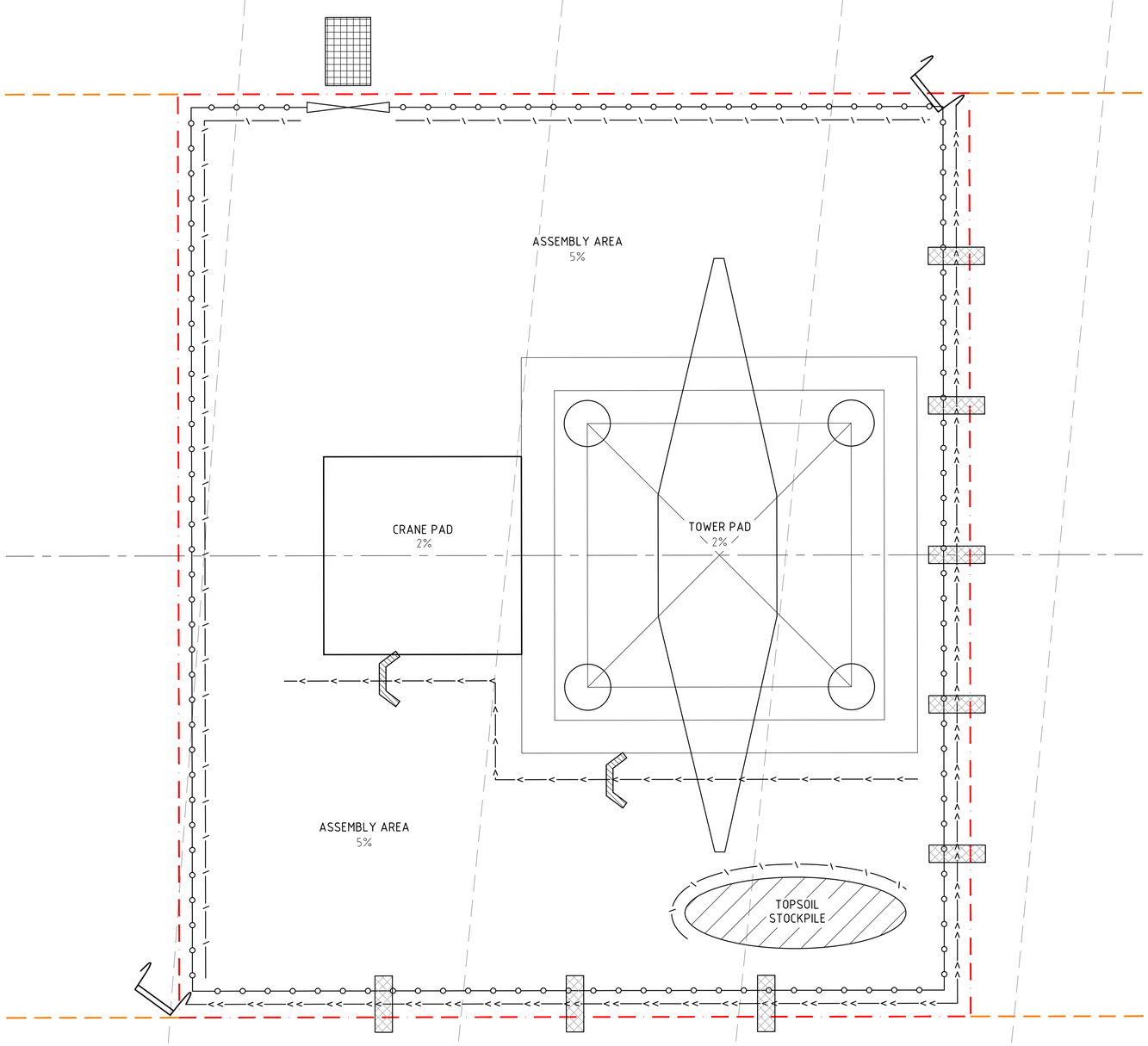
INDEX CLASS'N 02-02
SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$$$$$



TYPICAL TOWER PAD - TYPE A
SCALE 1:500

LEGEND

- DESIGN CONTOUR MINOR
- 239.00 DESIGN CONTOUR MAJOR
- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- SITE FENCE & GATE
- EARTH WINDROW / BUND
- SEDIMENT FENCE
- CATCH DRAIN
- EARTH BANK LOW FLOW
- BATTER STABILISATION DRAIN
- CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
- ROCK CHECK DAM (SEDIMENT FILTER)
- STRAW BALE CHECK DAM (SEDIMENT FILTER)
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL

4 2 0 4 8 12 16 20
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:200

AMENDMENT:

UGL
20 APR 2024
FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

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APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1	TL-799416-01	A
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$

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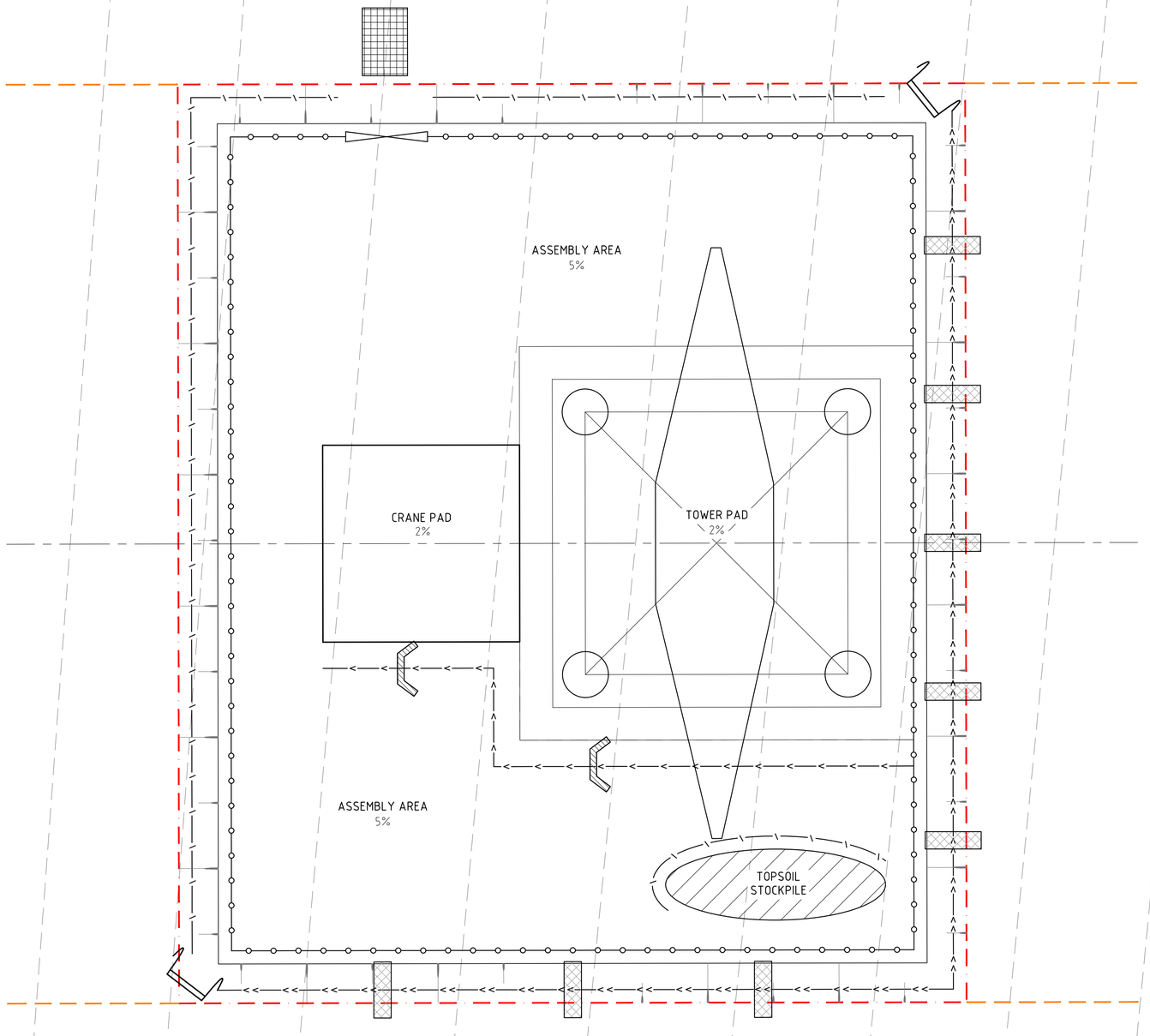

TYPICAL TOWER PAD - TYPE B

SCALE 1:500

LEGEND

- DESIGN CONTOUR MINOR
- 239.00 DESIGN CONTOUR MAJOR
- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- SITE FENCE & GATE
- EARTH WINDROW / BUND
- SEDIMENT FENCE
- CATCH DRAIN
- EARTH BANK LOW FLOW
- BATTER STABILISATION DRAIN
- CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
- ROCK CHECK DAM (SEDIMENT FILTER)
- STRAW BALE CHECK DAM (SEDIMENT FILTER)
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL

4 2 0 4 8 12 16 20

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:200

AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
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SCALE

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1	PREFIX TL	NUMBER 799416-02	SHEET	AMDT A

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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INDEX CLASS'N 02-02

566x801mm

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$$$

LEGEND

- DESIGN CONTOUR MINOR
- 239.00 DESIGN CONTOUR MAJOR
- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- SITE FENCE & GATE
- EARTH WINDROW / BUND
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- ROCK CHECK DAM (SEDIMENT FILTER)
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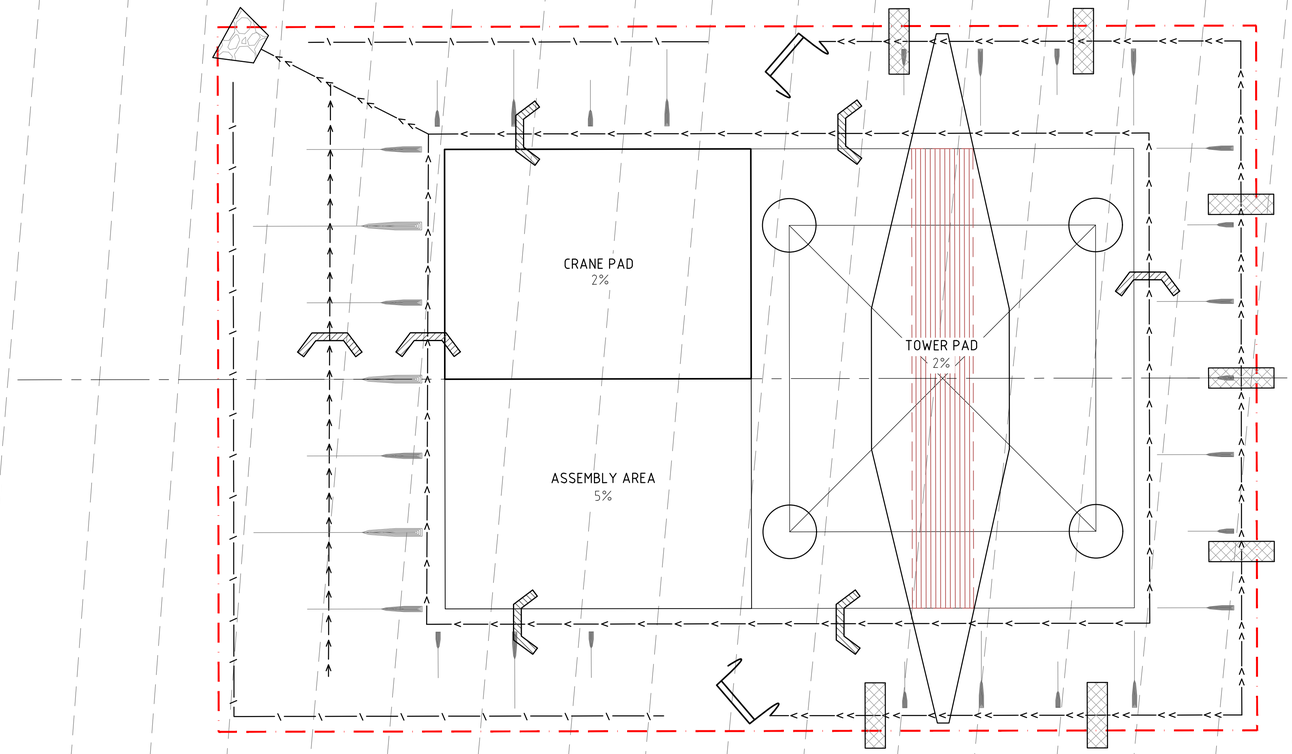
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL



TYPICAL TOWER PAD - TYPE D
SCALE 1:500

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:200

AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
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TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1	TL-799416-03	A
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

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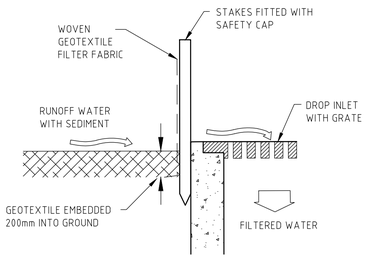
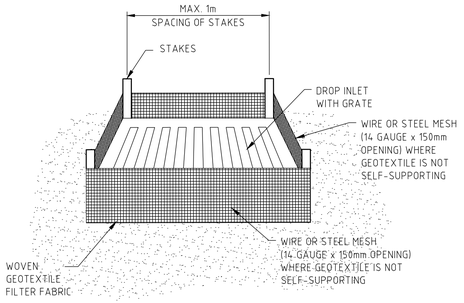
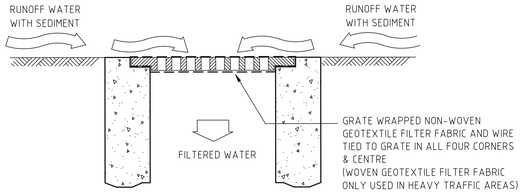




GOETEXTILE DROP INLET SEDIMENT TRAP TYPE 1

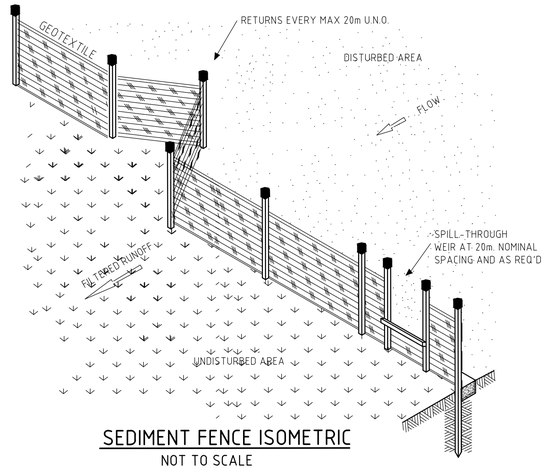
NOT TO SCALE



GOETEXTILE DROP INLET SEDIMENT TRAP TYPE 2

NOT TO SCALE

NOTE:
1. TO BE USED IN PAVED AREAS WHERE TRAFFIC ACCESS IS REQUIRED
2. PITS TO BE INSPECTED DAILY & CAPTURED SEDIMENT TO BE REMOVED



SEDIMENT FENCE ISOMETRIC

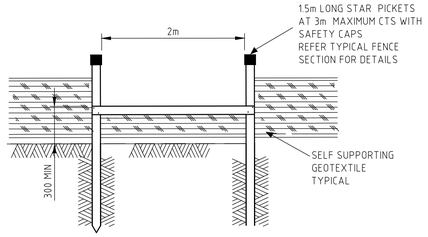
NOT TO SCALE

CONSTRUCTION SEQUENCE

1. WHERE POSSIBLE ALL SEDIMENT FENCES, PERIMETER BANKS, SEDIMENT BASINS AND OTHER SEDIMENT AND EROSION CONTROL STRUCTURES SHALL BE INSTALLED AS A FIRST STEP IN THE CONSTRUCTION SEQUENCE.
2. CARRY OUT CLEARING WITHIN SCOPE OF WORKS AND BULK EARTHWORKS TAKING CARE TO MINIMIZE THE EXTENT OF DISTURBANCE DURING CONSTRUCTION.
3. CARRY OUT BULK EARTHWORKS IN ACCORDANCE WITH THE ENVIRONMENTAL MANAGEMENT PLAN AND TAKING CARE TO MINIMIZE THE EXTENT OF DISTURBANCE.
4. ALL DISTURBED AREAS ARE TO BE HYDROSEEDED AND STRAW MULCHED UPON COMPLETION OF THE BULK EARTHWORKS. SEEDED AREAS SHALL BE WATERED DURING AND AFTER CONSTRUCTION UNTIL A UNIFORMLY DISTRIBUTED DENSE VEGETATION COVERAGE IS ESTABLISHED.
5. WHILE ANY AREAS REMAIN DISTURBED (ie BEFORE AND DURING RE-VEGETATION) ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE RETAINED.
6. AREAS WHERE DEVICES ARE REMOVED ON COMPLETION OF WORKS SHALL BE RE-INSTATED TO PRE-CONSTRUCTION CONDITIONS.

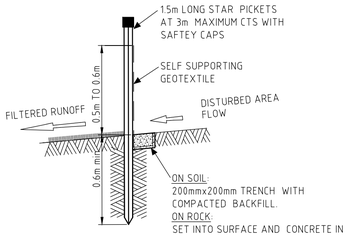
MAINTENANCE NOTES

ALL EROSION AND SEDIMENT CONTROL WORKS SHOULD BE CHECKED AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL EVENT. ALL TRAPPED SEDIMENT TO BE REMOVED WEEKLY.



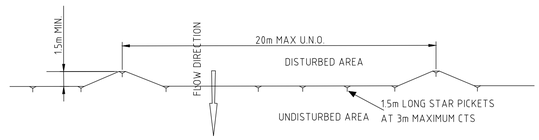
SPILL-THROUGH WEIR

NOT TO SCALE



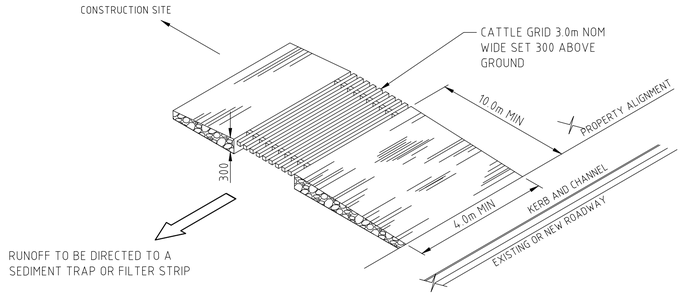
SEDIMENT FENCE SECTION

NOT TO SCALE



SEDIMENT FENCE PLAN

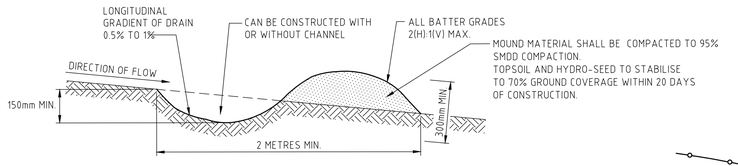
NOT TO SCALE



TEMPORARY STABILISED SITE ENTRY/EXIT DETAIL

SCALE N.T.S.

NOTES:
1. STABILISED ACCESS SHOULD BE CLEANED AND MAINTAINED AFTER EVERY RAINFALL EVENT (>5mm) AND WHEN SEDIMENT ACCUMULATION IS NOTED.
2. FINE ACCUMULATED SEDIMENTS SHOULD BE REMOVED FROM UNDERGRID AND CLEANED FROM AGGREGATE REGULARLY.



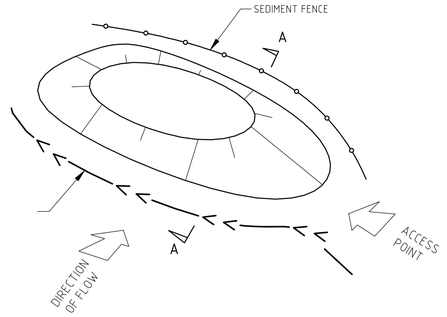
EARTH BANK (LOW FLOW)

SCALE N.T.S.

NOTE:
ONLY TO BE USED AS TEMPORARY BANK WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

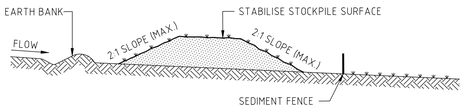
EARTH BANK CONSTRUCTION NOTES:

1. BUILD WITH GRADIENTS BETWEEN 1% AND 5%.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS-SECTIONS, NOT "V" SHAPED.
5. ENSURE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.



TYPICAL STOCKPILE TREATMENT

NOT TO SCALE



STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

SECTION A-A

AMENDMENT:		

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

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TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL DETAILS

A1	TL-799416-04	A
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

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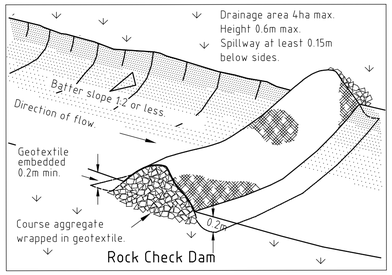
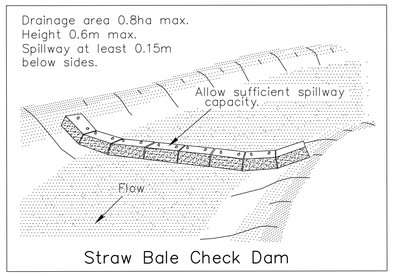
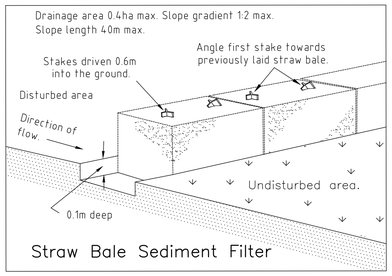


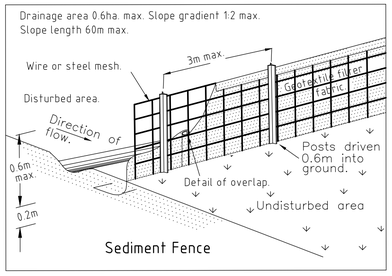
Rock Check Dam



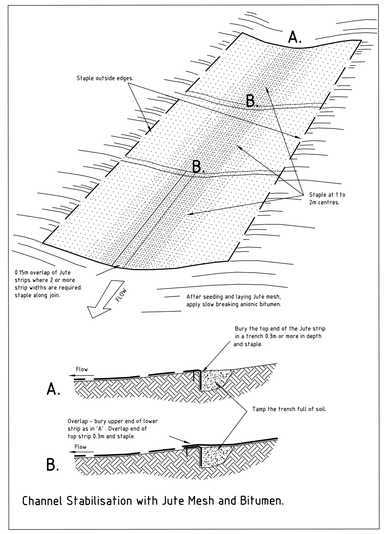
Straw Bale Check Dam



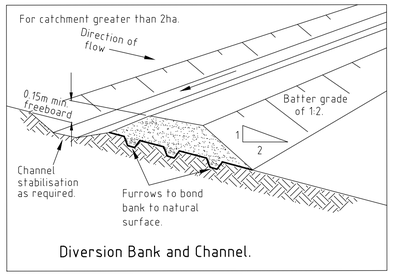
Straw Bale Sediment Filter



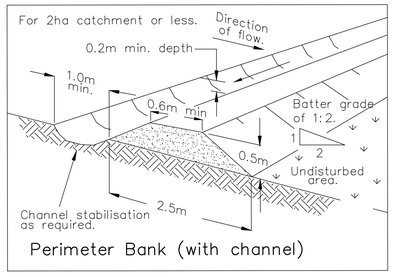
Sediment Fence



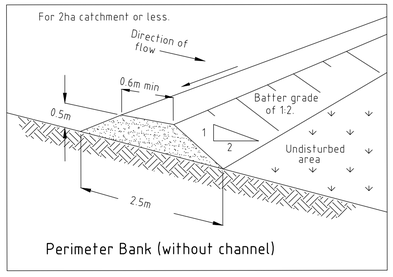
Channel Stabilisation with Jute Mesh and Bitumen.



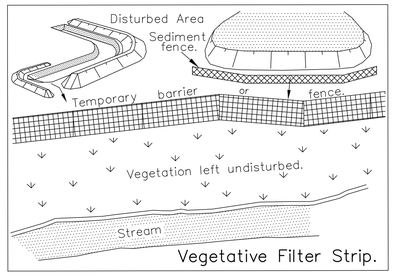
Diversion Bank and Channel.



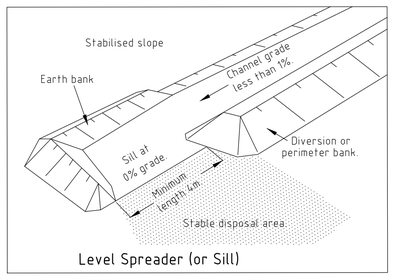
Perimeter Bank (with channel)



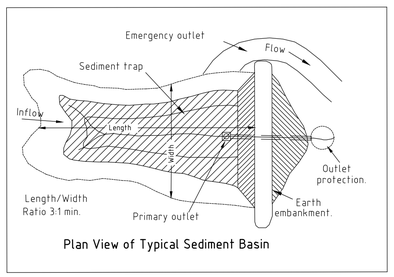
Perimeter Bank (without channel)



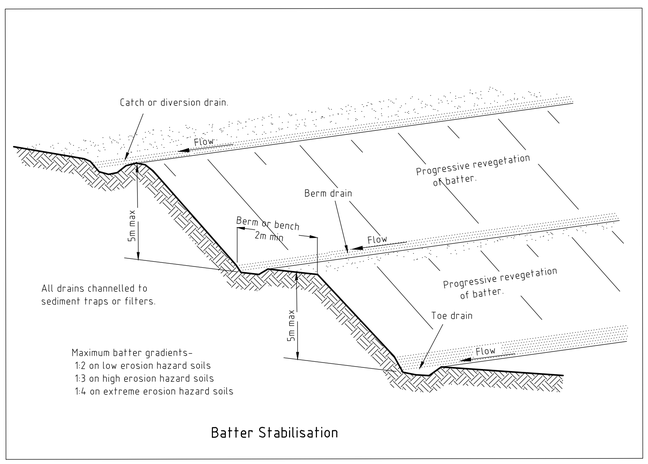
Vegetative Filter Strip.



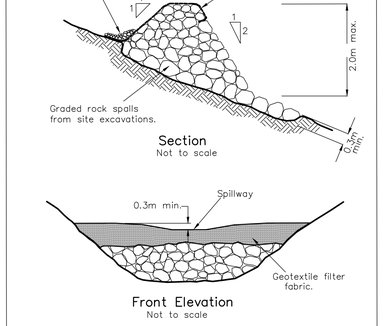
Level Spreader (or Sill)



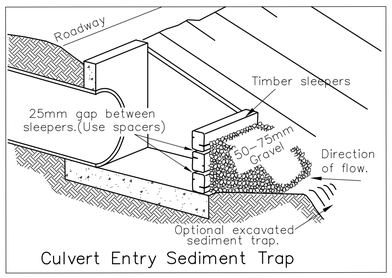
Plan View of Typical Sediment Basin



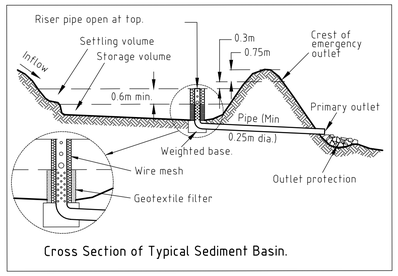
Batter Stabilisation



Stacked Rock Sediment Trap.



Culvert Entry Sediment Trap



Cross Section of Typical Sediment Basin.

AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

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SCALE

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL DETAILS

A1	TL-799416-05	A
	PREFIX NUMBER SHEET	AMDT

566x801mm

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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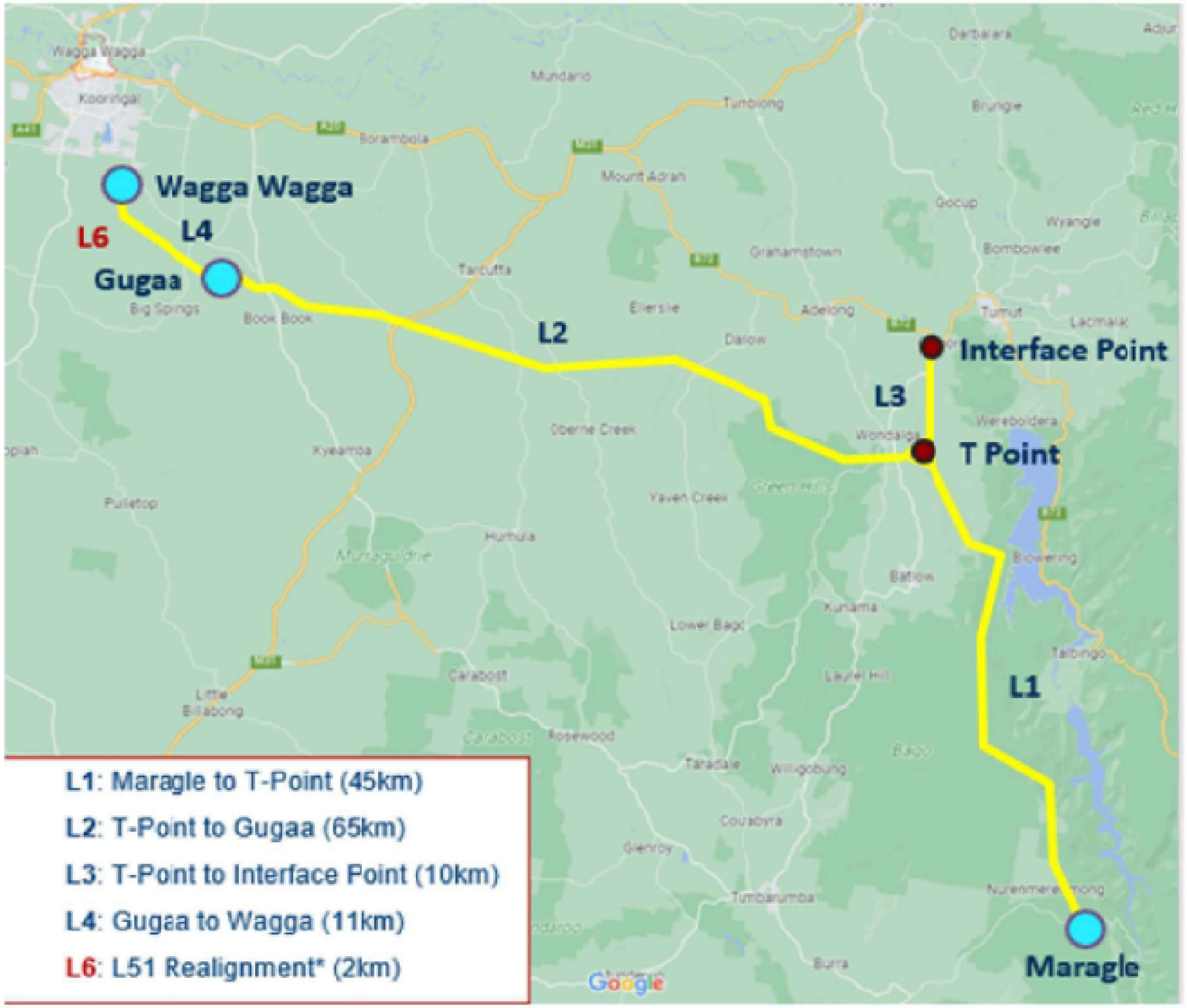
THIS DRAWING SET HAS BEEN PREPARED FOR THE HUMELINK WEST JOINT VENTURE TO DISPLAY TRAFFIC ENTRY / ACCESS POINTS TO BE CONSTRUCTED FOR TRANSGRID. THE ACCESS POINTS PROVIDE ACCESS FROM COUNCIL PUBLIC ROADS TO PRIVATE LOTS ADJOINIG THE ROAD RESERVE FOR THE PURPOSES OF CONSTRUCTING TRANSMISSION TOWERS.



L1: Maragle to T-Point (45km)

L2: T-Point to Gugaa (65km)

L3: T-Point to Interface Point (10km)

L4: Gugaa to Wagga (11km)

L6: L51 Realignment* (2km)

PROJECT LOCATION PLAN

20 10 0 20 40 60 80 100
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:1000

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SCALE AS SHOWN

HUMELINK WEST
ACCESS POINTS
TYPICAL DETAILS
SHEET 1 OF 3

A1	PREFIX TL	NUMBER 799418-01	SHEET	AMDT A

PLOT ISSUE DATE 16/04/24 PLOT TIME 12:06

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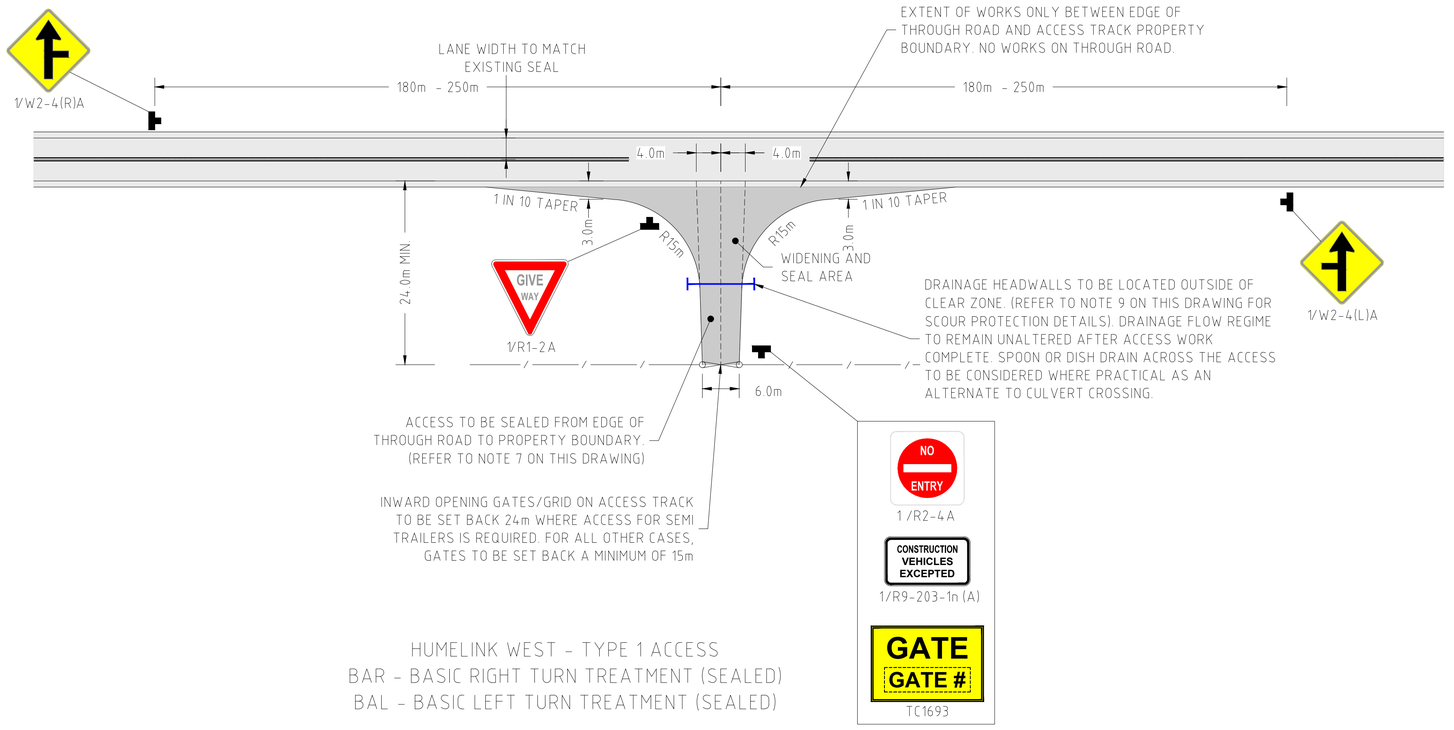
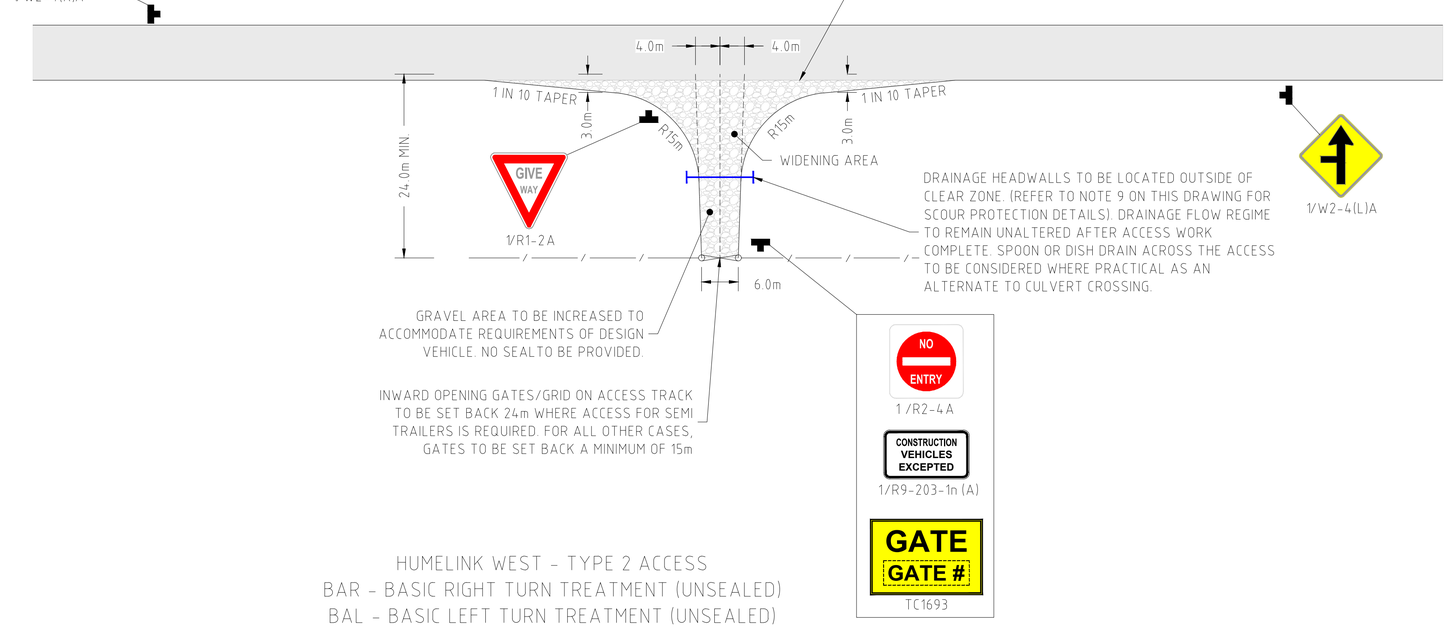


HUMELINK WEST - TYPE 1 ACCESS
BAR - BASIC RIGHT TURN TREATMENT (SEALED)
BAL - BASIC LEFT TURN TREATMENT (SEALED)



HUMELINK WEST - TYPE 2 ACCESS
BAR - BASIC RIGHT TURN TREATMENT (UNSEALED)
BAL - BASIC LEFT TURN TREATMENT (UNSEALED)

Notes:

1. Linemarking and signage to be in accordance with AS 1742.2 and AS 1743 respectively, and TfNSW TS05462:1.0 (Oct 2023)
2. Access track bellmouths to be a minimum of R10m, and increaseto R12m or R15m to accommodate articulated vehicles.
3. Access Point detail drawings are to reference the relevant access location Traffic Management Plans and are considered as part of the access arrangements.
4. Existing Signage conflicting with typical signage layout are to be covered or removed.
5. ASD, SISD and SSD to be in accordance with Austroads AGRD Parts 3 and 4A - Refer Drawing No TL-799418-03 of this set.
6. Fot the purposes of the access point concept design, a 19m semi trailer has been adopted as the design vehicle, and is considered the worst case scenario.
7. For access point pavement details, refer to Drawing No's TL-799419-01 and 02.
8. Where table drain culvert pipes are required under the access, a concrete pipe culvert (RCP) or an approved alternate material such as Farm Boss Poly Pipes, of a minimum 375mm diameter shall be used. Larger diameter pipes to be justified with hydraulic calculations where greater table drain flows are anticipated. Culvert headwalls are to be provided a minimum of 2m from the edge of the access.
9. Rip Rap protection is to be provided to culvert inlet and outlet headwalls, typically consisting of the following:
   - 9.1. $2m^3$ Dumped Rock. D50 =150mm, 200mm to 300mm thick layer,
   - 9.2. Approximately 2m wide x 3m long overlaying geofabric bidim A34 or similar.
   - 9.3. Extents of Rip Rap to be confirmed on site for each access.
10. Culvert loadings are to be considered for the anticipated construction loadings.
11. An approved surface dish type drain apporoved to Council specifications can be considered where surface flows can accommodate stormwater drainage from one side of the access to the other.
12. Scour protection to be provided where deemed necessary at drainage structures.
13. Upgrade works to the proposed access points may remain in place post construction unless the HLWJV are instructed otherwise.

10 5 0 10 20 30 40 50
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:500

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HUMELINK WEST
ACCESS POINTS
TYPICAL DETAILS
SHEET 2 OF 3

REFERENCE DRAWINGS

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A1 | TL-799418-02 | A
PREFIX NUMBER SHEET AMDT

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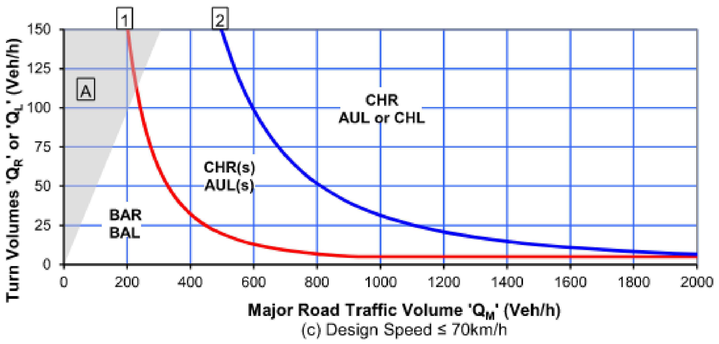
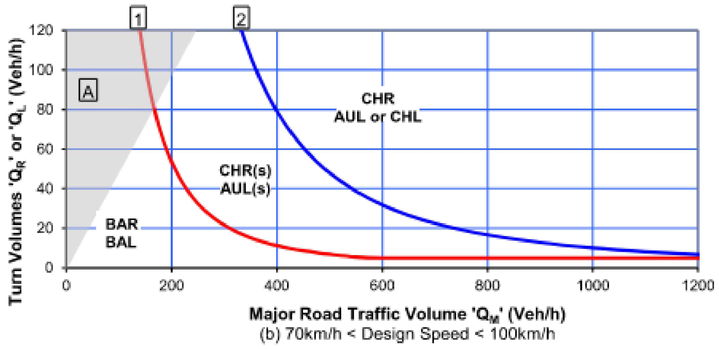
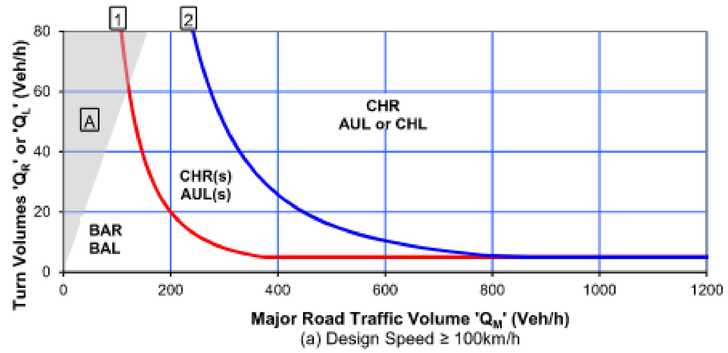


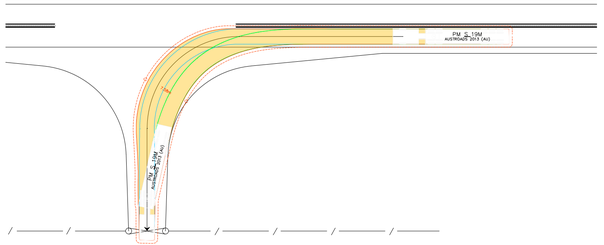
Sight Distance Requirements on Level Grade					
Refer to Section 3.1 - AGRD Part 4A and Section 5.3 - AGRD Part 3 (Sealed)					
Design Speed - Car =70km/h, Truck 60km/h; Reaction Time =2.0secs					
Vehicle	Sight Distance Type	Eye Height	Target Height	Distance	Min Crest Curve K Value
Car	ASD - Minor Leg	1.1m	0.0m	Assumed not applicable given low speed approach from private road	N/A
Truck		2.4m	0.0m		
Car	SISD	1.1m	1.25m	151m	24.3
Truck		2.4m	1.25m	132m	12.3
Car	SSD	1.1m	0.2m	92m	19.2
Truck		2.4m	0.2m	82m	8.5



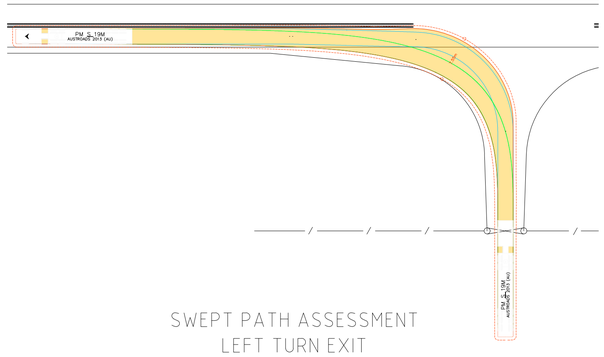
Sight Distance Requirements on Level Grade					
Refer to Section 3.1 - AGRD Part 4A and section 5.3 - AGRD Part 3 (Sealed)					
Design Speed - Car =90km/h, Truck 80km/h; Reaction Time =2.5secs (Sealed)					
Vehicle	Sight Distance Type	Eye Height	Target Height	Distance	Min Crest Curve K Value
Car	ASD - Minor Leg	1.1m	0.0m	Assumed not applicable given low speed approach from private road	N/A
Truck		2.4m	0.0m		
Car	SISD	1.1m	1.25m	226m	54.5
Truck		2.4m	1.25m	209m	30.8
Car	SSD	1.1m	0.2m	151m	51.0
Truck		2.4m	0.2m	142m	25.5



Sight Distance Requirements on Level Grade					
Refer to Section 3.1 - AGRD Part 4A and Section 5.3 - AGRD Part 3 (Sealed)					
Design Speed - Car =110km/h, Truck 100km/h; Reaction Time =2.5secs					
Vehicle	Sight Distance Type	Eye Height	Target Height	Distance	Min Crest Curve K Value
Car	ASD - Minor Leg	1.1m	0.0m	Assumed not applicable given low speed approach from private road	N/A
Truck		2.4m	0.0m		
Car	SISD	1.1m	1.25m	300m	96.1
Truck		2.4m	1.25m	289m	58.6
Car	SSD	1.1m	0.2m	209m	97.4
Truck		2.4m	0.2m	205m	52.9



SWEPT PATH ASSESSMENT
LEFT TURN ENTRY



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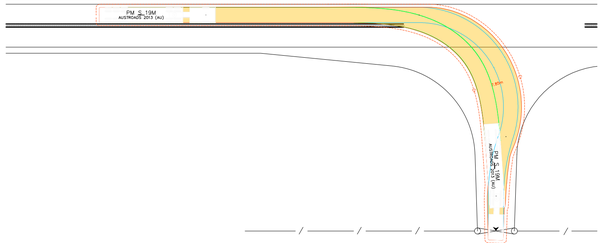
LEFT TURN EXIT



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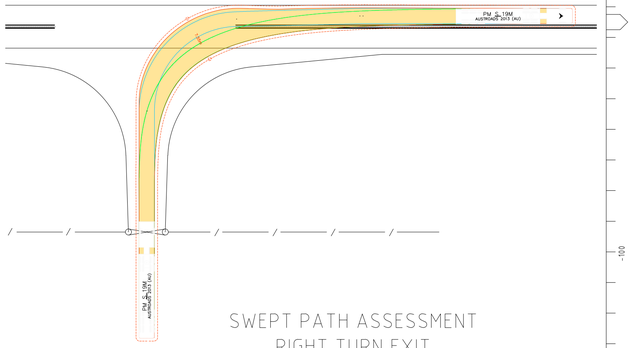
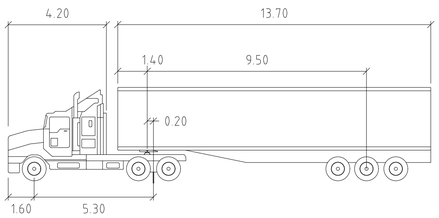
RIGHT TURN ENTRY



SWEPT PATH ASSESSMENT
RIGHT TURN EXIT



PM S 19M

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 27.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

NOTE:

FORMAL CONTROL AT ACCESS POINT WILL NEED TO BE IMPLEMENTED WHEN DESIGN VEHICLES ARE REQUIRED TO EXIT AND ENTER THE THROUGH ROAD. ONE VEHICLE WILL NEED TO BE HELD BY TRAFFIC CONTROL OR BY MEANS OF 2 WAY COMMUNICATION TO ALLOW SAFE PASSING. IF THIS CANNOT BE IMPLEMENTED, FURTHER UPGRADES TO THE ACCESS POINT, OR TRAFFIC MANAGEMENT, WILL BE REQUIRED.

LEGEND

- VEHICLE FRONT TYRE PATH
- VEHICLE REAR TYRE PATH
- VEHICLE BODY CLEARANCE - 0.5m
- VEHICLE BODY PATH

10 5 0 10 20 30 40 50
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:500

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HUMELINK WEST
ACCESS POINTS
TYPICAL DETAILS
SHEET 3 OF 3

REFERENCE DRAWINGS

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A1

PREFIX	NUMBER	SHEET	AMDT
	TL-799418-03		A

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Track Type	Description	Subgrade Condition[1]	Subgrade Assessment Summary[2]	Subgrade Preparation Summary[2]	Pavement Material Thickness Allowance[2,3]
Type 1	Existing Access Track Unimproved condition is generally suitable for construction access with potential for some minor pavement / drainage works	Good	Proof roll	N/A	Unsealed – nominal 0mm to 50mm top-up – scarify existing and blend in new to form a single pavement layer.
Type 1A	Existing Access Track Minor works (e.g. regrading, reshaping, drainage) and new pavement gravel required.	Good	Visual, proof roll and DCPs	Rip and recompact	Unsealed – 100 to 200mm
Type 2	New Access Track Minor earthworks (e.g. clear and grub, some local cut-fill, drainage) and pavement gravel required	Good	Visual, proof roll and DCPs	Rip and recompact insitu / cut base Fill to required specification	Unsealed – 100 to 200mm
Type 3	New Access Track Low strength subgrade in wet / boggy areas	Poor	Visual, proof roll and DCPs	Seek location specific advice	Unsealed – Place single layer of Geotextile (strength Class D), 250mm pavement layer, single layer Biaxial geogrid (60kN/m) and second 200mm pavement layer (total pavement material = 450mm)
Type 4A	New Access Track Local cut/fill or import subgrade Grade < 10%	Good (formed by cut and fill)	Visual, proof roll and DCPs	Rip and recompact insitu / cut base Fill to required specification	Unsealed – 100 to 200mm
Type 4B	New Access Track Local cut/fill or import subgrade Grade 10-15%	Good (formed by cut and fill)	Visual, proof roll and DCPs	Rip and recompact insitu / cut base Earthworks to required specification	Unsealed – 100 to 200mm
Type 4C	New Access Track Local cut/fill or import subgrade Grade >15%	Good (formed by cut and fill)	Visual, proof roll and DCPs	Rip and recompact insitu / cut base Fill to required specification	Unsealed – 100 to 200mm[4]
Access Points[5]	Existing Access Point Existing public-private access point intersection requiring only minor works (e.g. minor widenings, pavement re-sheeting, reshaping, signage).	Varies	Visual, proof roll and DCPs	Rip and recompact insitu / cut base Fill to required specification	Sealed – if existing is unsealed, nominal 0mm to 150mm DGB20 top-up after reshape existing, and apply prime and two-coat 14/7mm Class 170 sprayed seal. Unsealed – nominal 0mm to 150mm top-up after reshape existing.
	New Access Point (unsealed) New unsealed public-private access point intersection, or existing public-private access point intersection requiring significant works (e.g. widenings, culvert, earthworks, new pavement, signage).	Varies	Visual, proof roll and DCPs Soaked CBR for those deemed critical	Rip and recompact insitu / cut base Fill to required specification	Unsealed – 150 to 325mm
	New Access Point (sealed) New sealed public-private access point intersection, or existing public-private access point intersection requiring significant works (e.g. widenings, culvert, earthworks, new pavement, signage).	Varies	Visual, proof roll, DCPs and soaked CBRs	Rip and recompact insitu / cut base Fill to required specification	Sealed – 150 to 325mm pavement comprising: two-coat 14/7mm Class 170 sprayed seal; prime; min 100mm DGB20 over DGS40.

Notes:

1. Subgrade conditions to be assessed during construction to determine subgrade preparation and pavement thickness.
   a. Poor is N_d value < 3 (soft to firm clay)
   b. Good is N_d value = 3 (stiff and better clay)
2. Subgrade preparation and pavement material thickness is subject to change during construction depending on outcome of subgrade assessment and construction phase advice. Subgrade assessment to be carried out per pavement drawing number TL-799419-02 Pavement thickness to be determined with reference to pavement drawing number TL-799419-03
3. All pavement thicknesses and materials are preliminary and subject to change during further detailed design and in the construction phase.
4. May be sealed (e.g. TfNSW typical 7mm low-cutter seal) or stabilised (e.g. 1% GP cement additive) subject to further assessment during the detailed design and construction phases.
5. An “Access Point” is defined as the pavement area of public road reserve between a public road and the adjacent property. Refer to relevant drawings for clarification if needed.

ACCESS TRACK

INSITU CBR (%)	N_d (BLOWS / 100mm)	PAVEMENT THICKNESS (mm)
≤ 4	1 & 2	TREAT AS TYPE 3 TRACK - SEEK SITE SPECIFIC DESIGNER ADVICE
5 to 6	3	200
7 to 8	4	175
9 to 10	5	150
11 to 12	6	125
> 12	> 6	NOM. 100

ACCESS POINT

SOAKED / INSITU CBR (%)	N_d (BLOWS / 100mm)	PAVEMENT THICKNESS (mm)
< 3	1	SEEK SITE SPECIFIC DESIGNER ADVICE
3 to 4	2	200
5 to 6	3	175
7 to 8	4	150
9 to 10	5	125
> 10	> 6	NOM. 75 -100

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xx APR 2024
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HUMELINK WEST
TRANSMISSION LINE
TOWER PADS AND ACCESS TRACKS
TRACK TYPE AND PAVEMENT SUMMARY TABLE
PAVEMENT DESIGN - SHEET 1 OF 4

A1	TL-799419-01	A
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INDEX CLASS'N 02-02

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Subgrade Assessment and Preparation

Subgrade and Pavement Assessment – Track Type 1

1. Track Type 1 comprises existing access tracks where their existing condition is considered by the CPBUGL JV construction team to be generally suitable for construction access (potentially with some minor pavement / drainage improvements).
2. The subgrade and pavement assessment for Type 1 tracks should be conducted by a suitably experienced engineer and consist of:
    a. Visual assessment of the overall track and surface drainage condition to identify any evident poor performance which could indicate poorer subgrade conditions and/or any features that will need to be improved (e.g. pavement surface condition, surface drainage).
    b. Proof roll in general accordance with TfNSW test method T198. Areas of perceptible deformation should be assessed and considered for structural improvement by the CPBUGL JV construction team.
    c. The thickness of the existing pavement gravel layer should be assessed in several random locations. The need for additional pavement material to improve thickness and/or to enable the preparation of a tightly bound and stable track surface should be assessed and actioned by the CPBUGL JV construction team.

Subgrade Assessment – Track Types 1A, 2, 3, 4A, 4B, 4C

1. Prior to final compaction and trimming to subgrade level, a subgrade assessment shall be carried out to assess the required pavement thickness. In general, this subgrade assessment shall comprise the following:
    a. Visual assessment of the subgrade materials and review of fill material testing data by a suitably experienced engineer.
    b. Determine the requirements for testing based on the visual assessment as follows:
        i. For rock and dense coarse grained gravelly soils (where the estimated proportion of plastic fines is less than 30%), proceed directly to pavement thickness assessment and subgrade preparation and no insitu testing is required.
        ii. For all other materials, carry out testing for each track section / construction lot as indicated below.
2. For each track section / construction lot:
    a. Divide the section / lot into areas of homogeneous subgrade conditions. The factors to be considered for homogeneity include: general material type; insitu strength / stiffness / CBR; insitu moisture / drainage.
    b. Carry out DCP tests to a minimum depth of 0.9m below the approximate subgrade level at nominal track chainage intervals of 200m or min 3 tests per homogeneous section, whichever is greater. Record the number of blows, N_i, per 100mm of penetration.
    c. Calculate the least number of blows across three consecutive N_i values and divide the total by 3 to assess N_d. Result to be rounded down to the nearest whole number.
    d. Determine the required pavement thickness per the pavement thickness requirements.

Access Point Subgrade Preparation and Assessment

Subgrade and Pavement Assessment – Existing Access Points

1. Existing Access Points comprise existing track-road intersections where the existing condition is considered by the CPBUGL JV construction team to be generally suitable for construction access (potentially with some minor pavement / drainage improvements).
2. The subgrade and pavement assessment for Existing Access Points should be the same as that for the “Subgrade and Pavement Assessment – Track Type 1”.

Subgrade Assessment – New Access Points

1. Prior to final compaction and trimming to subgrade level, a subgrade assessment shall be carried out to assess the required pavement thickness. In general, this subgrade assessment shall comprise the following:
    a. Visual assessment of the subgrade materials, site surface and subsurface drainage and review of fill material testing data by an experienced engineer.
    b. Determine the requirements for testing based on the visual assessment as follows:
        iii. For new unsealed access points servicing a small number of towers in an area of good drainage it is recommended that DCP testing be carried out for access points which are not clearly in a rock cutting.
        iv. For new sealed access points, unsealed access points servicing multiple towers or unsealed access points in an area of poor to fair drainage, it is recommended that DCP and 4-day soaked CBR testing be carried out. The site drainage and criticality of the access points and the need for soaked CBR testing can be assessed by CPBUGL JV onsite.
2. For each access point:
    a. If soaked CBR testing is to be carried out, excavate 1 test pit to minimum 1m depth and obtain a sample of the material with the lowest estimated soaked CBR. This sample should be tested for 4-day soaked CBR at 100% MDD and OMC (Standard).
    b. Carry out DCP tests to a minimum depth of 0.9m below the approximate subgrade level at min 3 locations. Record the number of blows, N_i, per 100mm of penetration.
    c. Calculate the least number of blows across three consecutive N_i values and divide the total by 3 to assess N_d. Result to be rounded down to the nearest whole number.
    d. The required pavement thickness is the thicker of that determined from N_d or the soaked CBR value. Determine the required pavement thickness per the pavement thickness requirements.

Subgrade Preparation – All Track Types

1. Subgrade level is defined as the underside of the pavement.
2. For Track Type 1, this subgrade preparation section only applies to those track areas where cut or fill is required to alter the existing track surface level.
3. Post clear and grub works, the topsoil and any organic materials should be stripped and formed into a windrow or transported to an approved stockpile location as appropriate.
4. Where filling is required to raise an area to the design subgrade level:
    a. Materials can either be:
        i. Suitable locally won materials that are consistent with the track areas that are at grade or in cut. As the general intent of the access track design is to balance cut and fill, locally won materials should be used as fill whenever practicable.
        ii. Imported materials that, once placed and compacted, have an insitu stiffness / CBR at least equal to that of the surrounding insitu subgrade materials.
    b. Where practicable, materials with a higher estimated CBR shall be preferably placed in the upper layers of fill.
    c. Fill materials should generally be placed and compacted in accordance with good construction practices, including moisture conditioning to slightly dry of SOMC and compacted to nominally 95% to 100% of the SMDD, with particular attention paid to compaction with the upper 300mm of the subgrade. It is suggested that a construction trial (with density testing) be carried out at the start of construction to develop reliable construction practices.
    d. Fills of over 1.5m in height should be subject to regular quality testing to confirm that moisture conditioning is within -4% to +0% of SOMC and density ratio is at least 95% of SMDD.
5. Layers of fill should be protected from significant moisture changes (e.g. they should not be allowed to dry significantly) until they are covered by the next layer or the pavement.
6. Where the track is at grade or in cut at the design subgrade level treatment shall comprise: loosening the insitu material to a depth of between 200mm below the design subgrade level; moisture conditioning to slightly dry of Standard OMC; compacting the layer to at least 98% of the Standard MDD.
7. On completion of compaction and final trim, the subgrade shall be proof rolled per TfNSW QA Specification R71 Clause 7.6.1 prior to the placement of the pavement material.

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TOWER PADS AND ACCESS TRACKS
SUBGRADE ASSESSMENT AND PREPARATION
PAVEMENT DESIGN – SHEET 2 OF 4

A1	TL-799419-02	A
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Pavement Thickness Requirements

Traffic Assumptions

1. The following points must be noted regarding the pavement thicknesses below.
   a. Pavement thicknesses are based on the tracks being used by: road-legal heavy commercial vehicles; all-terrain cranes; and tracked piling rig (SR45 or equivalent).
   b. HV may find trafficking difficult on steep grades. Alternate operational arrangements and/or pavement surfacing / stabilisation will need to be considered by CPBUGL JV.
   c. Unsealed tracks are susceptible to rapid deterioration when the pavement is wet and/or under intense volumes of HV. Such instances should be controlled as much as practicable, and heavier inspection and maintenance schedules (e.g. pothole repair and reshaping) may result in such cases.
   d. Tracked piling rigs and the higher shear forces caused by tight turning movements of HV and all-terrain cranes can damage the pavement surface and require additional maintenance works.
2. For the road-legal HV the following assumptions were made:
   a. Single wheel loads of up to 32.5kN.
   b. An average of 5.0ESA/HV, comprising 4.0ESA/HV loaded inbound and 1.0ESA/HV unloaded outbound.
   c. Nominally 120 HV trips per tower across the entire construction phase.
3. For the all-terrain cranes the following assumptions were made:
   a. Single wheel loads of up to 70kN (i.e. 7t) when setup to travel.
   b. A small number of trips (i.e. 2 to 3 say) per tower across the entire construction phase.
4. For the tracked SR45 piling rigs the following assumptions were made:
   a. Maximum equivalent track pressure of 147kPa over a 3.1m long by 0.6m wide track area in the Case 1 (BR470) Standing or Travelling modes.
   b. A small number of trips (i.e. 1 to 2 say) per tower across the entire construction phase.
   c. No tracking on access points.

Pavement Thickness– Access Tracks

1. For Type 1 track sections the need for additional pavement material should be assessed onsite by the CPBUGL JV construction team. The assessment should consider the general intention to provide a safe and serviceable access track with a stable, tightly bound and relatively smooth surface that is appropriate for vehicle operating speeds.
2. For Type 1A track sections where surface levels will essentially remain unchanged, any existing crushed rock pavement thickness may be incorporated into the required pavement thickness subject to an onsite assessment by a suitably experienced engineer and any subsequent recommendations.
3. For homogeneous sections where the subgrade is rock or dense coarse grained gravelly soil, a nominally 75mm to 100mm thick pavement is recommended to provide a serviceable track surface, though the need for a pavement may be revised by the CPBUGL JV construction team subject to an onsite assessment by a suitably experienced engineer.
4. For clean sand subgrade the required pavement thickness is controlled by bearing capacity and constructability. A layer of geotextile may be necessary in order to sufficiently confine the sands, and pavement thicknesses in the order of 150mm to 200mm are likely to be required.
5. For homogeneous access track sections where DCP testing has been carried out, recommended minimum pavement thicknesses are shown in the following table.

Subgrade Type	N_d (blows/100mm)	Pavement Thickness (mm)
Soft to Firm Clay	1 and 2	Treat as Type 3 track – seek site specific designer advice
Stiff Clay	3	200
Stiff Clay	4	175
Stiff Clay	5	150
Stiff Clay	6	125
Very Stiff Clay	>6	Nom. 100

6. For track sections where N_i = 1 or 2 a site-specific assessment shall be carried out by the CPS pavement engineer.
7. CPBUGL JV should consider adding 25mm to 50mm to above thicknesses in areas of steep grades (>8%) to account for erosion losses. Alternatively, additional maintenance could be considered to account for the potential losses.
8. CPBUGL JV should consider applying a surfacing (e.g. sprayed seal) or adding a stabilising agent to the pavement material (e.g. cement) ti improve performance in areas of very steep grades (>15%) or where traction on the unsealed pavements is of concern.

Pavement Thickness– Access Points

1. For existing access points the need for additional pavement material should be assessed onsite by the CPBUGL JV construction team. The assessment should consider the general intention to provide a safe and serviceable access track with a stable, tightly bound and relatively smooth surface that is appropriate for vehicle operating speeds. Where existing access points are to be sealed, it is recommended that a 100mm thick DGB20 top-up be placed and compacted, followed by a prime and two-coat 14/7mm seal with a Class 170 binder.
2. For access points where the subgrade is rock or dense coarse grained gravelly soil, a nominally 150mm thick pavement is recommended to provide a serviceable track surface, though the need for a pavement may be revised by the CPBUGL JV construction team subject to an onsite assessment by a suitably experienced engineer.
3. For clean sand subgrade the required pavement thickness is controlled by bearing capacity and constructability. A layer of geotextile may be necessary in order to sufficiently confine the sands, and pavement thicknesses in the order of 200mm is likely to be required.
4. Unsealed access points shall be constructed using the unsealed access track pavement material specified on the pavement drawings.
5. Sealed access point pavement details should be as follows. Where the pavement thickness is < 200mm, the entire pavement should be constructed using DGB20 material.
   - 14/7mm two-coat seal with Class 170 binder
   - AMC0 or approved emulsion prime
   - DGB20 base (min 100mm)
   - DGS20 or DGS40 subbase
   - Insitu / fill subgrade (CBR to be assessed)
6. For new access points where CBR and DCP testing has been carried out, recommended minimum pavement thicknesses are shown in the following table.

Soaked CBR	N_d (blows/100mm)	Pavement Thickness (mm)
< 3	1	Seek site specific designer advice
3 and 4	2	325
5 and 6	3	250
7 and 8	4	200
9 and 10	5	175
>10	>6	150

7. For track sections where N_i = 1 a site-specific assessment shall be carried out by the CPS pavement engineer.

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TOWER PADS AND ACCESS TRACKS
PAVEMENT THICKNESS REQUIREMENTS
PAVEMENT DESIGN - SHEET 3 OF 4

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Material Specification, Construction and Maintenance

Unsealed Access Track & Access Point Pavement Materials Specification

1. Unsealed pavement material guidelines are shown below. Alternate materials which don't meet all of these guideline requirements may be suggested by CPBUGL JV subject to approval by the CPS pavement designer.

Property	Proposed 20mm		Proposed 40mm[Note 2]	
Sieve Size (mm)	Percent Passing			
53	100	100	100	100
37.5	100	100	95	100
26.5	95	100	75	95
19	85	100	65	90
13.2	70	90	50	85
9.5	55	80	40	80
4.75	40	65	30	70
2.36	30	60	20	55 (50)
0.425	15	40	10	30 (20)
0.075	7	20	7 (4)	20 (10)
Values in brackets are for alpine (snow and ice) areas specifically				
Plasticity - Wagga Wagga Council Areas				
Plasticity Index, PI (%)	Min 5	Max 15	Min 5	Max 15
Plasticity - Snowy Valleys Council Areas				
Plasticity Index, PI (%)	Min 4	Max 10	Min 4	Max 10
Fines Ratio	Min 0.4	Max 0.6	Min 0.4	Max 0.6
Fines Ratio = % passing 0.075mm / % passing 0.425mm				
Soaked CBR (%)	Min 40		Min 50	

2. In alpine (regular winter snow and ice) areas, a 40mm pavement material with modified grading limits (in brackets) and reduced plasticity limits is recommended.
3. Other than the properties indicated above, materials shall comprise crushed rock with durable aggregates that don't break down under traffic or repeated weeting and drying cycles. TfNSW QA Specification 3051 can be used as a guide in this regard.

Sealed Access Point Pavement Materials Specification

1. Access Track Pavement Material Requirements
   a. Sprayed seal materials and construction shall comply with local council requirements or relevant TfNSW specifications.
   b. Pavement materials shall comply with local council requirements or TfNSW QA Specification 3051.

Pavement Construction

1. The process of spreading, shaping and compacting through to final trim shall proceed continuously. Compacted layer thicknesses shall be in the range of 75mm to 200mm.
2. Maintain adequate drainage throughout the period of construction to ensure runoff of water without ponding.
3. Where a pavement comprises multiple layers, before placing any subsequent layer each layer shall be allowed to dry back such that it can withstand wheel loadings from construction plant without exhibiting any visible shoving, ravelling or deflection.
4. Overall construction quality and verification shall be under the control of the CPBUGL JV construction team. The final pavement surface shall have a consistent, relatively smooth and tightly bound appearance that provides adequate serviceability at the operational vehicle speeds for each section (which may be dependant on the vehicle type, weather conditions, and other factors).
5. The pavement design relies on the use of appropriately sourced materials which are placed, moisture conditioned and compacted in accordance with good industry practice. As a general guide: all earthworks and materials should be compacted slightly dry of SOMC; general earthworks should achieve minimum compaction of 95% of SMDD; materials within 300mm below subgrade level should achieve minimum compaction of 98% of SMDD; pavement materials should achieve minimum compaction of 100% of SMDD. Pavement layer and overall thickness shall be verified via random checks by the CPBUGL JV construction team.

Inspections and Maintenance

1. Pavements, both sealed and unsealed, require regular inspection and maintenance. Unsealed pavements are more susceptible to damage from weather and traffic, and therefore require regular inspections and maintenance (potentially requiring additional pavement material for resheeting) to maintain desired serviceability. Also, pavements are not designed to achieve 100% reliability, and CPBUGL JV can therefore expect to do some degree of unplanned structural patching on the access tracks and points throughout their use.
2. CPBUGL JV should develop a risk-based inspection regimen and response matrix that suits the hazards (e.g. access track geometry, tree fall), likelihood (e.g. volumes, periods of no use) and consequences (e.g. track criticality to operations; safety scenarios).
3. A defect reporting system should be available to all track users to enable a pseudo-ongoing inspection regimen (e.g. for issues like potholes, blocked drains, etc). Considering pavement serviceability only (i.e. no risk considerations), planned inspection and maintenance might comprise:
   a. Inspection of road condition and surface drains – quarterly.
   b. Apply dust suppressant – per supplier recommendations and as needed.
   c. Light formation grading – 30% of tracks annually (use dependant)
   d. Medium formation grading – 10% of tracks annually (use dependant)
   e. Structural formation grading – 10% of tracks annually (use dependant)
   f. Inspection of culverts – annually.
   g. Cleaning culverts – at >30% cross-section blockage.
4. Where regular snow clearing is expected to take place and reduce pavement thickness, the design thickness should be increased to account for potential losses

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PAVEMENT THICKNESS REQUIREMENTS
PAVEMENT DESIGN - SHEET 4 OF 4

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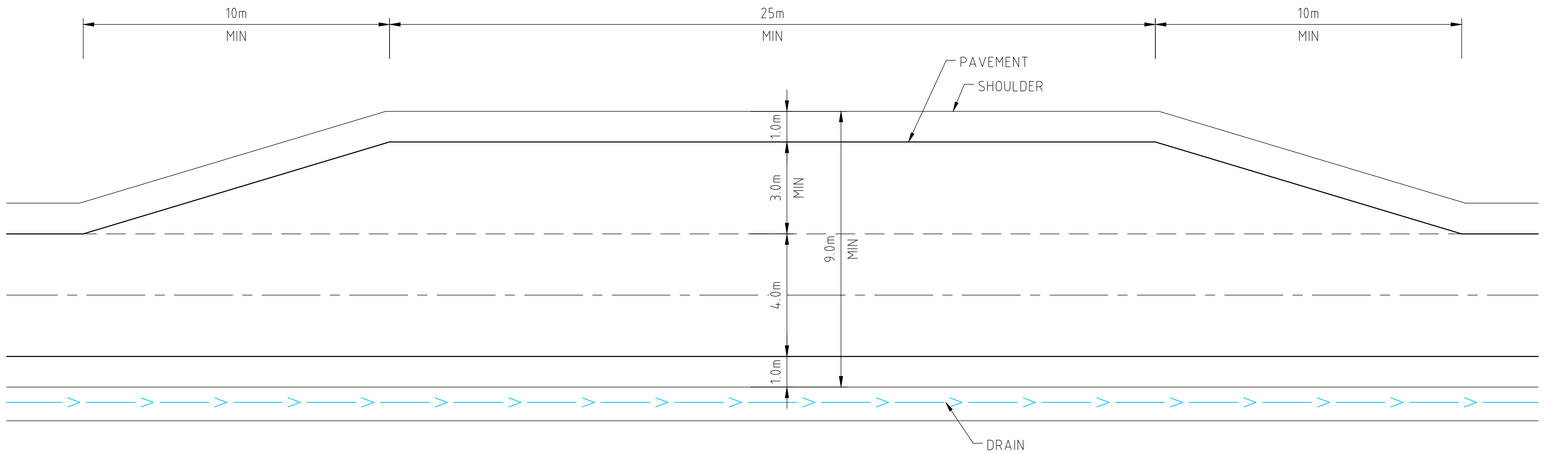

TYPICAL BYPASSING BAY LAYOUT

1:1000

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:1000

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TOWER PADS AND ACCESS TRACKS
ACCESS TRACKS
TYPICAL BYPASSING BAY LAYOUT

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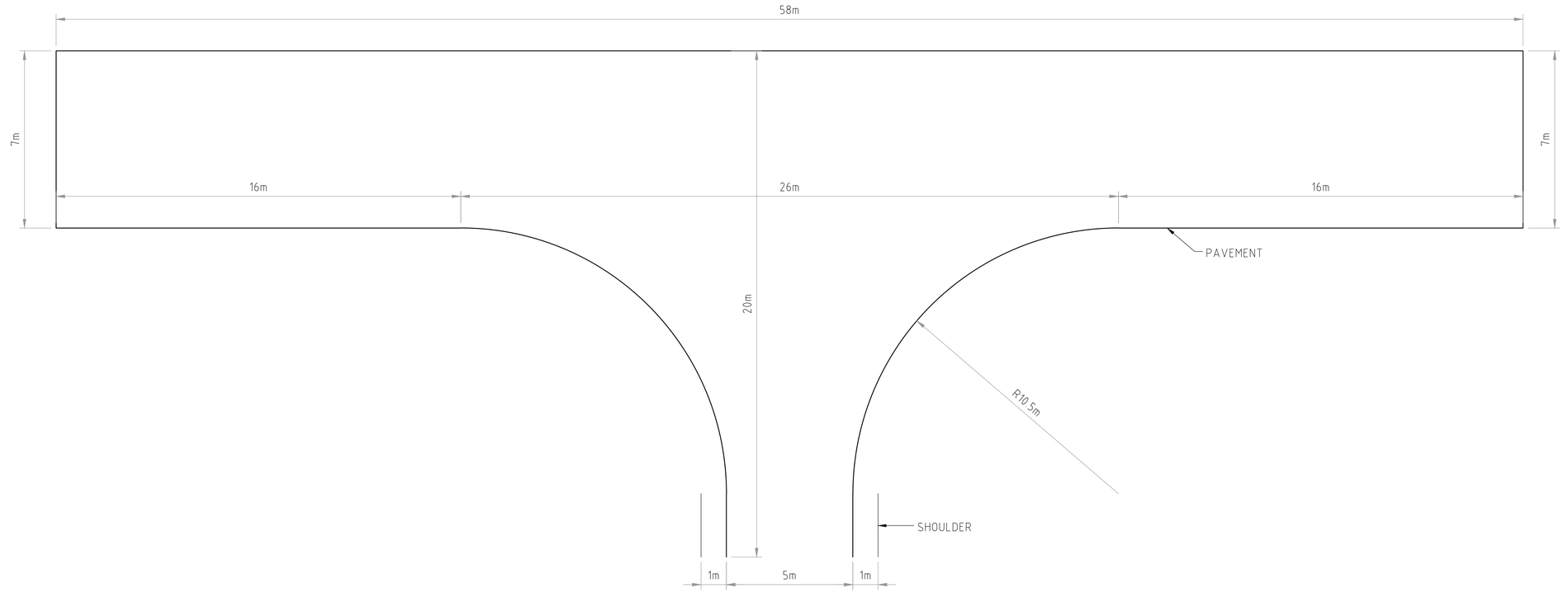

TYPICAL SEMI-TRAILER TURNHEAD LAYOUT

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TYPICAL SEMI-TRAILER TURNHEAD LAYOUT

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GENERAL INFORMATION

This PESCP provides direction for soil and water management for Transmission Tower sites on the Humelink West Transmission Project. Thie PESCP has been developed to meet best practice guidelines of the Blue Book volumes 1 and 2C (Landcom, 2004; DECC, 2008).

APPLICATION OF THIS PESCP

This PESCP is applicable to tower sites on gentle to moderately sloping sites < 15% with Low to Moderate soil erosion risk. Where sites are >15% or where other factors (eg sensitive receptors) are in proximity to a site, the project CPESC will assess the need for a standalone PESCP to provide site specific erosion and sediment control measures.

EROSION HAZARD ASSESSMENT – BASED ON RUSLE (A= R*K*LS*P*C)

Erosion hazard is calculated for transmission tower sites based on the Revised Universal Soil Loss Equation (RUSLE). Site, soil and climatic factors combine to provide an Erosion Risk Ranking from which appropriate erosion and sediment controls may be derived from best practice information in the Blue Book (Landcom, 2004; DECC, 2008).

USE OF SEDIMENT BASINS

The Blue Book (Landcom, 2004) specifies sediment basins as being best practice where the disturbed area is >2500m2 or where soil loss from a catchment is greater than 200t/yr. Where tower sites are small, sites have is less than 15% slopes, where may be subdivided into catchments to reduce effective erosion risk, and where erosion controls may achieve ESC outcomes, sediment basins may be avoided. As a consequence alternative ESC controls have been adopted within this PESCP.

EROSION AND SEDIMENT CONTROLS

Inspection and Monitoring

•Weather forecasts are to be monitored daily. Where rainfall is predicted, the site is to be readied, and ersed controls repaired or reinstated to standards specified in this PESCP.
•Pre-rainfall and post rainfall inspections are to be undertaken and findings actioned as specified in the Project Soil and Water Management Plan.
•Dewatering of ersed controls is to be undertaken according to Dewatering Procedure

Erosion Control and Stabilisation

•Existing vegetated areas to remain undisturbed until immediately prior to construction.
•Erosion and sediment controls, particularly perimeter controls, are to be installed prior to construction bulk earthworks commencing
•High traffic areas (access tracks, stockpile access areas, carpark and laydown areas) to be sheeted with clean crushed rock.
•Where not being actively removed from site, stockpiles to be encircled with sediment fencing and stabilised with soil binder, geotextile or hydromulch.
•Bulk earthworks cut and fill batters to be stabilised promptly on completion with soil binder, hydromulch or geotextile.
•Temporary culvert embankments to be stabilised with geotextile or clean rock immediately on completion and prior to rain events during construction.

Clean Water Diversions

•Construct upslope clean water diversion drains or earth bunds to divert off-site runoff around the Tower sites. Install earth bunds to a minimum of 400mm height (or as specified on drawings) using topsoil or similar.
•Stabilise drains and bunds with mulch, polymer soil binder (Vital Stonewall or similar), jute matting , geofabric or similar as specified on drawings.
•Place rock checks, coir logs or similar in drains at distances specified on drawings.
•Drain linings and soil stabilisation materials to be installed to manufacturer or supplier specification.
•The locations of diversions recommended in this ESCP and an accurate assessment of existing drainage have not been verified on site. Diversions may be field fitted during construction according to requirements.

Dirty Water Diversions and Downslope Perimeter Controls

•Install dirty water diversion bunds downslope to a height of 400mm minimum (or as specified on drawings). Bunds may be constructed from site-won earth or mulch, and must have returns installed at no more than 20m intervals equipped with sediment traps and coir log, rock or sediment fence outlet weirs (refer to Drawings attached). Indicative locations are noted on Drawings and should be field verified prior to installation.
•Place rock checks, coir logs or similar in drainages at distances specified on drawings.
•On site steeper than 15%, stabilise drains and bunds with mulch, polymer soil binder (Vital Stonewall or similar), jute matting , geofabric or similar as specified on drawings.
•Sediment fences may be specified as perimeter controls on Drawings on gently sloping sites.
•Drain linings, soil stabilisation materials and sediment fences to be installed to manufacturer or supplier specification.
•The locations of drains, bunds and sediment fences specified in this ESCP, and an accurate assessment of existing drainage have not been verified on site. Diversions may be field fitted during construction according to site and construction program requirements.

Surface Disturbance and Stabilisation

•Disturbance of natural surfaces should not be undertaken until immediately prior to active works to avoid erosion.
•All disturbed surfaces are to be stabilised promptly and effectively to minimise erosion.
•Stabilisation methods are dependent on the construction program, duration of disturbance and the site conditions. All require reference to and installation according to manufacturers recommendations. Methods recommended for the site include (but are not restricted to) the following:
  o Non-rewettable Soil Binder (eg Stonewall or similar) - suitable for temporary stabilisation of batters, stockpiles, subsoil and topsoil surfaces not subject to regular inundation.
  o Mulch - suitable for temporary stabilisation of topsoil and batter surfaces not subject to disturbance by direct runoff.
  o Hydromulch - a combination of seed, soil binder, fertiliser and an inert mulch such as paper or wood fibre. Suitable for medium to long term stabilisation of soil surfaces including batters, stockpiles, topsoiled areas etc not subject to regular inundation.
  o Geotextile – suitable for short to medium term stabilisation of surfaces, including those subject to inundation or channel flow
  o Clean rock, including fine crushed rock. Require sizing according to Blue Book or EA standards.

Stockpile Management

•Where there is sufficient area, topsoil stockpiles should not exceed 2m in height and have maximum batters of 2:1 slope.
•A sediment fence will be installed around any stockpiles and removed only for access during active works. (Refer to Drawings attached for sediment fence detail).
•Topsoil stockpiles to be retained for rehabilitation following construction will be reseeded with a suitable weed free annual grass mix. Seeding is not required for short term topsoil stockpiles (to be disturbed within 20 days).
•Stockpiles must be clearly delineated on the ground with signage indicating the type of material included in the stockpile.
•Stockpile areas will include clearly defined access controls.
•Topsoil stockpiles are to be kept separated from waste or other sources of contamination (e.g. subsoil or fill material).

Dust Suppression

•Dust suppression is to be undertaken as required using water carts.

Rehabilitation And Removal Of Ersed Controls

•Progressively stabilise work s as areas are completed to minimise the area at risk of erosion and sediment loss.
•Rehabilitation aims to achieve ground cover (C-Factor) of:
•60% ground cover (C = 0.1) within 20 days; and
•70% ground cover (C= 0.05) within 2 months or at completion of works.
•Where areas are completed with at least 90% of the construction area reaching 70% final ground cover, temporary sediment and drainage controls may be decommissioned.
•Where risk factors such as sensitive receptors or steeper slopes exist, consider maintaining drainage controls such as coir logs or rock checks until 100% of final cover is achieved.

CPESC CERTIFICATION

This ESCP Concept Plan is based on understanding of project requirements at partial design stage. Further site constraints and design amendments are expected to be incorporated prior to final design. Progressive ESCP documents are to be developed to guide erosion and sediment control works at key construction stages. This PESCP should not be applied to sites other than that specified in the drawings.

R Billyard
CPESC 9496

ANNOTATED R BILLYARD
26/10/2024

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Rev	DATE	DWN	CHK	APP	DETAILS
A	24/10/2024	RB			DRAFT FOR REVIEW

BC ENVIRONMENTAL

CLIENT: HLWJV UGL A MEMBER OF THE CIMIC GROUP CIMIC

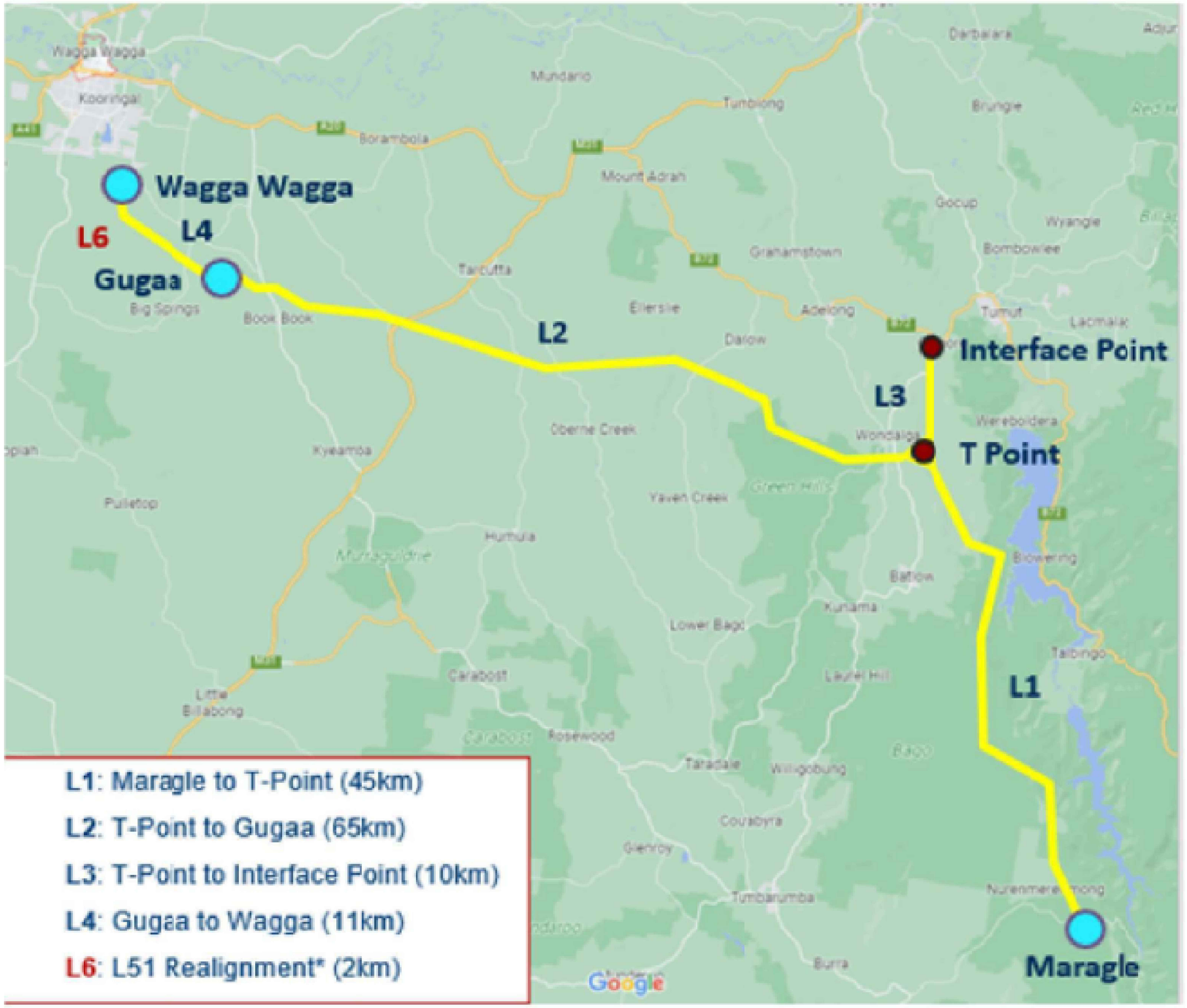
PROJECT: PESCP HUMELINK WEST

PESCP TITLE: PESCP TRANSMISISON TOWER SITES 0-25% SLOPE

ESC NOTES - SHEET 1 OF 12

PESCP # 2024-TT-GA-01 | DRAWING # PESCP 03 | REV A

THIS DRAWING SET HAS BEEN PREPARED FOR THE HUMELINK WEST JOINT VENTURE TO DISPLAY TRAFFIC ENTRY / ACCESS POINTS TO BE CONSTRUCTED FOR TRANSGRID. THE ACCESS POINTS PROVIDE ACCESS FROM COUNCIL PUBLIC ROADS TO PRIVATE LOTS ADJOINIG THE ROAD RESERVE FOR THE PURPOSES OF CONSTRUCTING TRANSMISSION TOWERS.



L1: Maragle to T-Point (45km)

L2: T-Point to Gugaa (65km)

L3: T-Point to Interface Point (10km)

L4: Gugaa to Wagga (11km)

L6: L51 Realignment* (2km)

PROJECT LOCATION PLAN

20 10 0 20 40 60 80 100
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:1000

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

AMENDMENT:

UGL 15-Apr-24 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	PRELIMINARY ISSUE - FOR REVIEW	TM	SC	TM	SC		

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ABN 96 096 365 972
40 Miller Street
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DRAWN	TM	15/04/2024
REVIEWED	SC	15/04/2024
VERIFIED		
APPROVED		

APPROVAL STATUS

REFERENCE DRAWINGS

SCALE AS SHOWN

HUMELINK WEST
ACCESS POINTS
TYPICAL DETAILS
SHEET 1 OF 3

A1	PREFIX TL	NUMBER 799418-01	SHEET	AMDT A

PLOT ISSUE DATE 16/04/24 PLOT TIME 12:06

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566x801mm

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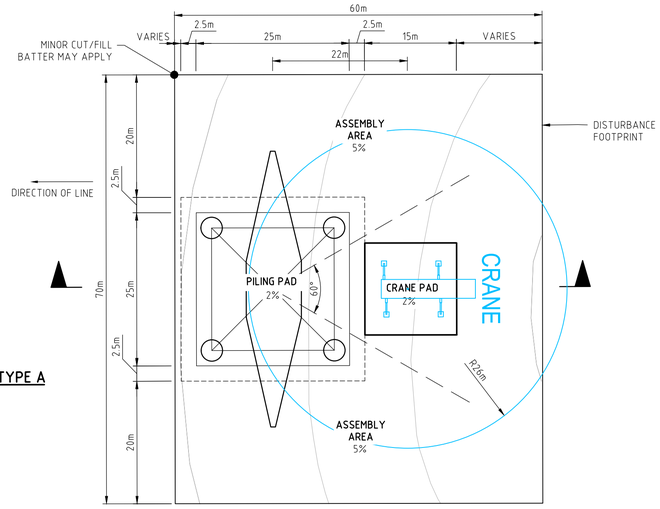
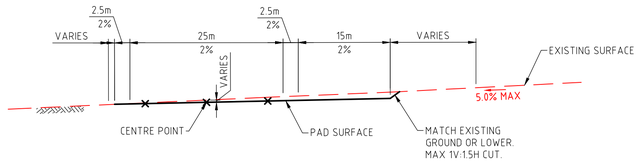
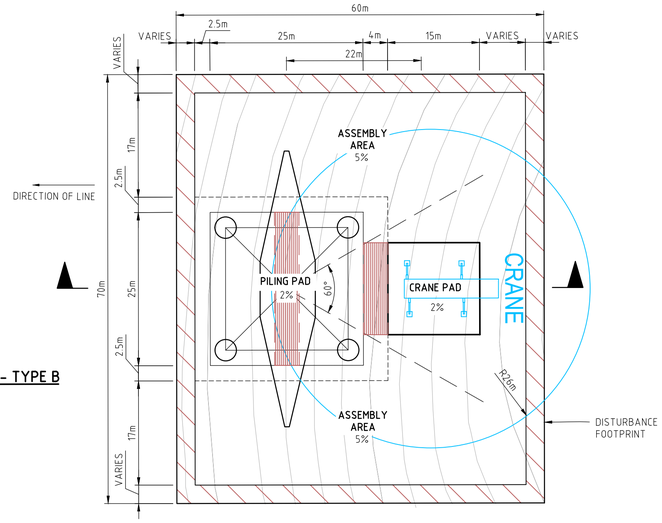


TYPICAL TOWER PAD - TYPE A SUSPENSION TOWERS

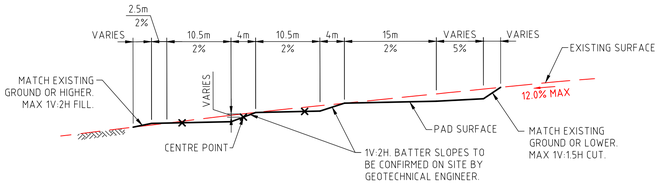
SCALE 1:500

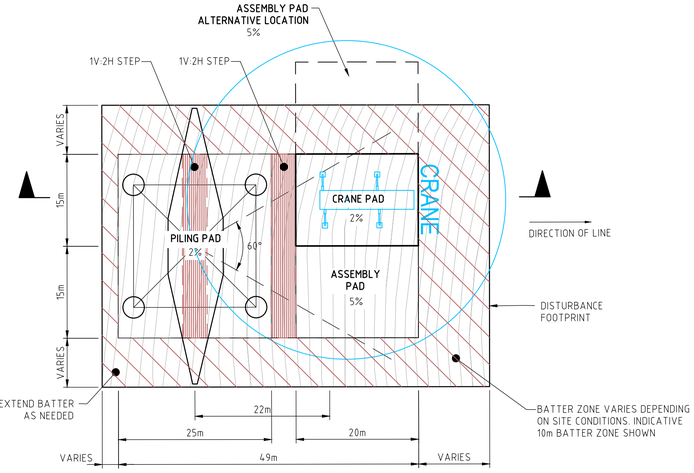


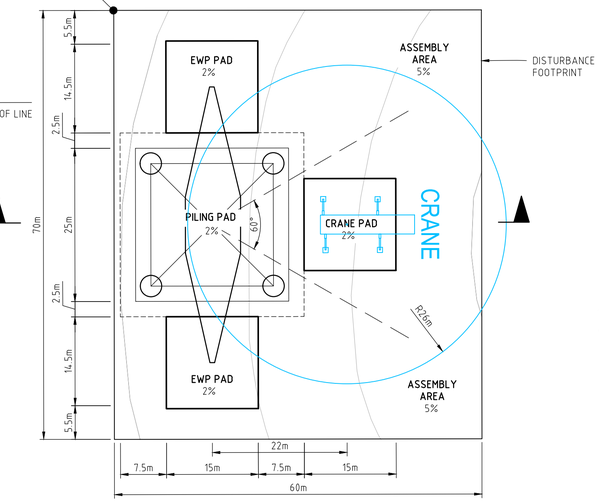


TYPICAL TOWER PAD - TYPE B SUSPENSION TOWERS

SCALE 1:500

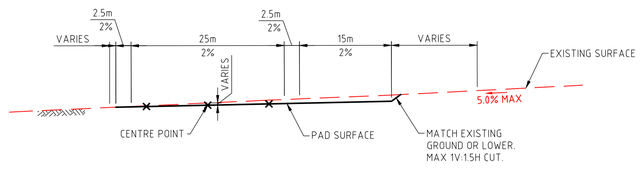


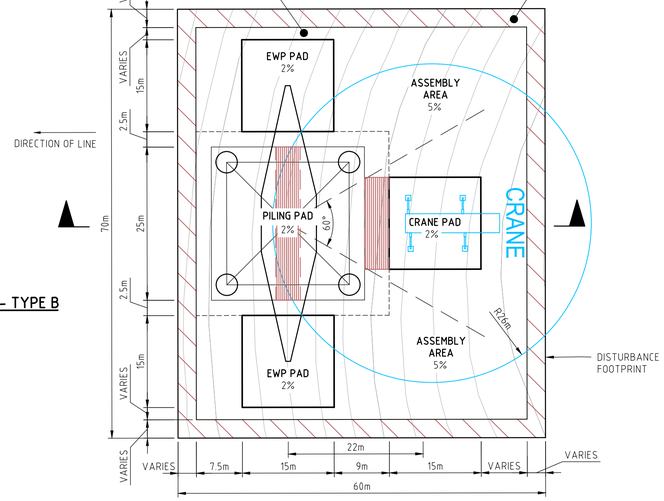




TYPICAL TOWER PAD - TYPE A STRAIN TOWERS

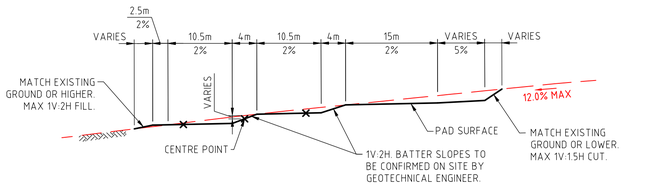
SCALE 1:500

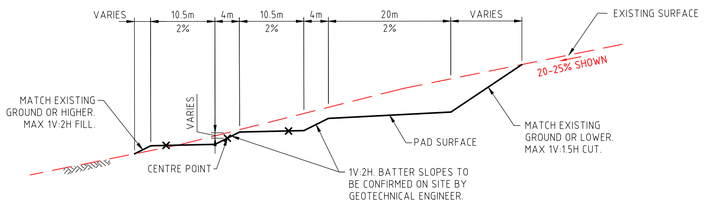




TYPICAL TOWER PAD - TYPE B STRAIN TOWERS

SCALE 1:500





TYPICAL TOWER PAD - TYPE D TENSION TOWERS

SCALE 1:500

10 5 0 10 20 30 40 50

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:500

AMENDMENT:

UGL 11 APR 2024 FOR REVIEW

F								
E	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
D	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L2	MN	DH	BB	MN	TS	18/03/2024
C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	03/11/2023
AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE

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REVIEWED		
VERIFIED		
APPROVED		

APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

TransGrid

HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
TYPICAL SECTIONS

A1	TL-799414-01	F
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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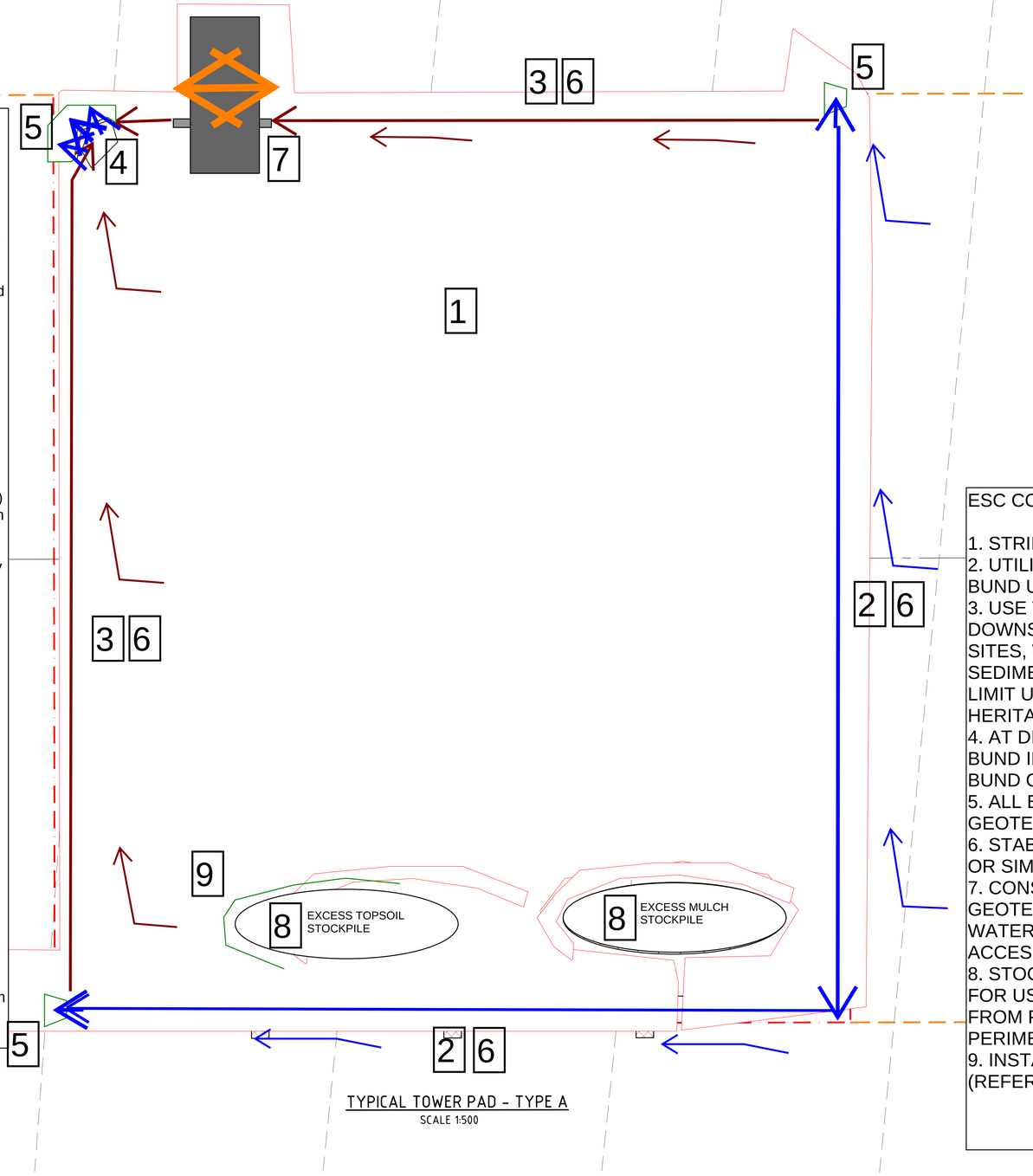
TYPICAL TOWER TYPE A
STAGE 1 - CLEARING AND TOPSOIL STRIPPING



TYPICAL TOWER PAD - TYPE A
SCALE 1:500

GENERAL ESC DIRECTIONS

1.All tower footprint permanent & temporary clearing, earthworks, stockpiles & parking areas must be within the approved disturbance area, clearing/disturbance must be undertaken in accordance with the HLW Clearing Protocol (HLW-HLJV-PRW-ENM-PLN-000001B)
No works, including vehicle & machinery parking, is permitted outside of the approved disturbance area.
2.Erosion & sediment control measures to be installed in accordance with the Erosion & Sediment Control Strategy and any site-specific Progressive Erosion & Sediment Control Plans (PESCPs) including:
• Upslope: where offsite 'clean' water may flow through the works area, install diversion bund/drainage controls as required. Direct offsite clean water to stable vegetated &/or rocky areas, where possible.
• Within the site: direct off-site water unimpacted and safely through the site.
• Downslope: direct site 'dirty' water to drainage controls and sediment controls using a diversion bund. Discharge water in accordance with the HLW Construction Soil and Water Management Sub-Plan (HLW-HLJV-PRW-ENM-PLN-000011)
• Stockpiles: Locate stockpiles inside perimeter bunds on then top side of the tower footprint, otherwise install earth bund on the upslope side. install sediment fence on downslope side. Stockpiles can be covered is there is rainfall forecast or windy conditions. Mulch stockpiles to be located on the top side of tower footprints.
• Stockpiles left for post construction rehabilitation must be stabilised with vegetation, soil binder or similar to mitigate erosion & prevent sediment loss.
3. Inspection of erosion and sediment controls to be completed weekly and following rainfall events of more than 10mm in a 24hr period, or a rainfall 'plus' event of more than 30mm of rain in a 24 hour period in accordance with Section 3.9.1 of the HLW CEMP (HLW-HLJV-PRW-ENM-PLN-000002). Controls are to be rectified, added, or amended as specified by the HLW Environment Team or CPESC.
4. Supervisor to ensure all controls & flagging installed as per ESCP/PESCP and Clearing Permit.
5. All measure to be installed in accordance with IECA/Blue Book Standard Drawings – refer to ESC Notes and Standard Drawings.
6. ESC controls may be decommissioned in consultation with the CPESC once 90% of the site reaches 70% of final soil cover condition.

*Note that Tower Footprints may have differing disturbance footprints & may require a modified arrangements/control measures. If in doubt consult the project Environmental Team or CPESC.

LEGEND

- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- FLUME UNDER ENTRY RAMP (WHERE REQUIRED)
- SEDIMENT TRAP WITH SEDIMENT FILTER WEIR
- SITE FENCE & GATE
- EARTH WINDROW / BUND
- SEDIMENT FENCE
- CLEAN WATER DIVERSION BUND
- DIRTY WATER DIVERSION BUND
- BATTER STABILISATION DRAIN
- CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
- ROCK CHECK DAM (SEDIMENT FILTER)
- STRAW BALE CHECK DAM (SEDIMENT FILTER)
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL
- CLEAN WATER FLOW
- DIRTY WATER FLOW
- CONSTRCUTION ACCESS

ESC CONSTRUCTION SEQUENCE

1. STRIP TOPOSIL TO DEPTH RECOMMENDED
2. UTILISE TOPSOIL TO CONSTRUCT PERIMETER CLEAN WATER DIVERSION BUND UPSLOPE OF WORKS (REFER DRAWING XX).
3. USE TOPSOIL TO CONSTRUCT DIRTY WATER DIVERSION BUND ON DOWNSLOPE SIDE OF WORKS (REFER DRAWING XX). FOR TYPE A TOWER SITES, WHERE TOPSOIL AVAILABILITY IS LIMITED A MULCH BUND OR SEDIMENT FENCE MAY BE INSTALLED (REFER DRAWING TL-799416-04). LIMIT USE OF MULCH BUNDS NEAR SENSITVE RECEPTORS (WATERWAYS, HERITAGE SITES ETC).
4. AT DISCHARGE POINTS AND LOW POINTS IN DIRTY WATER DIVERSION BUND INSTALL GEOTEXTILE LINED SEDIMENT TRAP WITH COIR LOG, MULCH BUND OR ROCK SEDIMENT FILTER.
5. ALL BUNDS AND FILTERS TO DISCHARGE TO STABLE VEGETATION OR GEOTEXTILE TO MINIMISE SCOUR.
6. STABILISE PERIMETER BUNDS WITH MULCH, GEOTEXTILE, SOIL BINDER OR SIMILAR.
7. CONSTRUCT STABLE ENTRY POINT USING CLEAN ROCK OVER GEOTEXTILE. WHERE NECESSARY RAMP ENTRY TO CONTROL DIRTY WATER RUNOFF, INSTALLING A FLUME PIPE TO MINIMISE EROSION OF ACCESS IF NECESSARY.
8. STOCKPILE EXCESS TOPSOIL AND MULCH IN SEPARATE STOCKPILES FOR USE IN REHABILITATION. LOCATE STOCKPILES NO LESS THAN 1M FROM PERIMETER BUNDS AND WEHRE SPACE IS LIMITED EXTEND ALONG PERIMETER. (REFER DRAWING TL-799416-04)
9. INSTALL SEDIMENT FENCING DOWNSLOPE OF TOPSOIL STOCKPILES (REFER DRAWING TL-799416-04).

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:200

AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

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ANNOTATED 17/10/2024
R BILLYARD CPESC #9496

ISSUED FOR REVIEW

DRAWN		
REVIEWED		
VERIFIED		
APPROVED		

APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1	TL-799416-01	A
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$

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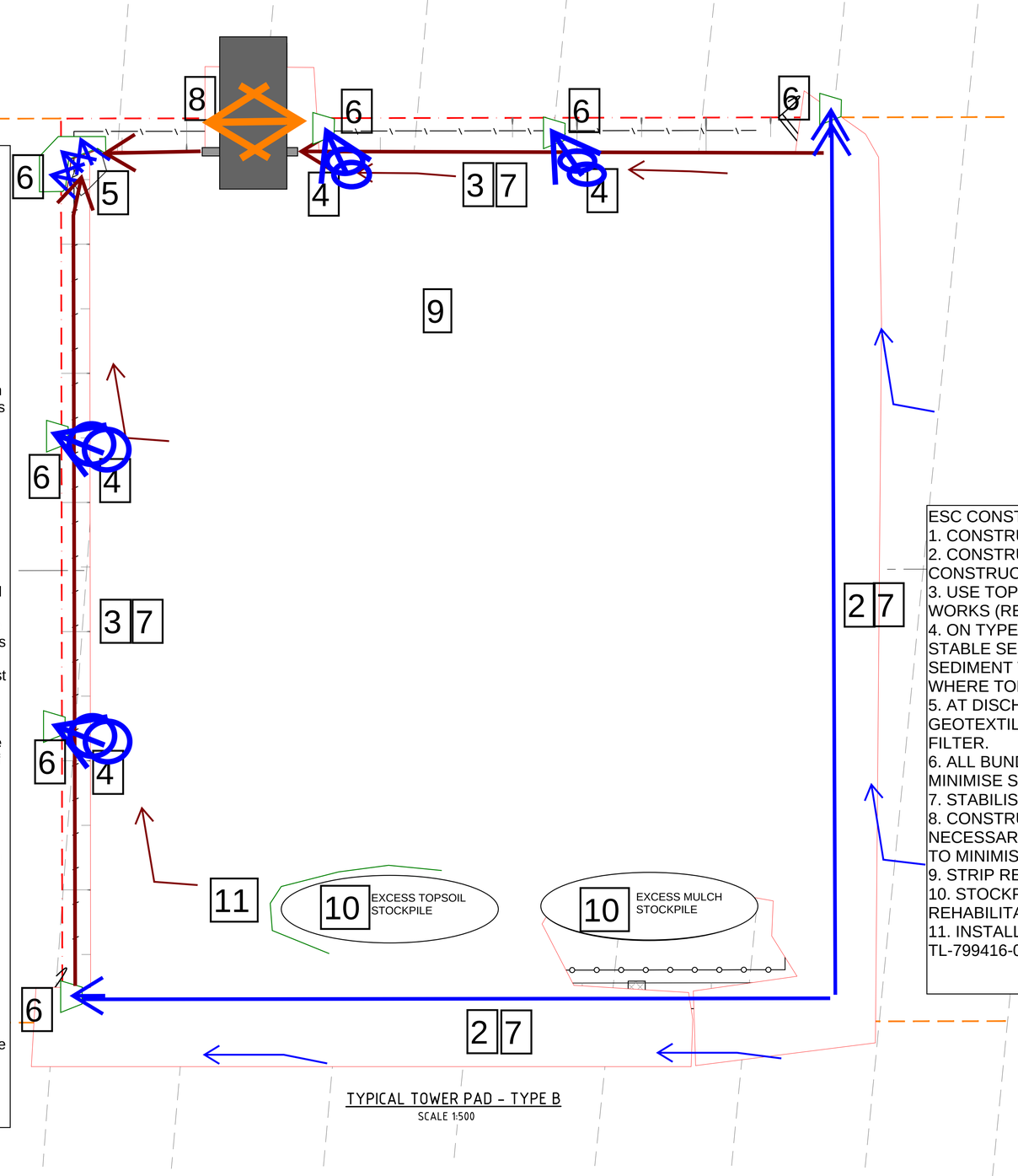
TYPICAL TOWER TYPE B
STAGE 1 - CLEARING AND TOPSOIL STRIPPING

GENERAL ESC DIRECTIONS

1.All tower footprint permanent & temporary clearing, earthworks, stockpiles & parking areas must be within the approved disturbance area, clearing/disturbance must be undertaken in accordance with the HLW Clearing Protocol (HLW-HLJV-PRW-ENM-PLN-000001B)
No works, including vehicle & machinery parking, is permitted outside of the approved disturbance area.
2.Erosion & sediment control measures to be installed in accordance with the Erosion & Sediment Control Strategy and any site-specific Progressive Erosion & Sediment Control Plans (PESCPs) including:
• Upslope: where offsite 'clean' water may flow through the works area, install diversion bund/drainage controls as required. Direct offsite clean water to stable vegetated &/or rocky areas, where possible.
• Within the site: direct off-site water unimpacted and safely through the site.
• Downslope: direct site 'dirty' water to drainage controls and sediment controls using a diversion bund. Discharge water in accordance with the HLW Construction Soil and Water Management Sub-Plan (HLW-HLJV-PRW-ENM-PLN-000011)
• Stockpiles: Locate stockpiles inside perimeter bunds on then top side of the tower footprint, otherwise install earth bund on the upslope side. install sediment fence on downslope side. Stockpiles can be covered is there is rainfall forecast or windy conditions. Mulch stockpiles to be located on the top side of tower footprints.
• Stockpiles left for post construction rehabilitation must be stabilised with vegetation, soil binder or similar to mitigate erosion & prevent sediment loss.
3. Inspection of erosion and sediment controls to be completed weekly and following rainfall events of more than 10mm in a 24hr period, or a rainfall 'plus' event of more than 30mm of rain in a 24 hour period in accordance with Section 3.9.1 of the HLW CEMP (HLW-HLJV-PRW-ENM-PLN-000002). Controls are to be rectified, added, or amended as specified by the HLW Environment Team or CPESC.
4. Supervisor to ensure all controls & flagging installed as per ESCP/PESCP and Clearing Permit.
5. All measure to be installed in accordance with IECA/Blue Book Standard Drawings – refer to ESC Notes and Standard Drawings.
6. ESC controls may be decommissioned in consultation with the CPESC once 90% of the site reaches 70% of final soil cover condition.

*Note that Tower Footprints may have differing disturbance footprints & may require a modified arrangements/control measures. If in doubt consult the project Environmental Team or CPESC.



TYPICAL TOWER PAD - TYPE B
SCALE 1:500

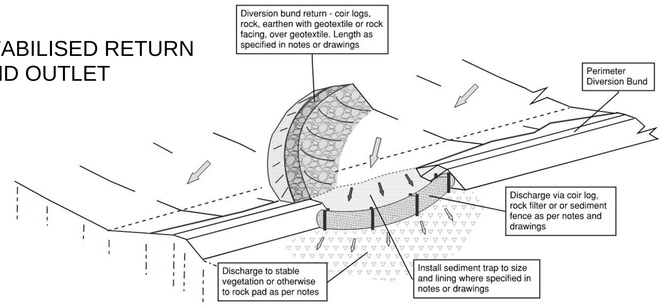
LEGEND

- DESIGN CONTOUR MINOR
- 239.00 DESIGN CONTOUR MAJOR
- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- SITE FENCE & GATE
- EARTH WINDROW / BUND
- SEDIMENT FENCE
- CATCH DRAIN
- EARTH BANK LOW FLOW
- BATTER STABILISATION DRAIN
- CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
- ROCK CHECK DAM (SEDIMENT FILTER)
- STRAW BALE CHECK DAM (SEDIMENT FILTER)
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL
- SITE RUNOFF DISCHARGE
- CLEAN WATER FLOW
- DIRTY WATER FLOW
- CONSTRUCTION ACCESS

ESC CONSTRUCTION SEQUENCE

1. CONSTRUCT PERIMETER CONTROLS IN ADVANCE OF TOPSOIL STRIPPING.
2. CONSTRUCT PERIMETER CLEAN WATER DIVERSION DRAIN OR UTILISE TOPSOIL TO CONSTRUCT TEMPORARY DIVERSION BUND UPSLOPE OF WORKS (REFER DRAWING XX).
3. USE TOPSOIL TO CONSTRUCT DIRTY WATER DIVERSION BUND ON DOWNSLOPE SIDE OF WORKS (REFER DRAWING TL-799416-05).
4. ON TYPE B SITES INSTALL RETURNS ON BUNDS AT NO MORE THAN 20M INTERVALS WITH STABLE SEDIMENT TRAPS AND FILTERS TO SHED WATER AND REDUCE DISCHARGE AT SEDIMENT TRAP (DRAWING BELOW). SEDIMENT FENCE WITH RETURNS MAY BE USED WHERE TOPSOIL IS NOT AVAILABLE FOR PEREIMETER BUND.
5. AT DISCHARGE POINTS AND LOW POINTS IN DIRTY WATER DIVERSION BUND INSTALL GEOTEXTILE LINED SEDIMENT TRAP WITH COIR LOG, MULCH BUND OR ROCK SEDIMENT FILTER.
6. ALL BUNDS AND FILTERS TO DISCHARGE TO STABLE VEGETATION OR GEOTEXTILE TO MINIMISE SCOUR.
7. STABILISE PERIMETER BUNDS WITH MULCH, GEOTEXTILE, SOIL BINDER OR SIMILAR.
8. CONSTRUCT STABLE ENTRY POINT USING CLEAN ROCK OVER GEOTEXTILE. WHERE NECESSARY RAMP ENTRY TO CONTROL DIRTY WATER RUNOFF, INSTALLING A FLUME PIPE TO MINIMISE EROSION OF ACCESS IF NECESSARY.
9. STRIP REMAINING TOPSOIL TO DEPTH RECOMMENDED.
10. STOCKPILE EXCESS TOPSOIL AND MULCH IN SEPARATE STOCKPILES FOR USE IN REHABILITATION (REFER DRAWING TL-799416-04).
11. INSTALL SEDIMENT FENCING DOWNSLOPE OF TOPSOIL STOCKPILES (REFER DRAWING TL-799416-04).

4 STABILISED RETURN AND OUTLET



AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

UGL A MEMBER OF THE CIMIC GROUP
ABN 96 096 365 972
40 Miller Street
North Sydney NSW 2060
www.uglimited.com

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BCE Environmental ESC | Audit

ANNOTATED 17/10/2024
R BILLYARD CPESC #9496

ISSUED FOR REVIEW

REFERENCE DRAWINGS

DRAWN		
REVIEWED		
VERIFIED		
APPROVED		

APPROVAL STATUS

SCALE

HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1	PREFIX TL-799416-02	NUMBER	SHEET	A AMDT

INDEX CLASS'N 02-02

566x801mm

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PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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TYPICAL TOWER TYPE D
STAGE 1 - CLEARING AND TOPSOIL STRIPPING

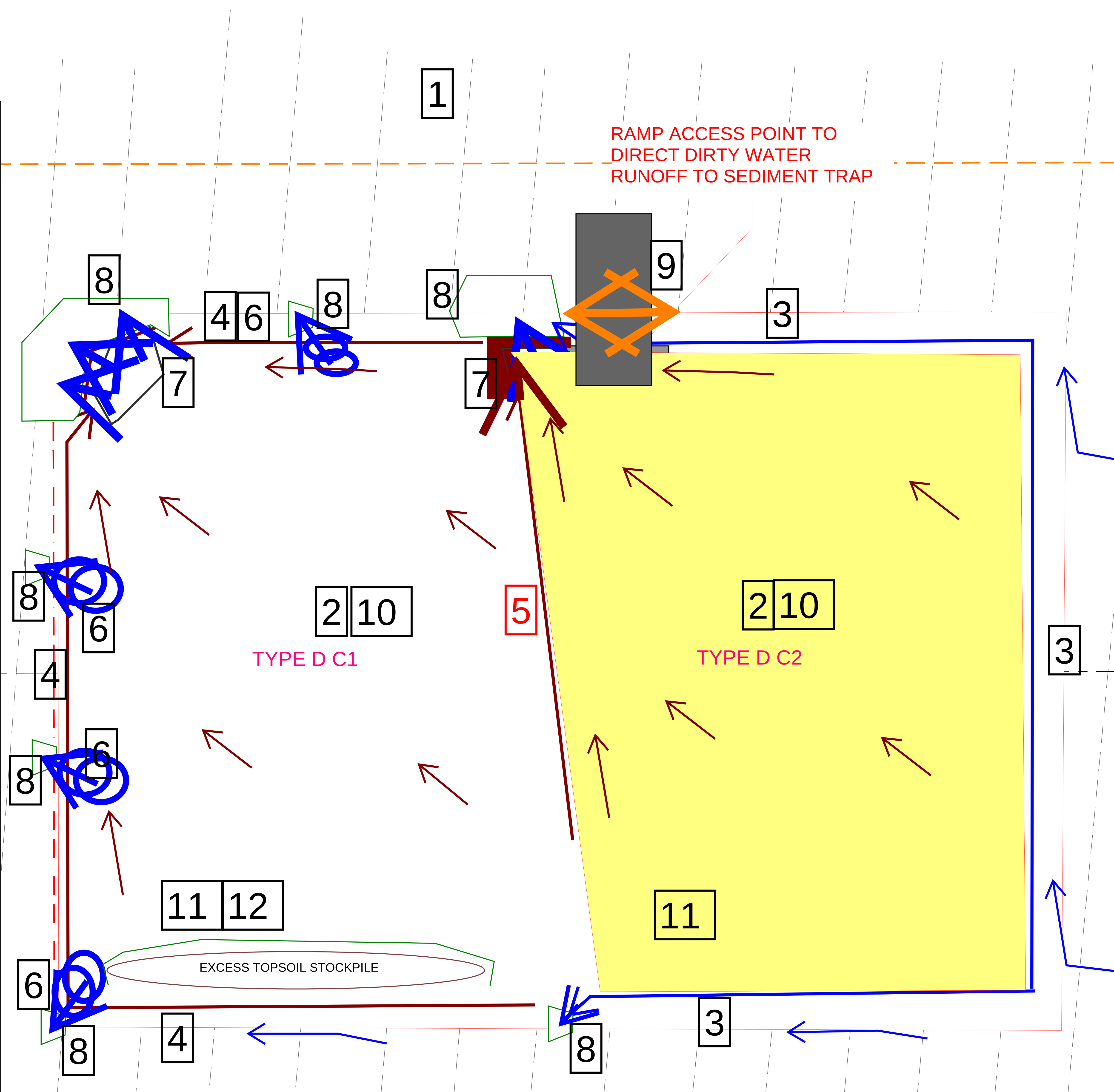
LEGEND

Symbol	Description	Symbol	Description
	DESIGN CONTOUR MINOR		CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
239.00	DESIGN CONTOUR MAJOR		ROCK CHECK DAM (SEDIMENT FILTER)
	EXISTING CONTOURS		STRAW BALE CHECK DAM (SEDIMENT FILTER)
	TOPSOIL STOCKPILE		LEVEL SPREADER
	STABILISED SIE ENTRY / EXIT		TOWER PAD DISTURBANCE AREA
	SITE FENCE & GATE		TRANSMISSION LINE EASEMENT
	EARTH WINDROW / BUND		TRANSMISSION LINE DIRECTION
	SEDIMENT FENCE		CUT
	CATCH DRAIN		FILL
	EARTH BANK LOW FLOW		SITE RUNOFF DISCHARGE
	BATTER STABILISATION DRAIN		CLEAN WATER FLOW
	CONSTRUCTION ACCESS		DIRTY WATER FLOW

GENERAL ESC DIRECTIONS

1. All tower footprint permanent & temporary clearing, earthworks, stockpiles & parking areas must be within the approved disturbance area, clearing/disturbance must be undertaken in accordance with the HLW Clearing Protocol (HLW-HLJV-PRW-ENM-PLN-000001B)
No works, including vehicle & machinery parking, is permitted outside of the approved disturbance area.
2. Erosion & sediment control measures to be installed in accordance with the Erosion & Sediment Control Strategy and any site-specific Progressive Erosion & Sediment Control Plans (PESCPs) including:
• Upslope: where offsite 'clean' water may flow through the works area, install permanent clean water drain or diversion bund/drainage controls as required. Direct offsite clean water to stable vegetated &/or rocky areas, where possible.
• Within the site: direct off-site water unimpacted and safely through the site.
• Downslope: direct site 'dirty' water to drainage controls and sediment controls using a diversion bund stabilised with geotextile. Discharge water in accordance with the HLW Construction Soil and Water Management Sub-Plan (HLW-HLJV-PRW-ENM-PLN-000011)
• Stockpiles: Locate stockpiles inside perimeter bunds on the top side of the tower footprint, otherwise install earth bund on the upslope side and install sediment fence on downslope side. Stockpiles can be covered is there is rainfall forecast or windy conditions. Mulch stockpiles to be located on the top side of tower footprints.
• Stockpiles left for post construction rehabilitation must be stabilised with vegetation, soil binder or similar to mitigate erosion & prevent sediment loss.
3. Inspection of erosion and sediment controls to be completed weekly and following rainfall events of more than 10mm in a 24hr period, or a rainfall 'plus' event of more than 30mm of rain in a 24 hour period in accordance with Section 3.9.1 of the HLW CEMP (HLW-HLJV-PRW-ENM-PLN-000002). Controls are to be rectified, added, or amended as specified by the HLW Environment Team or CPESC.
4. Supervisor to ensure all controls & flagging installed as per ESCP/PESCP and Clearing Permit.
5. All measure to be installed in accordance with IECA/Blue Book Standard Drawings – refer to ESC Notes and Standard Drawings.
6. ESC controls may be decommissioned in consultation with the CPESC once 90% of the site reaches 70% of final soil cover condition.

*Note that Tower Footprints may have differing disturbance footprints & may require a modified arrangements/control measures. If in doubt consult the project Environmental Team or CPESC.

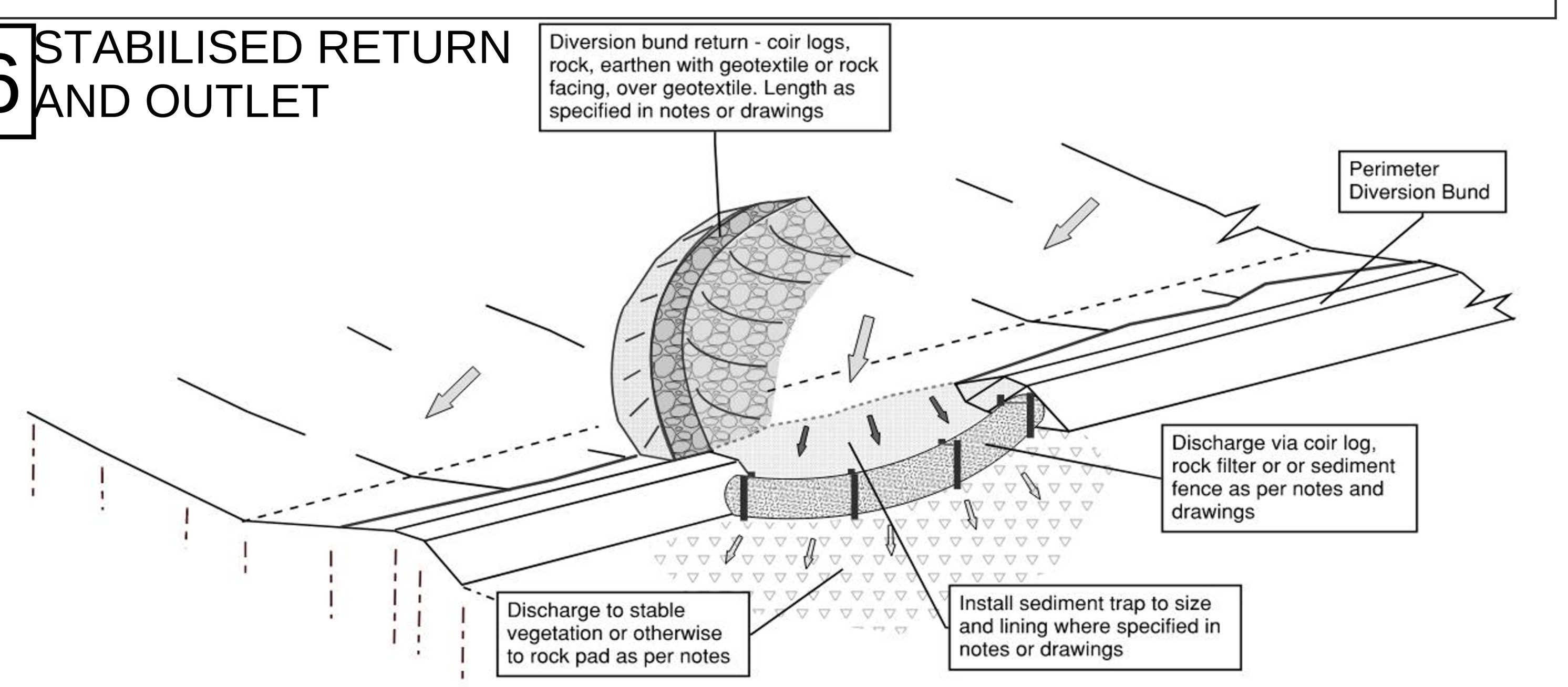


TYPICAL TOWER PAD - TYPE D
SCALE 1:500

ESC CONSTRUCTION SEQUENCE - STAGE 1 - CLEARING AND TOPSOIL STRIPPING
1. CONSTRUCT PERIMETER CONTROLS PRIOR TO TOPSOIL STRIPPING.
2. MAINTAIN TOPSOIL/MULCH COVER ON SOIL SURFACE UNTIL CUT TO FILL EARTHWORKS COMMENCE
3. WHERE PRACTICABLE INSTALL PERMANENT CLEAN WATER DIVERSION DRAIN DURING INTIAL WORKS. OTHERWISE UTILISE TOPSOIL TO CONSTRUCT PERIMETER CLEAN WATER DIVERSION BUND UPSLOPE OF WORKS (REFER DRAWING TL-799416-05).
4. USE TOPSOIL TO CONSTRUCT DIRTY WATER DIVERSION BUND (NOT SEDIMENT FENCE) ON DOWNSLOPE SIDE OF WORKS (REFER DRAWING TL-799416-05). STABILISE DIVERSION BUND WITH GEOTEXTILE TO REDUCE EROSION.
5. WHERE PRACTICABLE IN CONSULTAITON WITH CPESC AND ENVIRONMENTAL TEAM DIVIDE TOWER SITE INTO CATCHMENTS TO REDUCE RUNOFF AND SEDIMENT ATION DOWNSLOPE. CONSTRFUCT MULCH OR STABILISED TOPSOIL BUNDS TO DIRECT RUNOFF TO SEDIMENT TRAP CONSTRUCTED FOR EACH CATCHMENT. ALLOW ACCESS AT UPSLOPE END OF BUND VIA TRAFFICABLE ROLLOVER BERMS FOR SITE CONSTRUCTION ACCESS.
6. ON TYPE D SITES INSTALL RETURNS ON BUNDS AT NO MORE THAN 15M INTERVALS WITH STABLE SEDIMENT TRAPS AND FILTERS TO SHED WATER AND REDUCE DISCHARGE AT DOWNSLOPE SEDIMENT TRAP (REFER TO DRAWING BELOW).
7. AT CATCHMENT DISCHARGE POINTS FROM DIRTY WATER DIVERSION BUNDS INSTALL GEOTEXTILE LINED SEDIMENT TRAPS WITH COIR LOG, MULCH BUND OR ROCK SEDIMENT FILTER. SEDIMENT TRAP SURFACE AREAS TO BE AS PER TABLE PROVIDED ON THIS DRAWING.
8. ALL BUNDS AND FILTERS TO DISCHARGE TO LEVEL SPREADER OUTLETS STABILISED WITH VEGETATION, GEOTEXTILE OR CLEAN ROCK OVER GEOTEX TO MINIMISE SCOUR.
9. CONSTRUCT STABLE ENTRY POINT USING CLEAN ROCK OVER GEOTEXTILE. RAMP ACCESS WHERE NECESSARY TO DIRECT DIRTY WATER RUNOFF TO SEDIMENT TRAPS, INSTALL FLUME PIPE/S TO MINIMISE EROSION BY RUNON CLEAN WATER IF NECESSARY.
10. STRIP REMAINING TOPSOIL AND MULCH.
11. STOCKPILE EXCESS TOPSOIL AND MULCH IN SEPARATE STOCKPILES FOR USE IN STABILISATION/REHABILITATION. LOCATE STOCKPILES ALONG PERIMETER BUNDS OR ADJACENT TO FOOTPRINT WHERE PRACTICABLE TO MAXIMISE CONSTRUCTION AREA (REFER DRAWING TL-799416-04).
12. INSTALL SEDIMENT FENCING DOWNSLOPE OF TOPSOIL STOCKPILES (REFER DRAWING TL-799416-04).

4 GEOTEXTILE STABILISED PERIMETER BUND

6 STABILISED RETURN AND OUTLET



AMDT	AMENDMENT DETAILS	DESIGN	CHK'D	DRAWN	CHK'D	APP'D	DATE
A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

UGL
20 APR 2024
FOR REVIEW

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CIMIC
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40 Miller Street
North Sydney NSW 2060
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BCE
ANNOTATED 17/10/2024
R BILLYARD CPESC #9496
ISSUED FOR REVIEW

REFERENCE DRAWINGS

DRAWN		
REVIEWED		
VERIFIED		
APPROVED		
APPROVAL STATUS		
SCALE		

TransGrid
HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL PLAN

A1 | TL-799416-03 | A
PREFIX NUMBER SHEET | AMDT

PLOT ISSUE DATE $$$$$SYTIME$$$$$ $$PLOT_TIME$$ | COPIED FROM | SUPERSEDES | SUPERSEDED BY | INDEX CLASS'N 02-02

566x801mm
SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$$

TYPICAL TOWER TYPE D
STAGE 2 - CUT TO FILL EARTHWORKS

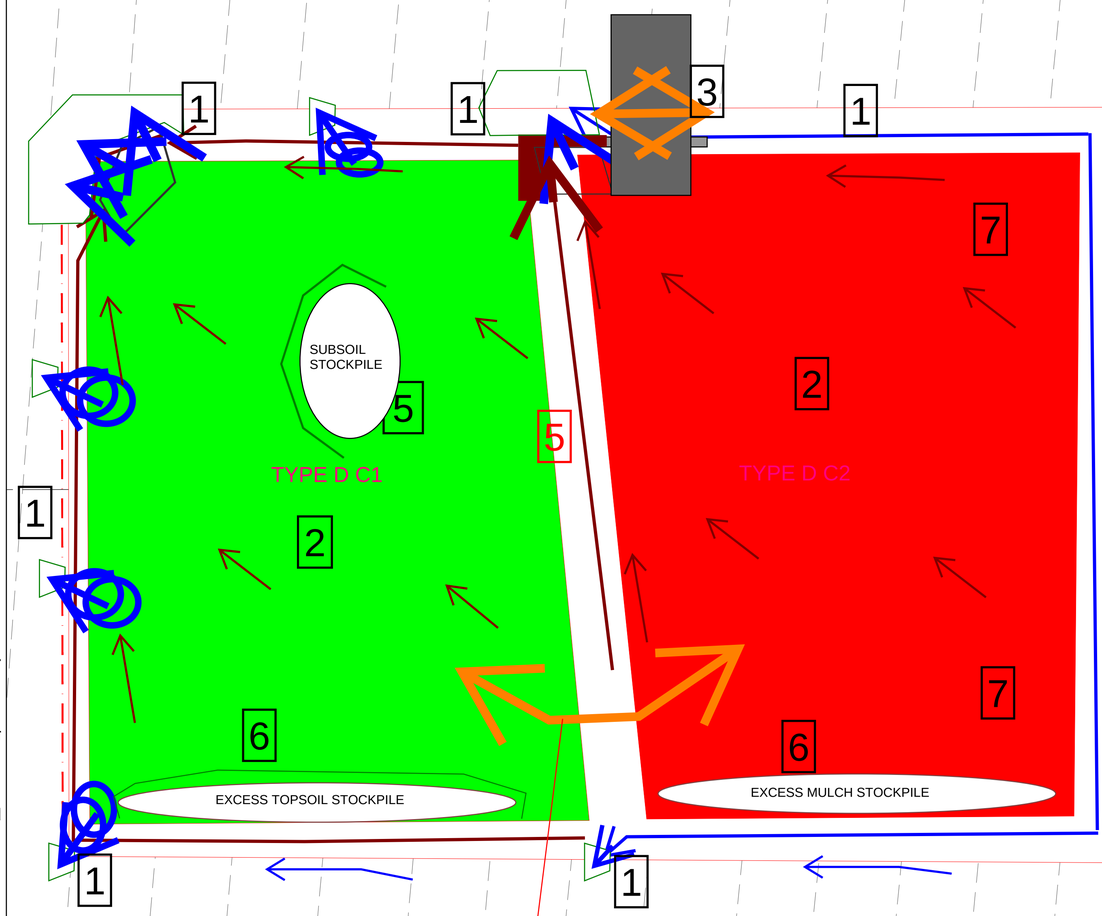
GENERAL ESC DIRECTIONS

1.All tower footprint permanent & temporary clearing, earthworks, stockpiles & parking areas must be within the approved disturbance area, clearing/disturbance must be undertaken in accordance with the HLW Clearing Protocol (HLW-HLJV-PRW-ENM-PLN-000001B)
No works, including vehicle & machinery parking, is permitted outside of the approved disturbance area.
2.Erosion & sediment control measures to be installed in accordance with the Erosion & Sediment Control Strategy and any site-specific Progressive Erosion & Sediment Control Plans (PESCPs) including:
• Upslope: where offsite 'clean' water may flow through the works area, install permanent clean water drain or diversion bund/drainage controls as required. Direct offsite clean water to stable vegetated &/or rocky areas, where possible.
• Within the site: direct off-site water unimpacted and safely through the site.
• Downslope: direct site 'dirty' water to drainage controls and sediment controls using a diversion bund stabilised with geotextile. Discharge water in accordance with the HLW Construction Soil and Water Management Sub-Plan (HLW-HLJV-PRW-ENM-PLN-000011)
• Stockpiles: Locate stockpiles inside perimeter bunds on the top side of the tower footprint, otherwise install earth bund on the upslope side and install sediment fence on downslope side. Stockpiles can be covered is there is rainfall forecast or windy conditions. Mulch stockpiles to be located on the top side of tower footprints.
• Stockpiles left for post construction rehabilitation must be stabilised with vegetation, soil binder or similar to mitigate erosion & prevent sediment loss.
3. Inspection of erosion and sediment controls to be completed weekly and following rainfall events of more than 10mm in a 24hr period, or a rainfall 'plus' event of more than 30mm of rain in a 24 hour period in accordance with Section 3.9.1 of the HLW CEMP (HLW-HLJV-PRW-ENM-PLN-000002). Controls are to be rectified, added, or amended as specified by the HLW Environment Team or CPESC.
4. Supervisor to ensure all controls & flagging installed as per ESCP/PESCP and Clearing Permit.
5. All measure to be installed in accordance with IECA/Blue Book Standard Drawings – refer to ESC Notes and Standard Drawings.
6. ESC controls may be decommissioned in consultation with the CPESC once 90% of the site reaches 70% of final soil cover condition.

*Note that Tower Footprints may have differing disturbance footprints & may require a modified arrangements/control measures. If in doubt consult the project Environmental Team or CPESC.

LEGEND

- DESIGN CONTOUR MINOR
- 239.00 DESIGN CONTOUR MAJOR
- EXISTING CONTOURS
- TOPSOIL STOCKPILE
- STABILISED SIE ENTRY / EXIT
- SITE FENCE & GATE
- EARTH WINDROW / BUND
- SEDIMENT FENCE
- CATCH DRAIN
- EARTH BANK LOW FLOW
- BATTER STABILISATION DRAIN
- CONSTRUCTION ACCESS
- CATCH DRAIN / TABLE DRAIN RIP-RAP OUTLET
- ROCK CHECK DAM (SEDIMENT FILTER)
- STRAW BALE CHECK DAM (SEDIMENT FILTER)
- LEVEL SPREADER
- TOWER PAD DISTURBANCE AREA
- TRANSMISSION LINE EASEMENT
- TRANSMISSION LINE DIRECTION
- CUT
- FILL
- SITE RUNOFF DISCHARGE
- CLEAN WATER FLOW
- DIRTY WATER FLOW



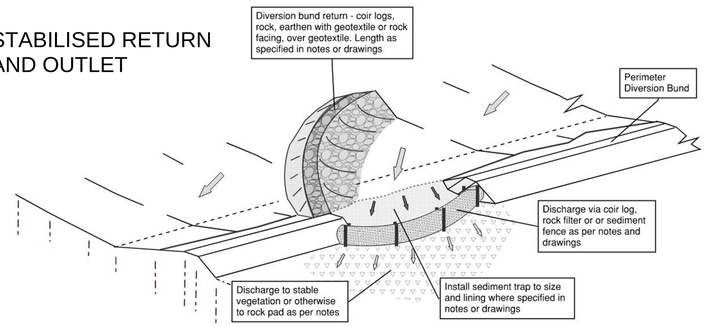
ACCESS CUT AND FILL SITES AROUND UPPER END OF CATCHMENT BERM

TYPICAL TOWER PAD - TYPE D
SCALE 1:500

ESC CONSTRUCTION SEQUENCE - STAGE 2 - CUT TO FILL EARTHWORKS

1. MAINTAIN PERIMETER CONTROLS INCLUDING UPSLOPE CL;EAN WATER DIVERSION DRAIN AND DOWNSLOPE DIRTY WATER DIVERSION BUNDS AND ASSOCIATED SEDIMENT TRAPS, RETURNS AND STABLE DISCHARGE POINTS.
2. MAINTAIN TOPSOIL/MULCH COVER ON SOIL SURFACE UNTIL CUT TO FILL EARTHWORKS COMMENCE
3. MAINTAIN STABLE ACCESS POINT AND FREE DRAINAGE FOR SITE RUNOFF TO SEDIMENT TRAP.
4. WHERE PRACTICABLE RETAIN DIVISIONS OF TOWER SITE INTO CATCHMENTS DURING CUT TO FILL WORKS. MAINTAIN BUNDS AND SEDIMENT TRAPS. PROVIDE FOR CONSTRUCTION ACCESS AROUND UPSLOPE END OF CATCHMENT BUNDS.
5. STOCKPILE SUBSOILS ON CUT AND FILL SITES SEPARATELY TO TOPSOIL AND MULCH AND NO CLOSER THAN 1M FROM PERIMETER BUINDS. INSTALL SEDIMENT FENCE DOWNSLOPE IF STOCKPILE IS NOT IN ACTIVE USE (EG CREW BREAKS, TEMPORARY SHUTDOWNS ETC).
6. MAINTAIN SEPARATE STOCKPILES FOR TOPSOIL AND MULCH FOR USE IN STABILISATION/REHABILITATION. MAINTAIN SEDIMENT FENCING DOWNSLOPE OF TOPSOIL STOCKPILES.(REFER TO STAGE 3 DRAWING ATTACHED)
7. STABILISE CUT AND FILL BATTERS PROGRESSIVELY AS CUT TO FILL WORKS ARE COMPLETED (FOR DETAILS REFER TO STAGE 3 DRAWING ATTACHED)

6 STABILISED RETURN AND OUTLET



AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

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R BILLYARD CPESC #9496
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APPROVED		

APPROVAL STATUS
SCALE

HUMELINK WEST
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TOWER PADS AND ACCESS TRACKS
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INDEX CLASS'N 02-02

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PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

SOURCE DESIGN FILE: $$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$

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TYPICAL TOWER TYPE D
STAGE 2 - CUT TO FILL EARTHWORKS

GENERAL ESC DIRECTIONS

1.All tower footprint permanent & temporary clearing, earthworks, stockpiles & parking areas must be within the approved disturbance area, clearing/disturbance must be undertaken in accordance with the HLW Clearing Protocol (HLW-HLJV-PRW-ENM-PLN-000001B)
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5. All measure to be installed in accordance with IECA/Blue Book Standard Drawings – refer to ESC Notes and Standard Drawings.
6. ESC controls may be decommissioned in consultation with the CPESC once 90% of the site reaches 70% of final soil cover condition.

*Note that Tower Footprints may have differing disturbance footprints & may require a modified arrangements/control measures. If in doubt consult the project Environmental Team or CPESC.

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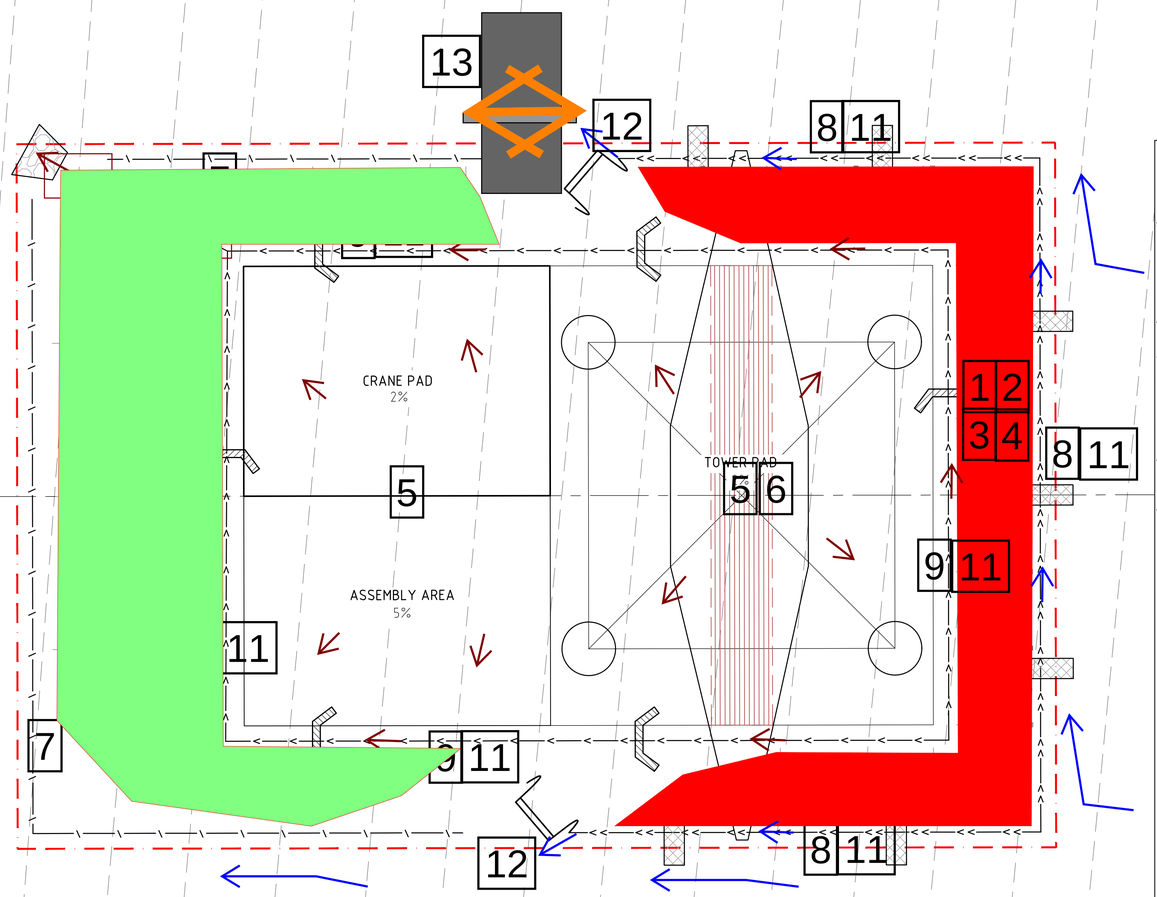
- TRANSMISSION LINE DIRECTION
- CUT
- FILL
- CONSTRUCTION ACCESS
- CLEAN WATER FLOW
- SITE RUNOFF
- BATTER CHUTE



TYPICAL TOWER PAD - TYPE D
SCALE 1:500

ESC CONSTRUCTION SEQUENCE - STAGE 3 - PERMANENT CONTROLS AND STABILISATION

1. STABILISE CUT AND FILL BATTERS PROGRESSIVELY AS CUT TO FILL WORKS ARE COMPLETED
2. TRACK ROLL COMPLETED BATTERS UP AND DOWN THE SLOPE TO ROUGHEN SURFACE
3. COVER BATTERS WITH 50-100MM OF TOPSOIL AND COMPACT LOOSELY WITH EXCAVATOR BUCKET.
4. STABILISE BATTER TOPSOIL SURFACE WITH MULCH (<100MM THICKNESS) OR SOIL BINDER. WHERE TOPSOIL IS UNAVAILABLE UTIULISE HYDROMULCH INCLUDING NPK FERTILISER AND APPROVED SEEDMIX.
5. SPREAD AVAILABLE TOPSOIL AND MULCH COVER ON TOWER PAD, ASSEMBLY AREA AND CRANE PADS.
6. FOR TOWER PAD FOOTPRINT, UTILISE OTHER OTHER TREATMENT WHERE ADVISED BY TRANSGRID.
7. INSTALL SEDIMENT FENCING DOWNSLOPE OF FILL BATTERS AS SHOWN. REMOVE SEDIMENT FENCING ONCE 70% VEGETATION COVER IS ESTABLISHED (REFER DRAWING TL-799416-04)
8. INSTALL PERMANENT CATCH DRAINS FOR CLEAN WATER DIVERSION (ON UPSLOPE MARGIN).
9. INSTALL CATCH DRAINS AT TOE OF CUT BATTERS AND TOP OF FILL BATTERS (IF NOT COMPLETED PREVIOUSLY).
10. INSTALL BATTER CHUTES AS INDICATED USING +100-150MM ROCK OVER GEOTEXTILE. BATTER CHUTES TO HAVE TRAPEZOIDAL PROFILE TO ENSURE FREE DRAINAGE (SEE DRAWING BELOW).
11. INSTALL ROCK CHECK DAMS IN ALL CATCH DRAINS AT MINIMUM 15M SPACINGS.
12. INSTALL LEVEL SPREADER OUTLETS AT DISCHARGE POINTS FOR ALL CATCH DRAINS. TEMPORARY OUTLETS MAY BE SUITABLE FOR USE IF PREVIOUSLY CONSTRUCTED.
13. MAINTAIN STABLE ENTRY POINT USING CLEAN ROCK OVER GEOTEXTILE. WHERE NECESSARY MANAGE CLEAN WATER RUNOFF VIA A RAMPED ENTRY OVER FLUME PIPE/S, OR OVER A STABLE LOW WATER CROSSING (REFER DRAWING TL-799415-05)

4 2 0 4 8 12 16 20
SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:200

AMENDMENT:

UGL 20 APR 2024 FOR REVIEW

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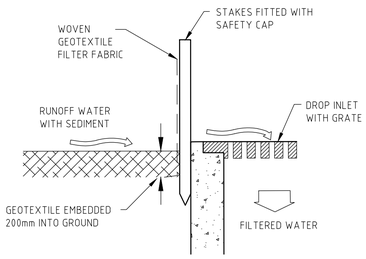
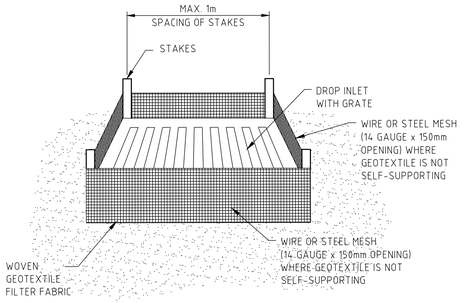
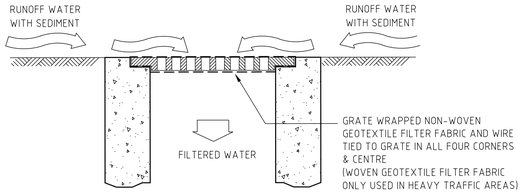




GOETEXTILE DROP INLET SEDIMENT TRAP TYPE 1

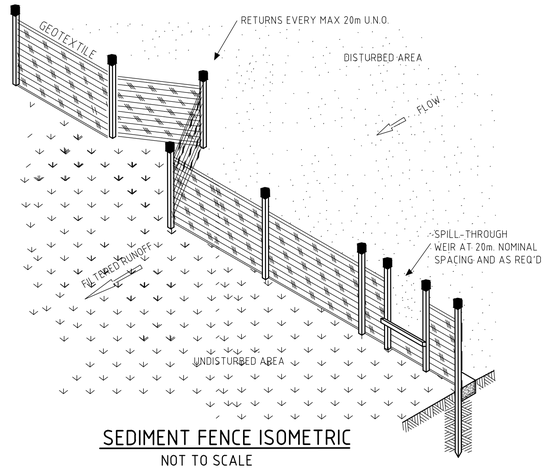
NOT TO SCALE



GOETEXTILE DROP INLET SEDIMENT TRAP TYPE 2

NOT TO SCALE

NOTE:
1. TO BE USED IN PAVED AREAS WHERE TRAFFIC ACCESS IS REQUIRED
2. PITS TO BE INSPECTED DAILY & CAPTURED SEDIMENT TO BE REMOVED



SEDIMENT FENCE ISOMETRIC

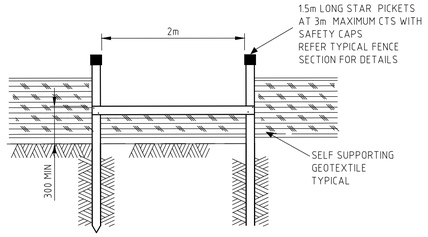
NOT TO SCALE

CONSTRUCTION SEQUENCE

1. WHERE POSSIBLE ALL SEDIMENT FENCES, PERIMETER BANKS, SEDIMENT BASINS AND OTHER SEDIMENT AND EROSION CONTROL STRUCTURES SHALL BE INSTALLED AS A FIRST STEP IN THE CONSTRUCTION SEQUENCE.
2. CARRY OUT CLEARING WITHIN SCOPE OF WORKS AND BULK EARTHWORKS TAKING CARE TO MINIMIZE THE EXTENT OF DISTURBANCE DURING CONSTRUCTION.
3. CARRY OUT BULK EARTHWORKS IN ACCORDANCE WITH THE ENVIRONMENTAL MANAGEMENT PLAN AND TAKING CARE TO MINIMIZE THE EXTENT OF DISTURBANCE.
4. ALL DISTURBED AREAS ARE TO BE HYDROSEEDED AND STRAW MULCHED UPON COMPLETION OF THE BULK EARTHWORKS. SEEDED AREAS SHALL BE WATERED DURING AND AFTER CONSTRUCTION UNTIL A UNIFORMLY DISTRIBUTED DENSE VEGETATION COVERAGE IS ESTABLISHED.
5. WHILE ANY AREAS REMAIN DISTURBED (ie BEFORE AND DURING RE-VEGETATION) ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE RETAINED.
6. AREAS WHERE DEVICES ARE REMOVED ON COMPLETION OF WORKS SHALL BE RE-INSTATED TO PRE-CONSTRUCTION CONDITIONS.

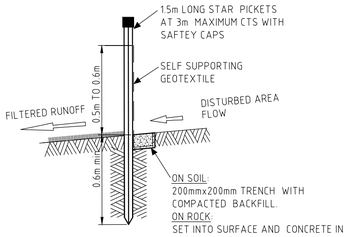
MAINTENANCE NOTES

ALL EROSION AND SEDIMENT CONTROL WORKS SHOULD BE CHECKED AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL EVENT. ALL TRAPPED SEDIMENT TO BE REMOVED WEEKLY.



SPILL-THROUGH WEIR

NOT TO SCALE



SEDIMENT FENCE SECTION

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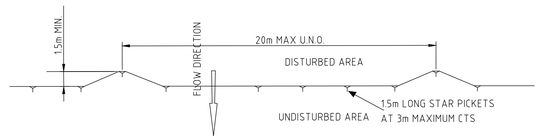
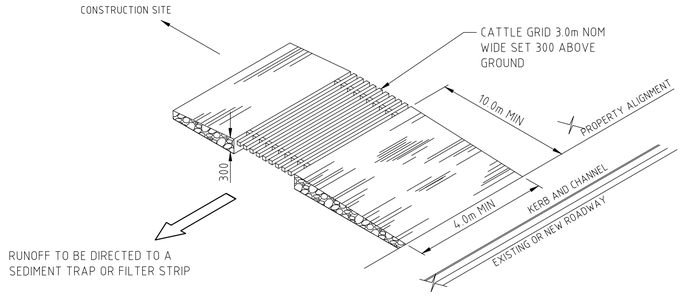


SEDIMENT FENCE PLAN

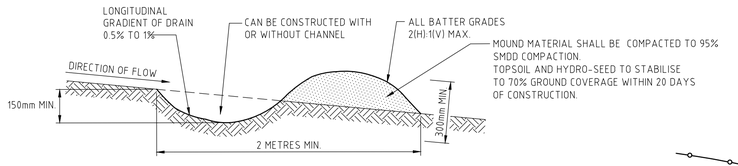
NOT TO SCALE



TEMPORARY STABILISED SITE ENTRY/EXIT DETAIL

SCALE N.T.S.

NOTES:
1. STABILISED ACCESS SHOULD BE CLEANED AND MAINTAINED AFTER EVERY RAINFALL EVENT (>5mm) AND WHEN SEDIMENT ACCUMULATION IS NOTED.
2. FINE ACCUMULATED SEDIMENTS SHOULD BE REMOVED FROM UNDERGRID AND CLEANED FROM AGGREGATE REGULARLY.



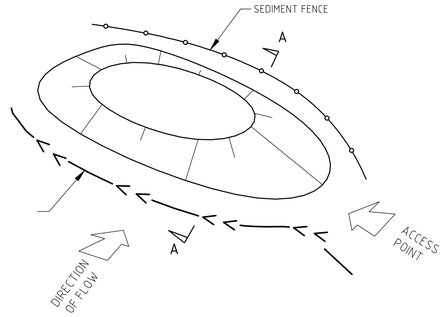
EARTH BANK (LOW FLOW)

SCALE N.T.S.

NOTE:
ONLY TO BE USED AS TEMPORARY BANK WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

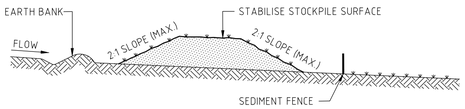
EARTH BANK CONSTRUCTION NOTES:

1. BUILD WITH GRADIENTS BETWEEN 1% AND 5%.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS-SECTIONS, NOT "V" SHAPED.
5. ENSURE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.



TYPICAL STOCKPILE TREATMENT

NOT TO SCALE



STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

SECTION A-A

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A	ISSUED FOR 90% INTERNAL REVIEW	MN	DH	BB	MN	TS	20/04/2024

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HUMELINK WEST
TRANSMISSION LINES
TOWER PADS AND ACCESS TRACKS
TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL DETAILS

A1	TL-799416-04	A
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INDEX CLASS'N 02-02

566x801mm

PLOT ISSUE DATE $$$$$$SYTIME$$$$$ $$PLOT_TIME$$

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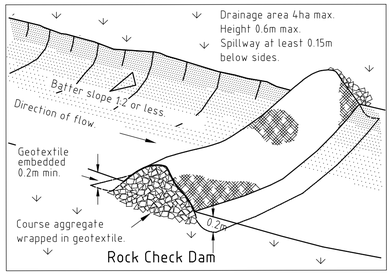

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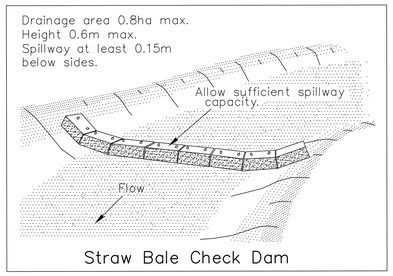
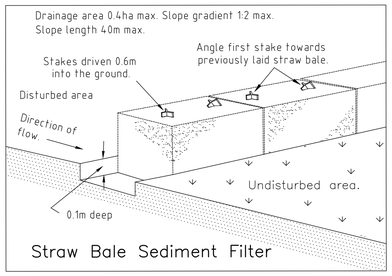
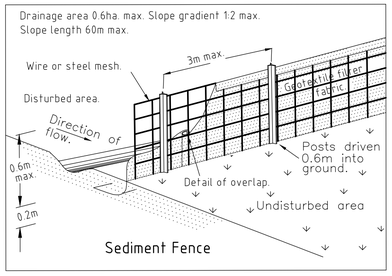


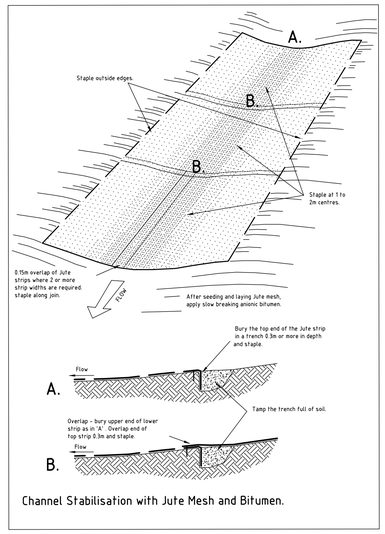
Straw Bale Check Dam



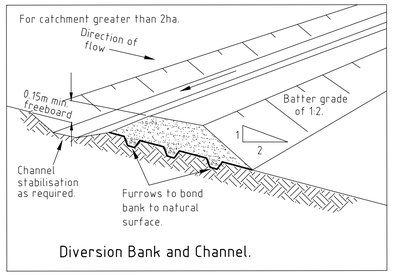
Straw Bale Sediment Filter



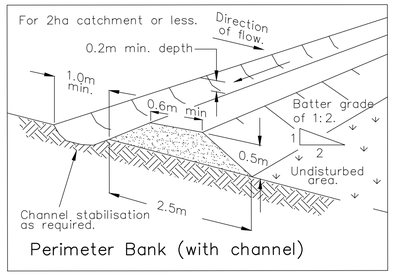
Sediment Fence



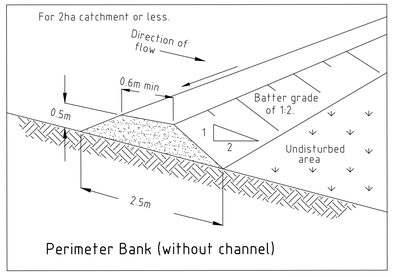
Channel Stabilisation with Jute Mesh and Bitumen.



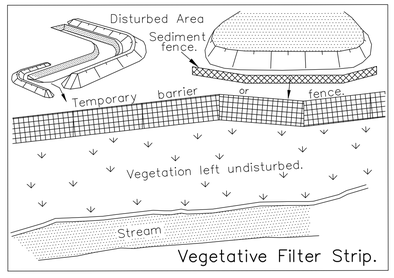
Diversion Bank and Channel.



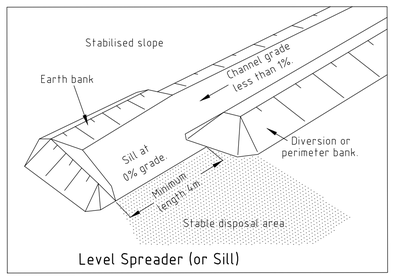
Perimeter Bank (with channel)



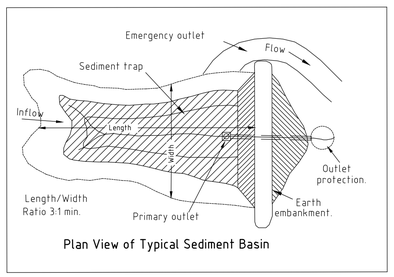
Perimeter Bank (without channel)



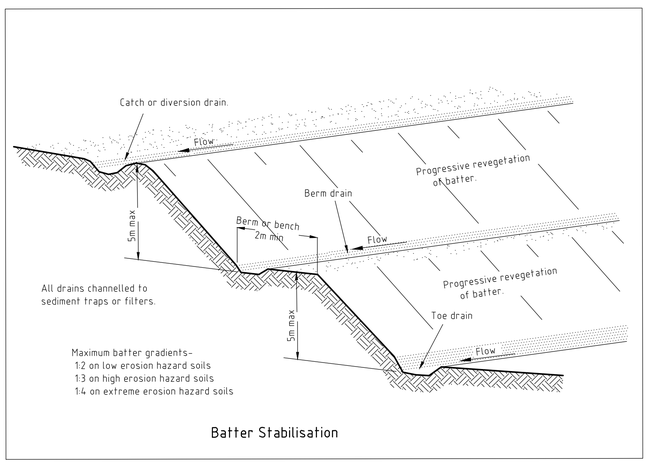
Vegetative Filter Strip.



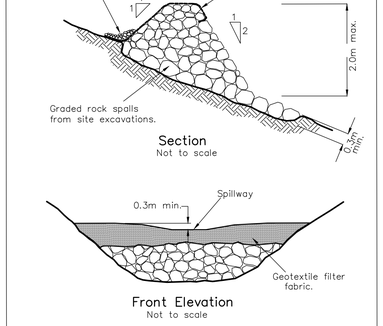
Level Spreader (or Sill)



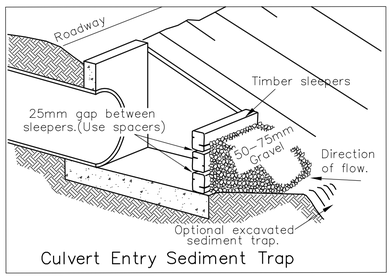
Plan View of Typical Sediment Basin



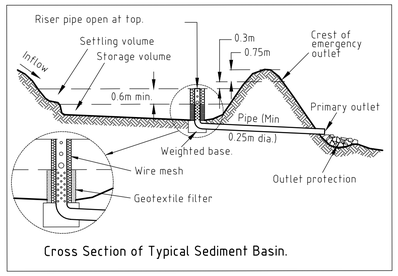
Batter Stabilisation



Stacked Rock Sediment Trap.



Culvert Entry Sediment Trap



Cross Section of Typical Sediment Basin.

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TOWER PADS
CONCEPT EROSION & SEDIMENT CONTROL DETAILS

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	PREFIX NUMBER SHEET	AMDT

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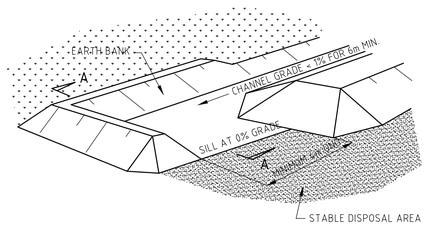
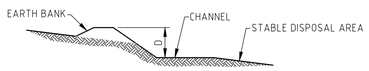


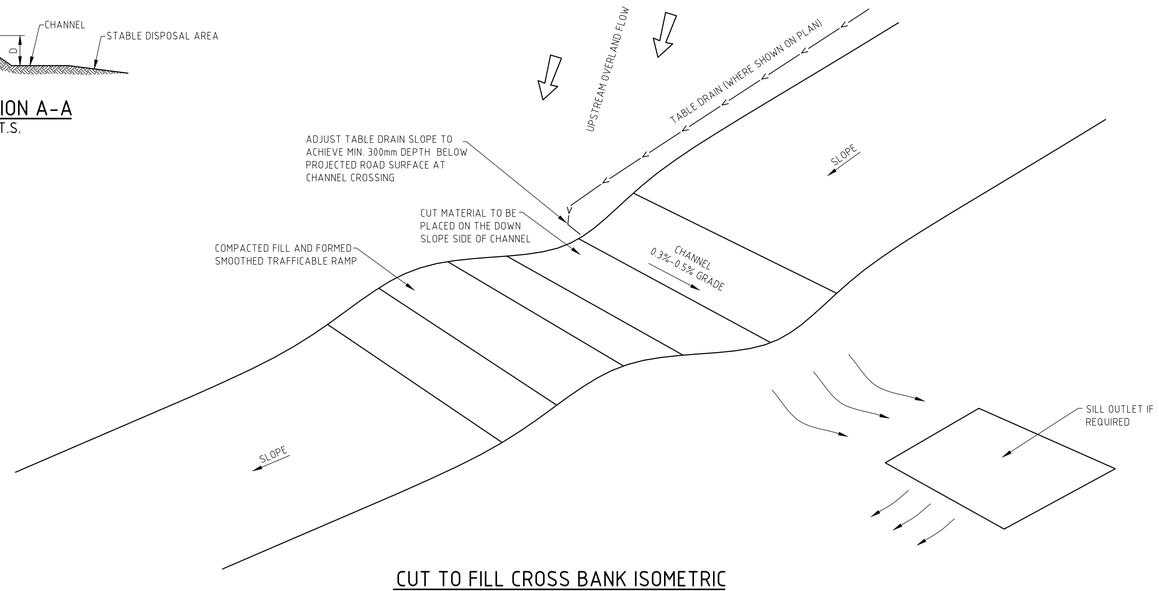
SILL OUTLET
N.T.S.



SECTION A-A
N.T.S.

CONSTRUCTION NOTES:

1. CONSTRUCT AT THE GRADIENT SPECIFIED ON THE ESCP OR SWMP, NORMALLY BETWEEN 1% AND 5%.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V-SHAPED, AT THE DIMENSIONS SHOWN ON THE SWMP.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION FOLLOWING TABLE 5.2 IN LANCOM (2004).
7. WHERE DISCHARGING TO ERODIBLE LANDS, ENSURE THEY OUTLET THROUGH A PROPERLY CONSTRUCTED LEVEL SPREADER.
8. CONSTRUCT THE LEVEL SPREADER AT THE GRADIENT SPECIFIED ON THE ESCP OR SWMP NORMALLY LESS THAN 1% OR LEVEL.
9. WHERE POSSIBLE, ENSURE THEY DISCHARGE WATERS ONTO EITHER STABILISED OR UNDISTURBED DISPOSAL SITES WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED. APPROVAL MAY BE REQUIRED TO DISCHARGE INTO SUBCATCHMENTS.



CUT TO FILL CROSS BANK ISOMETRIC
N.T.S.

ARTICULATED VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

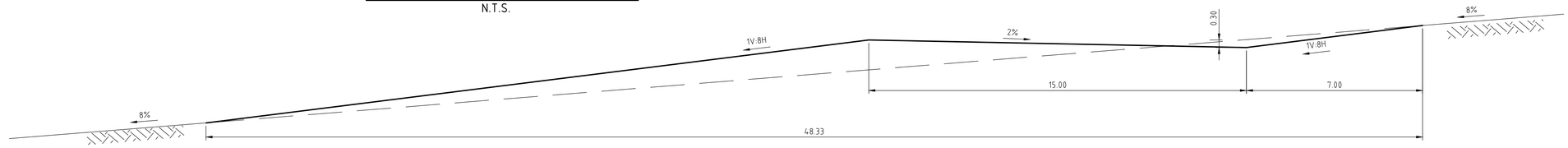
Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.020	0.0050	0.10	358	0.59
		0.20	1585	0.93
		0.30	3713	1.18
		0.36	5657	1.34
	0.0100	0.10	507	0.83
		0.20	2242	1.31
		0.30	5251	1.67
		0.36	8000	1.89
0.018	0.0050	0.10	398	0.65
		0.20	1761	1.03
		0.30	4126	1.31
		0.36	6285	1.49
	0.0100	0.10	563	0.92
		0.20	2491	1.46
		0.30	5835	1.85
		0.36	8888	2.10

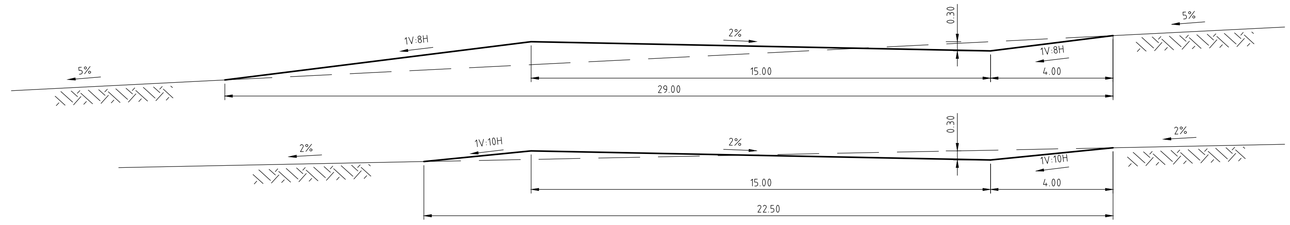
SMALL RIGID VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.018	0.005	0.10	154	0.53
		0.20	981	0.85
		0.30	2892	1.11
	0.010	0.10	218	0.75
		0.20	1387	1.20
		0.30	4090	1.57

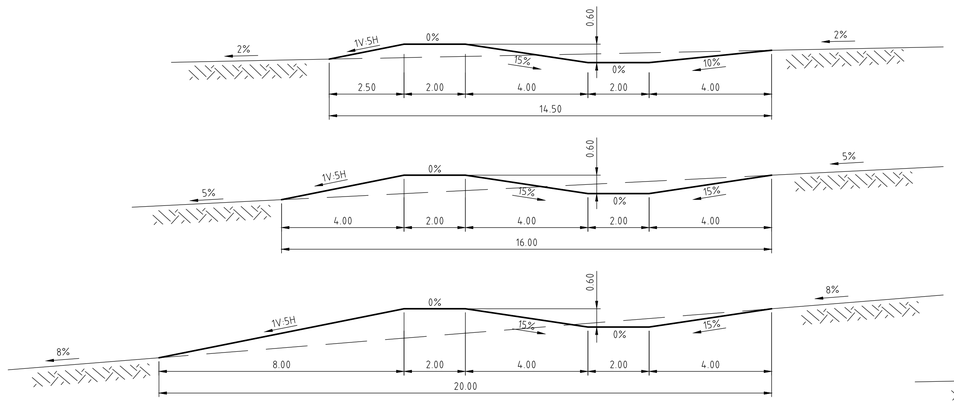
4WD VEHICLE CROSS BANK CROSSING DISCHARGE VELOCITY TABLE

Mannings "n"	Slope	Depth	Discharge	Velocity
	m/m	m	l/sec	m/sec
0.018	0.005	0.10	194	0.73
		0.20	713	1.07
		0.30	1604	1.34
	0.010	0.10	274	1.03
		0.20	1008	1.51
		0.30	2269	1.89

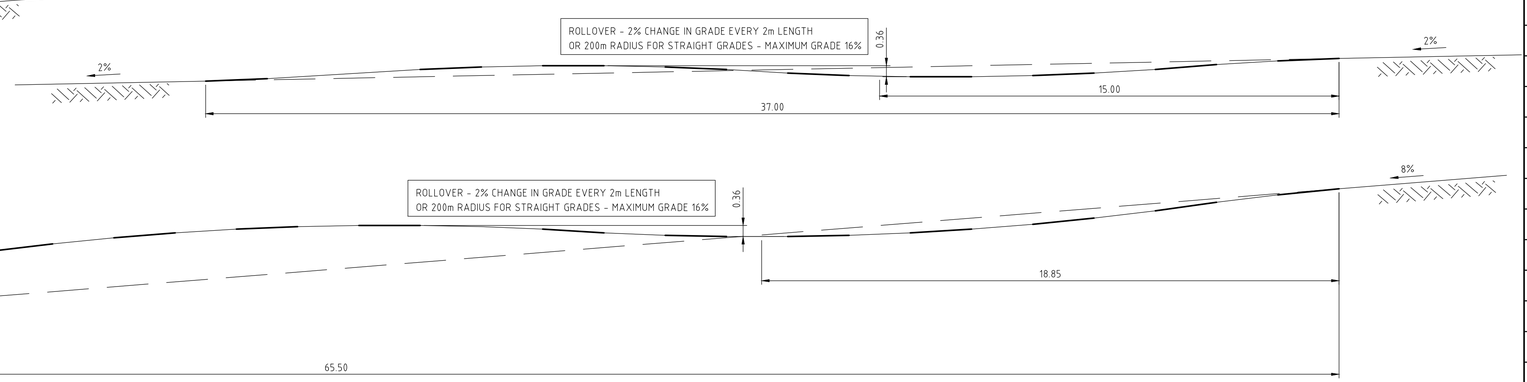




CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY CARS AND SMALL RIGID VEHICLES (WB-SRV)
SCALE 1:100



CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY 4WD ONLY (MIN. 200mm GROUND CLEARANCE)
SCALE 1:100



CROSS BANK TYPICAL SECTIONS FOR TRACKS USED BY ARTICULATED VEHICLES (WB-AV)
SCALE 1:100

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:100

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E	ISSUED FOR TRANSGRID REVIEW - 50% SUBMISSION L4	MN	DH	BB	MN	TS	11/04/2024
D	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L2	MN	DH	BB	MN	TS	18/03/2024
C	ISSUED FOR TRANSGRID REVIEW - 20% SUBMISSION L4	MN	DH	BB	MN	TS	29/11/2023
B	ISSUED FOR 20% IV REVIEW	MN	DH	BB	MN	TS	08/11/2023
A	ISSUED FOR 20% INTERNAL REVIEW	MN	DH	BB	MN	TS	03/11/2023

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ACCESS TRACKS
CROSS BANK DETAILS

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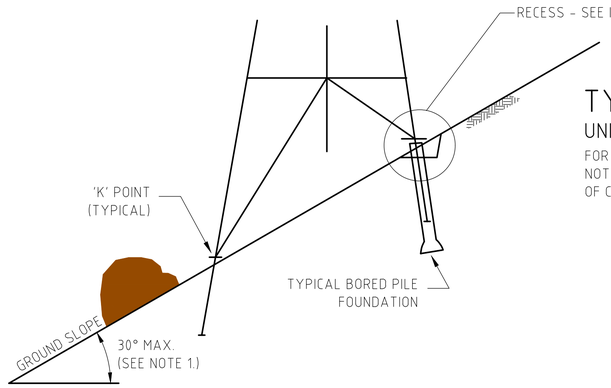
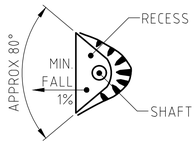


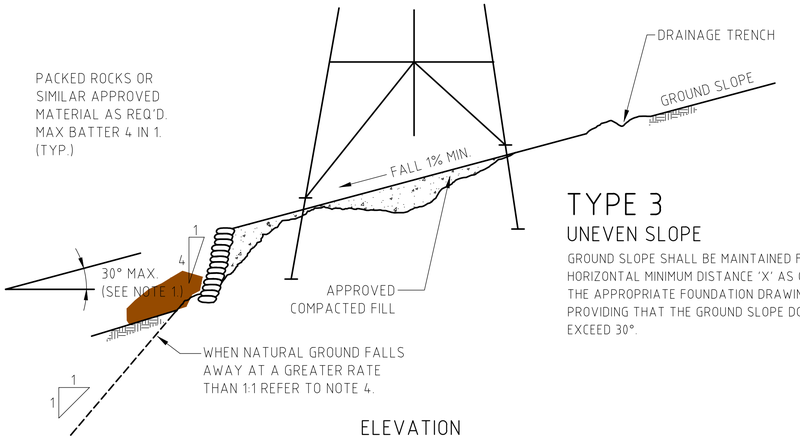
TYPE 1
UNIFORM SLOPE

FOR GROUND SLOPES UP TO 30°, BENCHING MAY NOT BE REQUIRED FOR BORED FOUNDATIONS. TOP OF CONCRETE PIER TO BE MIN 200MM ABOVE GL.

ELEVATION



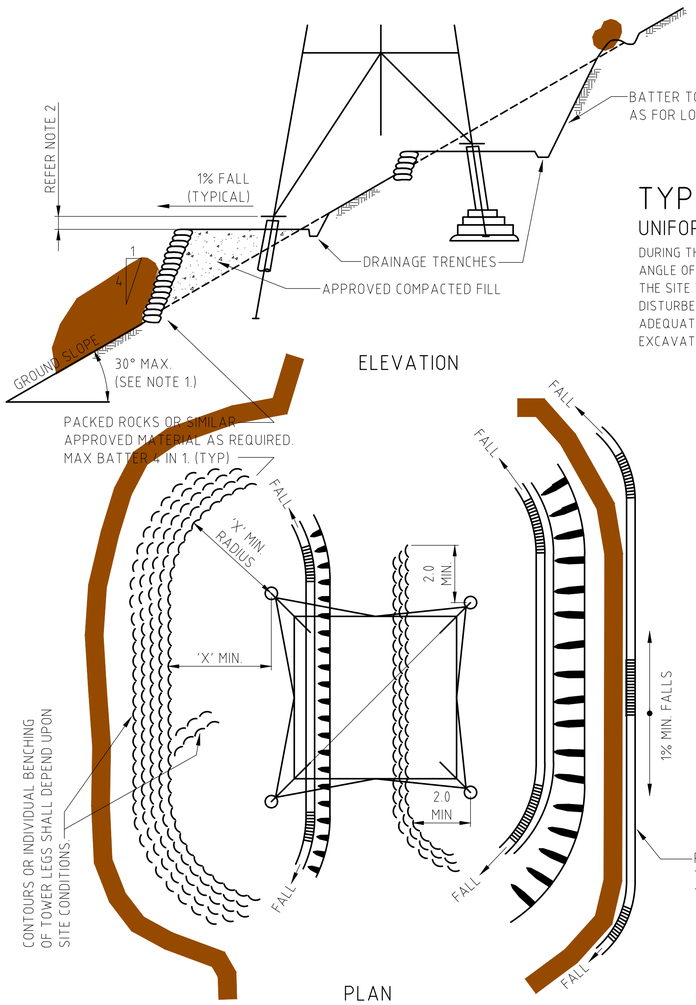
INSET PLAN



TYPE 3
UNEVEN SLOPE

GROUND SLOPE SHALL BE MAINTAINED FOR THE HORIZONTAL MINIMUM DISTANCE 'X' AS GIVEN ON THE APPROPRIATE FOUNDATION DRAWING, PROVIDING THAT THE GROUND SLOPE DOES NOT EXCEED 30°.

ELEVATION



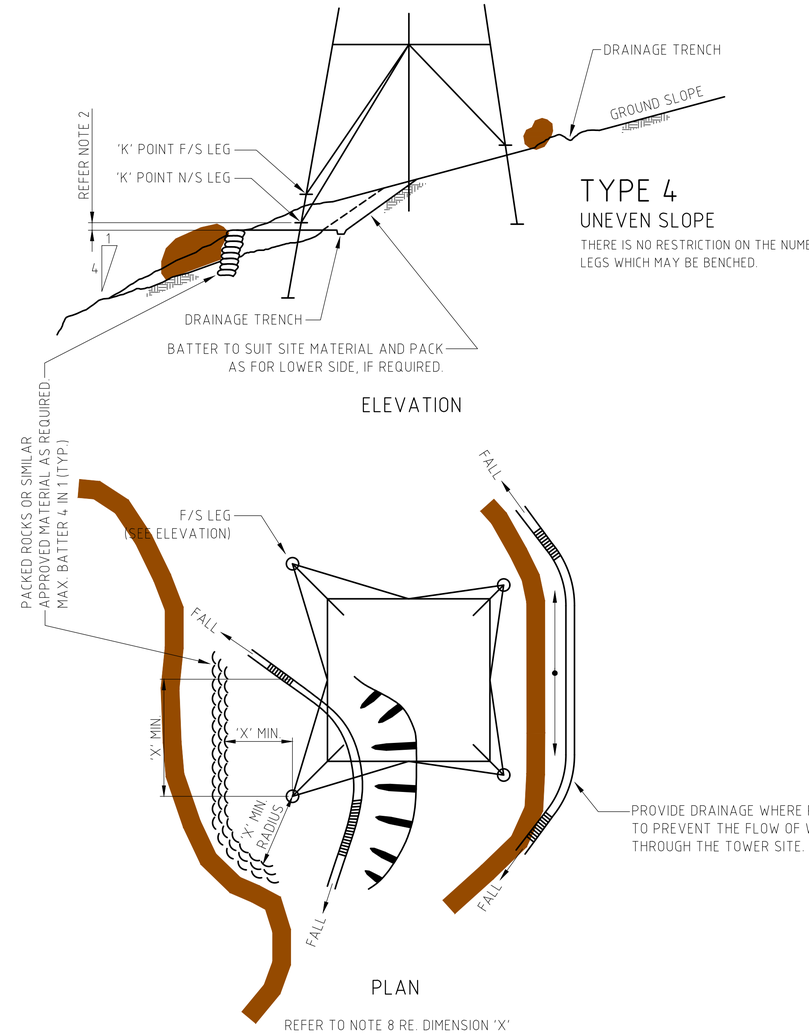
TYPE 2
UNIFORM SLOPE

DURING THE BACKFILLING OF OPEN EXCAVATIONS THE ANGLE OF SLOPE MAY MAKE IT DESIRABLE TO BENCH THE SITE TO PREVENT WATER FLOW SCOURING THE DISTURBED SURFACE AND TO ENSURE THAT THERE IS ADEQUATE MATERIAL ON THE DOWNHILL SIDE OF THE EXCAVATION TO RESIST UPLIFT FORCES.

ELEVATION

PLAN

REFER TO NOTE 8 RE. DIMENSION 'X'



TYPE 4
UNEVEN SLOPE

THERE IS NO RESTRICTION ON THE NUMBER OF LEGS WHICH MAY BE BENCHED.

ELEVATION

PLAN

REFER TO NOTE 8 RE. DIMENSION 'X'

NOTES

1. THIS DRAWING IS SUITABLE FOR SITES RANGING FROM HORIZONTAL UP TO A GROUND SLOPE OF 30°. FOR GROUND SLOPES GREATER THAN 30° SITE REQUIREMENTS AND FOUNDATION DESIGN SHALL BE DETERMINED BY THE CIVIL DESIGNER.
2. WHEN SITE CONDITIONS NECESSITATE BENCHING, THEN THE BENCH LEVEL SHALL BE SELECTED TO COMPLY WITH THE HEIGHT TO THE 'K' POINT ABOVE FINISHED GROUND LEVEL (BENCH LEVEL) AS SHOWN ON THE APPROPRIATE FOUNDATION DRAWING
3. ALL BACKFILL AND BENCHING MATERIALS SHALL BE COMPACTED TO NOT LESS THAN 95% SMDD AND SUFFICIENT QUANTITIES SHALL BE PROVIDED FOR FUTURE SETTLEMENT. SLOPING SITES REQUIRE PARTICULAR ATTENTION TO BE GIVEN TO THE DOWN HILL SIDE OF THE FOUNDATIONS. THEY HAVE THE LEAST VOLUME TO RESIST UPLIFT AND THEREFORE COMPACTION OF BACKFILL OR BENCHING MATERIAL IS OF PRIME IMPORTANCE.
4. WHEN NATURAL GROUND FALLS AWAY AT A GREATER RATE THAN 1:1, IN CLOSE PROXIMITY TO THE MINIMUM 'X' DIMENSION (REFER TO NOTE 3) AND IS OF ANY MATERIAL OTHER THAN SOLID ROCK, IT SHALL BE BROUGHT TO THE ATTENTION OF THE CIVIL DESIGNER. THIS SHALL APPLY IN ALL CASES
5. ON BENCHED SITES ADQUATE DRAINAGE SHALL BE PROVIDED TO DIVERT THE FLOW OF SURFACE WATER AWAY FROM THE DISTURBED SURFACE. BENCHING SHALL BE GRADED SO THAT PONDING AND EROSION DO NOT OCCUR.
6. DIMENSION 'X' SHALL BE 1.4 x DEPTH OF FOUNDATION.
7. UNLESS OTHERWISE STATED, ALL DIMENSIONS ARE IN METRES.
8. TOWER FOUNDATION BENCHING AND GRADIENTS TO BE INSTALLED AS PER INDIVIDUAL TOWER FOUNDATION AND ACCESS DESIGN DRAWINGS.
9. TIMBER MULCH FROM EASEMENT CLEARING TO BE UTILISED FOR WATER DIVERSION MOUNDS AND SEDIMENT CONTROL BUNDS. UPON COMPLETION OF ALL WORKS MULCH IS TO BE SPREAD OVER ALL BATTERS AND DISTURBED AREAS EXCLUDING ACCESS ROADS.
10. MINIMUM STRUCTURAL ADEQUACY OF MATERIALS FOR BENCHING, BATTERS, OR ROCK RETAINING STRUCTURES TO BE CONFIRMED BY ON SITE GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.

LEGEND

MULCH BERMS

0 2500 5000 7500 10000 15000 20000 25000mm

SCALE 1:250 AT ORIGINAL SIZE

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TRANSGRID STANDARD BENCHING TYPES

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Annexure B. Unexpected Finds Protocol – Contamination

Unexpected Finds Procedure – Contamination

Document number: HLW-HLJV-PRW-ENM-PLN-000011-Annex-B

Revision date: **10/12/2024**

Revision: **0.02**

Plan Approval

Rev.	Approval	Name	Position	Organisation	Signature	Date
0.02	Approved By	Tim Burns	Project Director	UGL		
0.01	Endorsed By					

Document Revision History

Rev.	Date	Prepared by	Reviewed by	Approved by	Remarks
0.01	08/01/2024	Ian Irwin	Jim Maniord	Jim Maniord	Initial issue for review
0.02	10/12/2024	Nicholas Mok	Ian Irwin	Tim Burns	Issued for construction

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List of emergency and key contacts

Position	Name	Phone
EPA pollution hotline		131 555
Fire and Rescue NSW		000 (for pollution incidents that present an immediate threat to human health or property) 1300 729 579 (for pollution incidents that do not present an immediate threat to human health or property)
The Ministry of Health		(02) 9391 9000
SafeWork NSW		131 050
Wagga Wagga City Council		1300 292 442
Project Environmental Manager	Jeremy Slattery	+61 421827231
Community Manager	Peter Cassuben	+61 417 980 009
Project Manager	Sherif Mansour	+61 459 936 310
Site Supervisor	TBC	
Transgrid Environmental Representative	Ali Youssef	+61 498 260 949

1 Introduction

This procedure describes how to manage unexpected contaminated material. This refers to land that contains substances that are actually or potentially hazardous to health or the environment, often resulting from commercial, industrial and agricultural activities.

Contaminants may include:

- Hydrocarbons
- Polyaromatic hydrocarbons
- PCBs and pesticides
- Heavy metals such as lead, arsenic, cadmium and mercury
- Radioactive waste
- Unexploded ordnance (UXO)
- Asbestos
- Biologically pathogenic materials and waste.

All works associated with the management of contaminated materials is to be undertaken in accordance with the relevant legislation and guidelines (refer to Section 4).

1.1 Identification of contamination

Contaminated material is usually identifiable through the following:

- Strong or unusual odour, becoming more prevalent as the soils are disturbed.
- Discolouration of soils or unusual or unnatural soil profiles found during excavation
- Foreign / waste material present within soils.
- Waters or soils demonstrating a hydrocarbon sheen (rainbowing on soils and water indicating the presence of fuels or oils)

2 Unexpected Finds Procedures

A brief flow chart is detailed in Section 5

2.1 Unexpected Find – Contaminated Soils

If potentially contaminated material is detected in unexpected areas prior to, or during site works the following will apply:

1. Upon discovery of suspected contaminated material stop work and notify your supervisor and the Environmental Manager
2. Close off the affected area using barrier tape and warning signs.
3. Excavate and separately stockpile impacted materials (based on field observations) for classification.
4. Ensure that stockpiles of suspected contaminated material is segregated from other stockpiles, bunded to contain run-off and sign posted to identify (further details are covered in the Stockpile Management Plan).
5. In dry and windy conditions, stockpiles will be lightly wetted.
6. Validation of the remedial pit by a suitably qualified person for the contaminants and in accordance with relevant Guidelines.
7. Waste classification and off-site disposal of impacted materials in accordance with the Construction Environmental Management Plan.
8. Inclusion of validation, waste classification and disposal documents (including landfill dockets in a validation report.

2.2 Unexpected Find – Buried Structures

In the unlikely event that buried structures such as Underground Storage Tanks (USTs) or livestock dips are encountered during site works, the structure(s) and any associated pipework should be managed /removed as follows:

1. Upon discovery of suspected contaminated material stop work and notify your supervisor and the Environmental Manager
2. Close off the affected area using barrier tape and warning signs.
3. The structure and any associated pipework are to be removed by a qualified contractor.
4. In the case of an UST, the tank must be removed in accordance with Australian Institute of Petroleum (AIP) Code of Practice and Australian standards.
5. Excavate and stockpile impacted materials (based on field observations) for classification.
6. Validation of the remedial pit by a suitably qualified person for the contaminants of concern at the following sampling density:
    a. Base of tank pit excavation - 1 sample per 25 m² (i.e. 5m x 5 m grid)
    b. Side of tank pit excavation - 1 sample per 10 linear metre (minimum of 1 sample per side) and 1 sample per 2m – 3m depth interval
    c. Fuel feed lines/pipe-work - 1 sample per 10 linear metre and 2 - 3 depth interval: and d. QA/QC sampling and analysis in accordance with the Project Quality Management Plan.
7. If required, ‘chase out’ all of materials in the remediation pit identified to be impacted by petroleum/hydrocarbons and further validation sampling and analysis as required to assess appropriate removal of impacted materials.

8. Waste classification and off-site disposal of impacted materials in accordance with the project Environmental Management Plan or Waste Management Plan.
9. Inclusion of validation, waste classification and disposal documents (including landfill dockets and, in the case of UST's, tank and pipe work destruction certificates) in the validation report

2.3 Unexpected Find – Asbestos Material

If asbestos material, including Naturally Occurring Asbestos (NOA) is detected in unexpected areas prior to, or during site works the following will apply:

1. Upon discovery of suspected contaminated material stop work and notify your supervisor and the Safety Manager
2. Close off the affected area using barrier tape and warning signs. If suspected as asbestos material warning signs shall be specific to Asbestos Hazards and shall comply with the AS1319-1994 – *Safety Signs for the Occupational Environment*.
3. An Occupational Hygienist is to be notified to inspect the area and confirm the presence of asbestos and to determine the extent of remediation works to be undertaken. A report detailing this information will be compiled by the Occupational Hygienist and provided to the principal (or their representative) and the Construction Manager.
4. The location of the identified contaminated material would be surveyed using sub-meter Differential Global Positioning System (DGPS).
5. In dry and windy conditions, stockpiles will be lightly wetted and covered with plastic sheet whilst awaiting classification and/or disposal.
6. All work associated with asbestos in soil would be undertaken by a contractor holding a class ASA Licence. Safework NSW must be notified 7 days in advance of any asbestos works.
7. Monitoring for airborne asbestos fibres is to be carried out during the soil excavation in asbestos contaminated materials.
8. Documentary evidence (weighbridge dockets) of correct disposal is to be provided to the principal (or their representative).
9. At the completion of the excavation, a clearance inspection is to be carried out and written certification is to be provided by an Occupational Hygienist that the area is safe to be accessed and worked. If required, the filling material remaining in the inspected area can be covered/sealed by an appropriate physical barrier layer of non-asbestos containing material prior to sign–off.
10. Validation samples would be collected from the remedial excavation to confirm the complete removal of the contaminated materials. If asbestos pipes/conduits are uncovered, then sampling density would typically comprise one sample per 10-20 linear meter (depending on the length of the pipe). If asbestos debris are found, then the sampling density would typically comprise 1 sample per 5 metre x 5 metre grid.
11. The sampling locations should be surveyed using a sub-meter DGPS.
12. Details are to be recorded in the site record system.
13. Following clearance by an Occupational Hygienist, the area may be reopened for further excavation or construction work.
14. Materials found to be classified as contaminated in accordance with the NSW EPA Waste Classification Guidelines (2014) will be stored and disposed of in accordance with their classification:
    - Special waste

- Hazardous waste
- Restricted solid waste

2.4 Unexpected Find – Contaminated Waters

If potentially contaminated waters are detected in unexpected areas prior to, or during site works the following will apply:

1. Upon discovery of suspected contaminated material stop work and notify your supervisor and the Environmental Manager
2. Close off the affected area using barrier tape and warning signs.
3. Assessment by a suitably qualified person to determine the extent and scope of potential contamination and to determine the source.
4. If an isolated source is identified then waste classification and off-site disposal of impacted materials in accordance with the Construction Environmental Management Plan.
5. If the source is unidentified or not related to the Project then the matter and actions moving forward will be discussed with Transgrid and the HLWJV to determine the most appropriate action(s) to be undertaken

2.5 Unexpected Find – Unexploded Ordinance

UXO refers to ammunition which has been fired but has not functioned as designed and could be dangerous as they may easily become functioning with little handling. The Department of Defence maintains a record of sites confirmed as or suspected of being contaminated with UXO (Department of Defence, 2023).

The Environmental Impacts Assessment (as defined within the SSI approval) has determined that

'…it is unlikely that any UXOs would be encountered during the work.' Section 5.6.8 'Phase Contamination Assessment - EIS Technical Report 10'

In the unlikely event that UXO's are encountered the following will apply:

1. Upon discovery of suspected UXO stop work and notify your supervisor and the Safety Manager
2. Close off the affected area using barrier tape and warning signs.
3. Contact the police who will arrange for military experts to attend and dispose of it.

2.6 Unexpected Find – Potential Acid Sulphate Soils

Due to the elevated nature of the site Potential Acid Sulphate Soil (PASS) is not considered to be present in the region. However, if PASS are exposed, possible management strategies include:

- Upon discovery of suspected PASS stop work and notify your supervisor and the Environmental Manager
- Close off the affected area using barrier tape and warning signs.
- Modifying the work to avoid the area of PASS and so prevent the generation of more Acid Sulphate Soils (ASS).
- Delineation and removal of material to a suitably licenced facility or establish an appropriate site for onsite treatment to neutralise the ASS, which could include the application of lime.

The management of ASS includes appropriate erosion and sediment controls to minimise the potential for pollution to waters.

Any material to be removed off-site will be classified in accordance with the NSW EPA Waste Classification requirements.

3 Roles and responsibilities

Site supervisor

- Ensure this Unexpected Finds Procedure – Contamination is implemented throughout works.
- Stop work immediately upon becoming aware of a suspected unexpected contamination find.
- Inform Project Environment Manager of unexpected find.
- Assist Project Environment Manager in recording details of unexpected finds.
- Work with Project Environment Manager to develop a plan for managing and/or remediating the unexpected find.
- In coordination with the Environment Manager, implement the plan for the management and/or remediation of the unexpected find.
- Ensure asbestos removalist (if required) are appropriately licenced.
- If required, treat ASS on site to neutralise potential impact to environment.
- Recommence work following approval from the Project Environment Manager.
- Prior to any waste being removed from site ensure the waste been classified in accordance with the NSW EPA Waste Classification requirements.

Project Environment Manager

- Ensure this Unexpected Finds Procedure – Contamination is implemented throughout construction.
- Record details of unexpected find.
- Engage suitably qualified contaminated land consultant following unexpected find.
- Assist suitably qualified contaminated land consultant in the investigation and assessment of unexpected find.
- Work with Site Supervisor to develop a plan for managing and/or remediating the unexpected find.
- Advise Site Supervisor of appropriate treatment methods to address any potential threat to the environment.
- In coordination with the Site Supervisor, implement the plan for the management and/or remediation of the unexpected find.
- Following successful management of the unexpected finds, issue the Site Supervisor with approval to recommence work.

Project Safety Manager

- Ensure this Unexpected Finds Procedure – Contamination is implemented throughout construction for asbestos materials and UXO's.
- Record details of unexpected finds for asbestos.
- Engage suitably qualified person to manage unexpected finds for asbestos materials.
- Assist suitably qualified person in the investigation and assessment of the unexpected find.
- Work with Site Supervisor to develop a plan for managing and/or remediating the unexpected find.
- Advise Site Supervisor of appropriate treatment method to neutralise any potential threat to the environment/safety.

- In coordination with the Site Supervisor, implement the plan for the management and/or remediation of the unexpected find.
- Engage licenced asbestos removalist if required.
- Following successful management of the unexpected finds, issue the Site Supervisor with approval to recommence work.

Suitably Qualified Person

- Identify the potential hazard to human health and/or the environment in accordance with applicable legislative requirements.
- Undertake sampling of unexpected finds for laboratory analysis.
- Undertake waste classification of any waste to be removed from site in accordance with the NSW EPA Waste Classification requirements.
- Issue asbestos clearance certification (if required).

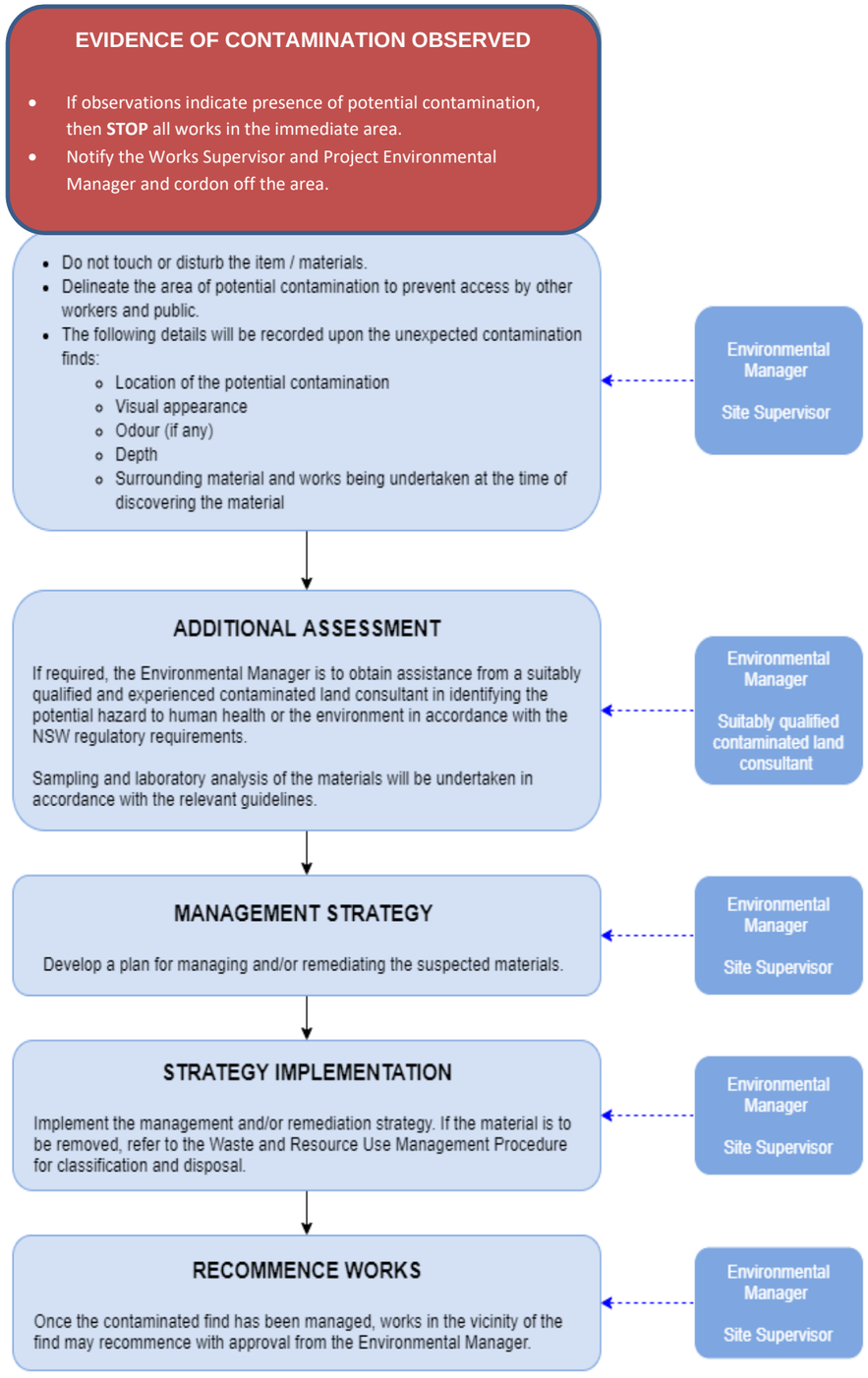
4 Reference Documentation

The below documentation may be relevant to this unexpected contamination finds procedure:

- Protection of the Environment Operations Act 1997 (POEO Act)
- Work Health and Safety Act (WHS Act)
- HLJV Safety Manual
- Transgrid's Asbestos Management Plan / HLJV' Asbestos Management Plan (on construction approval)
- Code of Practice – How to safely remove asbestos in the workplace (SafeWork NSW Dec 2022)
- Code of Practice – How to manage and control asbestos (SafeWork NSW Dec 2022)
- Acid Sulfate Soil Manual (ASSMAC 1998).
- National Acid Sulfate Soils Guidance (DAWE 2018)
- Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009.
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) (ANZG 2018).
- Guidelines for Consultants reporting on contaminated Land: Contaminated land guidelines (NSW EPA 2020)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013).
- Guidelines for Assessment and Management of Groundwater Contamination, DEC, 2007.
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW, NSW EPA 2022.
- Contaminated Land Guidelines - Consultants reporting on contaminated land, NSW EPA, 2020.
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997, NSW EPA, 2015.
- Waste Classification Guidelines, NSW EPA, 2014.
- Acid Sulfate Soil Guidelines, Acid Sulfate Soil Management Advisory Committee, August 1998.
- (National) Acid Sulfate Soil Sampling and Identification Methods Manual, Department of Agriculture and Water Resources, June 2018.
- AS1319-1994 – Safety Signs for the Occupational Environment

5 Unexpected Finds Process - Contamination

Unexpected Finds Procedure



The Unexpected Finds Procedure – Contamination must be followed should unexpected contamination, asbestos or UXO (or suspected contamination or UXO) be excavated or otherwise discovered. This unexpected find procedure has been prepared with consideration of the *Guideline for the Contamination of Management – Factsheet 12* (TfNSW, 2013).

Likelihood of contamination

The following indicates the presence of potentially contaminated material; where material is uncovered which displays some or all of these characteristics, stop works and notify the Environment Manager:

- Unusual odour from soils that are not detected in other similar areas.
- Discolouration or staining of soil or rock.
- Seepage of unusual liquids from soil or rock.
- Unusual odours, sheen or colour on groundwater and/or surface water.
- Unusual metal objects.
- Unexpected underground storage tanks, buried drums or machinery etc.
- Presence of waste or rubbish above or below ground.
- Potential asbestos containing material.

Where these factors are identified, the material is considered to be possibly contaminated and the flowchart is to be followed.

Asbestos

An unexpected asbestos find occurs when asbestos containing materials (ACM), not identified in the Asbestos Register, are found on site or in the case of naturally occurring asbestos (NOA). In the event of an unexpected asbestos find, the below steps are to be followed along with the flowchart:

1. The area is to be demarcated, works in the area to cease and workers warned.
2. Notify the Safety Manager and Site Supervisor.
3. Ensure the soil and potential asbestos remain damp with dust suppression or covered where water cannot be accessed.
4. Arrange for testing of the suspected ACM/NOA and monitoring of the area (if required).
5. An asbestos removalist is to be engaged to provide recommendations to treat the area, as required.
6. A clearance certificate is required from the asbestos removalist to confirm that the area is to be made safe.

Acid Sulphate Soils

Due to the elevated nature of the site Potential Acid Sulphate Soil (PASS) is not considered to be present in the region. However, if PASS are exposed, possible management strategies include:

- Modifying the work to avoid the area of PASS and so prevent the generation of more Acid Sulphate Soils (ASS).
- Delineation and removal of material to a suitably licenced facility.
- Onsite treatment to neutralise the ASS, which could include the application of lime.

The management of ASS includes appropriate erosion and sediment controls to minimise the potential for pollution to waters.

Any material to be removed off-site will be classified in accordance with the NSW EPA Waste Classification requirements.

NOTE: Potential Acid Sulphate Soils (PASS) are soils which, while in-situ are considered inert, however once exposed to the air, either as a result of groundwater draw down or excavation, react with the air to form acid sulphate and become acid sulphate soils.

UXO

The EIS has determined that UXO are unlikely to be present on site, however if suspected UXO are uncovered. STOP work Immediately and notify the Site Supervisor immediately.

Annexure C. Consultation Summary

Separate Attachment

Annexure D. Water Reuse and Discharge Permit

PART A: INFORMATION	
Permit Number:	
Area: ☐ Switching Station ☐ Sediment Basin ☐ Tower Number: **Site Location:**	**Location of Water (From):** ☐ Basin ☐ Bund ☐ Drain ☐ Excavation ☐ Sump ☐ Other: **ID (where relevant):**
Transfer Volume (m^3): ***And / Or*** **Basin Depth (m):**	**Dewatering Method:** ☐ Irrigation (Part B) ☐ Transfer to Basin (Part C) ☐ Transfer to Watercart (Part D) ☐ Offsite discharge (sediment basins only) (Part E) ☐ Disposal offsite (Part F)
Permit Start **Date:** **Time:**	**Permit Expiry** **Date:** **Time:**

PART B: IRRIGATION

Irrigation Location:

CONTROL MEASURES	YES	NO / NA	COMMENTS
Pumping and irrigation equipment checked and operational	☐	☐	
Float or similar device installed to prevent inlet from sinking into mud	☐	☐	
Water testing equipment field calibrated	☐	☐	
Water quality meets the irrigation criteria for the specific location			
Irrigation area is within an approved location	☐	☐	
Irrigation area is well vegetated or in an approved disturbed footprint	☐	☐	
Irrigation area is not saturated from rainfall	☐	☐	
Irrigation area has no sensitive receiving environments (e.g., waterways, heritage sites)	☐	☐	
Irrigation area has no areas of contamination (e.g., former copper mine)	☐	☐	

WATER QUALITY	Date	Time	Tested by	pH (6.5-8)	Visible Oil / Grease	Ok to irrigate?
DAY 1						-
DAY 2						
DAY 3						
DAY 4						
DAY 5						

CONDITIONS / INSTRUCTIONS

- If saturation of proposed irrigation area due to rainfall or previous days irrigation is observed do not irrigate.
- Check saturation of irrigation area hourly. Monitoring to be recorded using Part G.
- Ensure irrigated water does not reach sensitive areas or watercourses.
- If visible oil and grease, or other contaminants do not irrigate.
- If water is observed to be pooling and not infiltrating stop irrigation immediately.

Permit conditions accepted, understood and communicated to work party

Name (Supervisor / Leading Hand / Delegate)	Signed	Date

PART C: TRANSFER TO BASIN					
Basin ID:					
CONTROL MEASURES	**DAY 1**	**DAY 2**	**DAY 3**	**DAY 4**	**DAY 5**
Date					
Remaining Basin Capacity (depth marker reading m or volume m^3)					
Rainfall in the last 24 hours	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Rainfall forecast in the next 48 hours	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Visible Oil / Grease	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
CONDITIONS / INSTRUCTIONS					
Permit conditions accepted, understood, and communicated to work party					
Name (Supervisor / Leading Hand / Delegate)	Signed	Date			

PART D: TRANSFER TO WATERCART					
Watercart ID:		**Watercart Operator:**			
CONTROL MEASURES	**DAY 1**	**DAY 2**	**DAY 3**	**DAY 4**	**DAY 5**
Date					
Purpose	☐ Basin transfer - Part C ☐ Dust suppression	☐ Basin transfer - Part C ☐ Dust suppression	☐ Basin transfer - Part C ☐ Dust suppression	☐ Basin transfer - Part C ☐ Dust suppression	☐ Basin transfer - Part C ☐ Dust suppression
Visible Oil / Grease	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

CONDITIONS / INSTRUCTIONS

Permit conditions accepted, understood and communicated to work party		
Name (Supervisor / Leading Hand / Delegate)	Signed	Date

PART E: Offsite Discharge (SEDIMENT BASINS ONLY)			
Discharge Point Number:		**Date discharge to commence:**	
Last heavy rainfall date:		**Permit expiry date:**	
Estimated basin volume (m^3):			
WATER QUALITY TESTING			
Sample date		**Sample time**	
Water Meter Make and ID / SN		**Water meter calibration expiry date**	
Parameter	**Criteria**	**Result**	**Compliant?**
pH	**6.5 – 8.5**		☐ Yes ☐ No
Turbidity	**50 NTU**		☐ Yes ☐ No
Oil and Grease	**Not visible**		☐ Yes ☒ No

Section 3 - Control Requirements Set Up (Competed by work supervisor)	
Spill Kit and drip tray in place for refuelling	☐ Yes ☐ No Provide Details:
Float or similar device installed to limit sediment movement	☐ Yes ☐ No Provide Details:
Outlet to basin and/or receptor set up avoid scouring or environmental damage	☐ Yes ☐ No Provide Details:
Pumping equipment checked and operational	☐ Yes ☐ No Provide Details:
Briefing to site personnel on monitoring requirements	☐ Yes ☐ No Provide Details:
CONDITIONS / INSTRUCTIONS	

PART F: Disposal Offsite		
Communicate with Environmental Advisor regarding offsite disposal requirements and tracking certificates.		
Permit conditions accepted, understood and communicated to work party		
Name (Supervisor / Leading Hand / Delegate)	Signed	Date

PART G: SIGN OFF		
Environment Team (Permit Issuer) I confirm the work area is controlled and authorise work to proceed in strict accordance with the conditions stated in this Work Permit		
Name	**Signed**	**Date**
Site Supervisor (Permit Holder) I confirm and accept the conditions stated in this Work Permit and associated work activity documents. I will ensure strict adherence to these conditions and all persons under my control will be advised accordingly.		
Name	**Signed**	**Date**
Any other conditions / instructions		
Comments		

PART H: MONITORING RECORD							
Date	**Time**	**Initials**	**Comment**	**Date**	**Time**	**Initials**	**Comment**

Annexure E. Surface Water Quality Monitoring Program

Annexure E

Surface Water Quality Monitoring Program

HumeLink West

Revision: 04

TransGrid

Date 30/05/2025

Document Control

Version Control

Revision	Date	Description	Approval
A	15/05/2024	Initial Draft for TG Review	
00	25/06/2024	Issued for consultation	
01	13/12/2024	Updated for MCoAs	
02	19/03/2025	Updated in response to consultation	
03	19/05/2025	Response to stakeholder and ER comments:	
04	30/05/2025	Response to ER comments:	

Distribution of controlled copies

This HumeLink West Soil and Water Management Sub-Plan Annexure E – Surface Water Quality Monitoring Program (SWQMP) is available to all personnel and sub-contractors via the HLW document control management system.

The document is uncontrolled when printed. One controlled hard copy of the Management Plan will be maintained by the Quality Manager at the HLW office and on the HumeLink website, were relevant.

Copy number	Issued to	Version

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Attachments:

Attachment 1: Sampling Location Maps

1. Introduction

1.1. Purpose

This Surface Water Quality Monitoring Program (SWQMP) is for the establishment and management of a monitoring program to ensure that potential environmental impacts associated with HLW are adequately monitored during construction. The program addresses the Minister's Conditions of Approval (MCoA) planning documents and relevant legislation.

The scope of the SWQMP is to describe how HLWJV will monitor potential impacts to surface water during construction. Operational monitoring and mitigation measures are not included in the scope of this construction phase plan.

1.2. Objectives

The key objective of the SWQMP is to ensure all MCoA, REMMs, and licence/permit requirements relevant to surface water monitoring are described, scheduled, and assigned responsibility.

The monitoring program will be undertaken upstream and downstream of areas where crossings will be installed. These waterbodies will be monitored to provide a suitable baseline data for use in deriving trigger values in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) during construction.

1.3. Consultation

This program was provided to DCCEEW Water Division, and Wagga Wagga City Council, Snowy Valleys Council as part of the consultation on the Soil and Water Management Sub Plan.

1.4. Legislation, regulation, guidelines, and policy

This procedure has been developed referring to the following legislation, regulation, guidelines, and policies.

- EIS Ministers Conditions of Approval (MCoA)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) (ANZG 2018).*
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (2004).
- *Australian Drinking Water Guidelines* (NHMRC 2011)
- *PFAS National Environmental Management Plan 2018* (PFAS NEMP)
- *Contaminated Land Management Act 1997*
- *NSW Water Quality and River Flow Objectives* (DECCW, 2006)
- *Volume 1, 4th Edition (Landcom, 2004) and Volume 2D, Main Road Construction* (DECC, 2008)
- *NSW MUSIC Modelling Guidelines* (BMT WBM, 2015)
- Relevant Conditions for this Monitoring Program

This monitoring program has been developed to comply with REMM B7 as noted in the table below.

Table 2.1: Surface water monitoring conditions and commitments

UMM Ref.	Mitigation Measure	Document Reference
B26	The key measures proposed to avoid, manage and/or mitigate impacts to surface water, and groundwater and soils will involve: • Preparation of Soil and Water Management Plans (SWMPs) as part of the Construction Environmental Management Plan (CEMP) to manage water quality impacts during construction of HLW. • Preparation of Erosion and Sediment Control Plans (ESCPs) by a certified professional in erosion and sediment control and Water Quality Monitoring Program (WQMP) within the SWMPs. • Consideration of appropriately designed scour protection at new stormwater management points. The SWMP will include a combination of the following plans: • ESCPs • WQMP • Excavation Dewatering Plans • Emergency Spill Plans • Unexpected Finds Protocol - Contamination. ESCPs will be developed for the activities and areas that are considered higher risk. The plans will detail the processes, responsibilities and measures to manage potential soil and water quality impacts in accordance with the principles and requirements in: • Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004) and Volumes 2A (DECC, 2008a) and Volume 2C (DECC, 2008b), commonly referred to as the 'Blue Book' • Best Practice Erosion and Sediment Control (IECA, 2008) • Guidelines for Controlled Activities on Waterfront Land (NRAR 2018).	This Program or EWMP as per MCoA B67

UMM Ref.	Mitigation Measure	Document Reference
SW3	Water quality monitoring will be implemented to establish baseline water quality conditions in waterways of high sensitivity that may be impacted by nearby construction and to detect any changes in water quality that may be attributable to the project during construction. The frequency, location and duration of sampling will be detailed in a monitoring program. Monitoring locations will include: • at a minimum two monitoring locations (one located upstream and one downstream of the transmission line crossing) for waterways with a Strahler 4th stream order or higher within the Sydney Drinking Water Catchment where construction activities within 200 metres of the waterway will be carried out and could result in impacts • monitoring for total dissolved solids, total suspended solids, total nitrogen, and total phosphorus	Section 2.1

2. Existing Environment

2.1. Background surface water quality

EIS Technical Paper 12 Surface Water and Groundwater used results from *State of the Catchments 2010: Murrumbidgee Region* (DECCW, 2010a), *National Water Quality Assessment* (SKM, 2011) and Murrumbidgee Water Resource Plan (DPIE, 2019) to identify background water quality for the Murrumbidgee River Catchment.

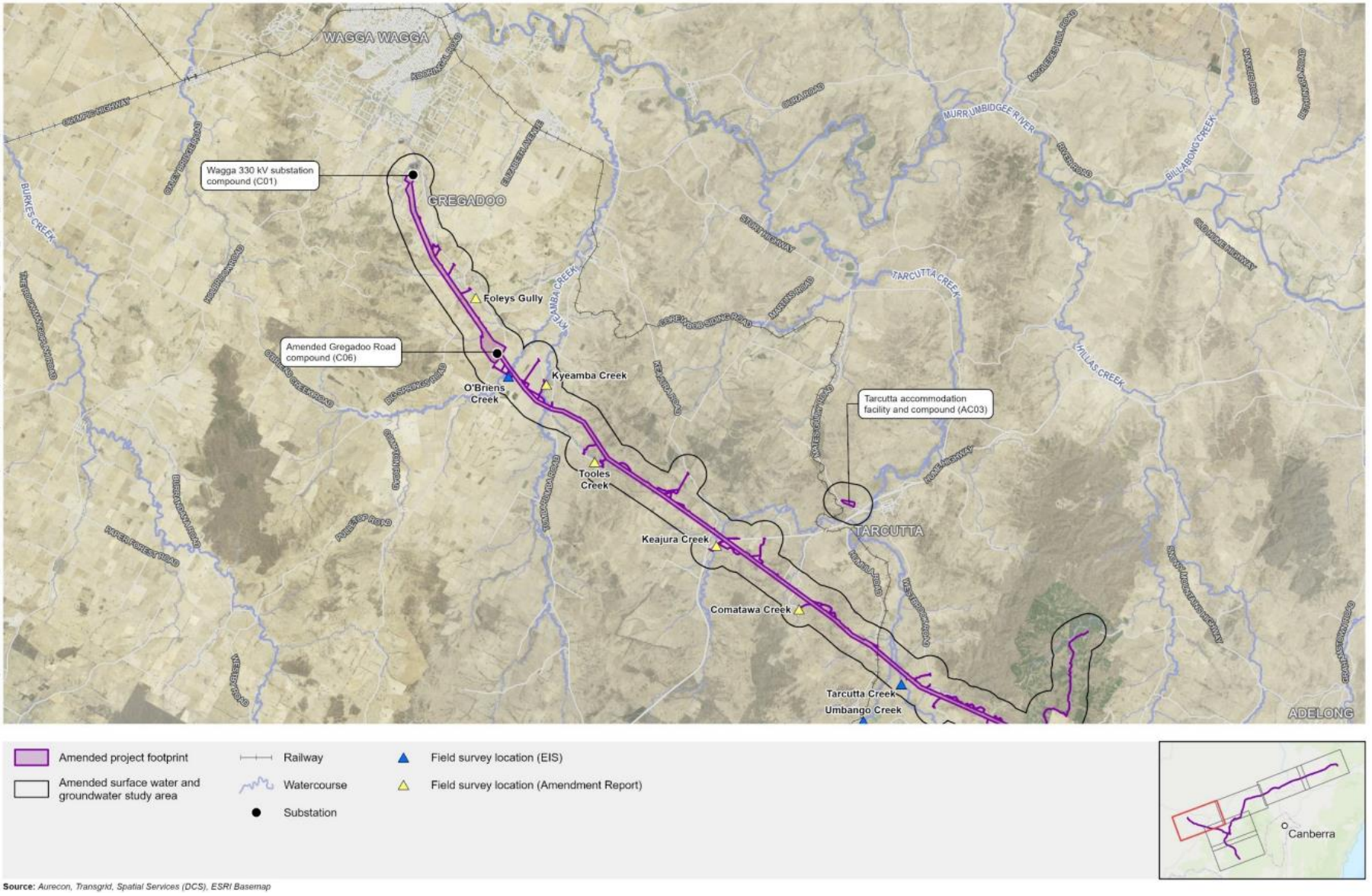
Table 2-1: Summary of background surface water quality

Document	Description of surface water quality
***State of the Catchments 2010: Murrumbidgee Region* (DECCW, 2010a)**	• The monitoring locations included in the report that were closest to the project footprint were Tumut River at Oddy's Bridge (# 410073) and Murrumbidgee River at Gundagai (#410068). • Exceedances of the ANZECC values for TP and turbidity were recorded at each monitoring location.
***National Water Quality Assessment* (SKM, 2011)**	• Provides a snapshot of water quality across inland waters in Australia. The assessment presented a comparison between water quality data against relevant ANZECC 2000 WQO for the region. • Turbidity exceedances were generally low at 12 per cent. • Nutrients exceeded the guidelines, ranging from 'fair' to 'poor'. TN was rated 'poor' with 74 per cent exceedance and TP was rated 'fair' with 50 per cent exceedance. • Three water quality variables (turbidity, salinity, and ph) were rated 'good' with greater than 75 per cent of samples within the ANZECC 2000 relevant guideline value range.
Murrumbidgee Water Resource Plan (DPIE, 2019)	• The condition of the Murrumbidgee River below Burrinjuck was rated as 'poor' to 'excellent'. • Dissolved oxygen concentrations were mostly within the target range; however, they were highly variable during low flow conditions. • The pH levels were mostly within the target range but with occasional pH levels outside the target range in the Tumut River • Sub-catchments in the mid Murrumbidgee yielded some of the highest salinity results and salt loads in NSW. • Nutrients frequently exceeded targets in tributaries to the Murrumbidgee River below Burrinjuck Dam. In the Murrumbidgee River, however, nutrient levels were generally low. • Elevated levels of turbidity occurred due to a number of factors including the widespread conversion of land for cropping and grazing, riverbank and riparian condition, presence of carp, and grazing practices.

Document	Description of surface water quality
Tooma River at Warbrook (#401003) **Tumbarumba at Tumbarumba Creek (#401007)**	• Temperature was generally within guidelines conditions at Tumbarumba (#401007). • Conductivity was within guideline conditions at Tumbarumba (#401007). • TP values exceeded guidelines and turbidity was generally within guidelines at Tooma River (#401003)

In addition to the above, field surveys were undertaken as part of the EIS and Amendment Report. Site investigations were conducted in waterways thought to be representative of a range of waterways traversed or in proximity to the project. As part of the site investigations, instream water quality measures were taken in-field for parameters including temperature, pH, conductivity, dissolved oxygen and turbidity.

The locations where these field surveys were undertaken are provided in Figure 2-1, Figure 2-2 and Figure 2-3. Water quality sampling results are provided in Table 2-2.:



Source: *Aurecon, Transgrid, Spatial Services (DCS), ESRI Basemap*

Figure 2-1: Field survey locations (*Technical Report 12-Surface Water and Groundwater Impact Assessment Addendum*)

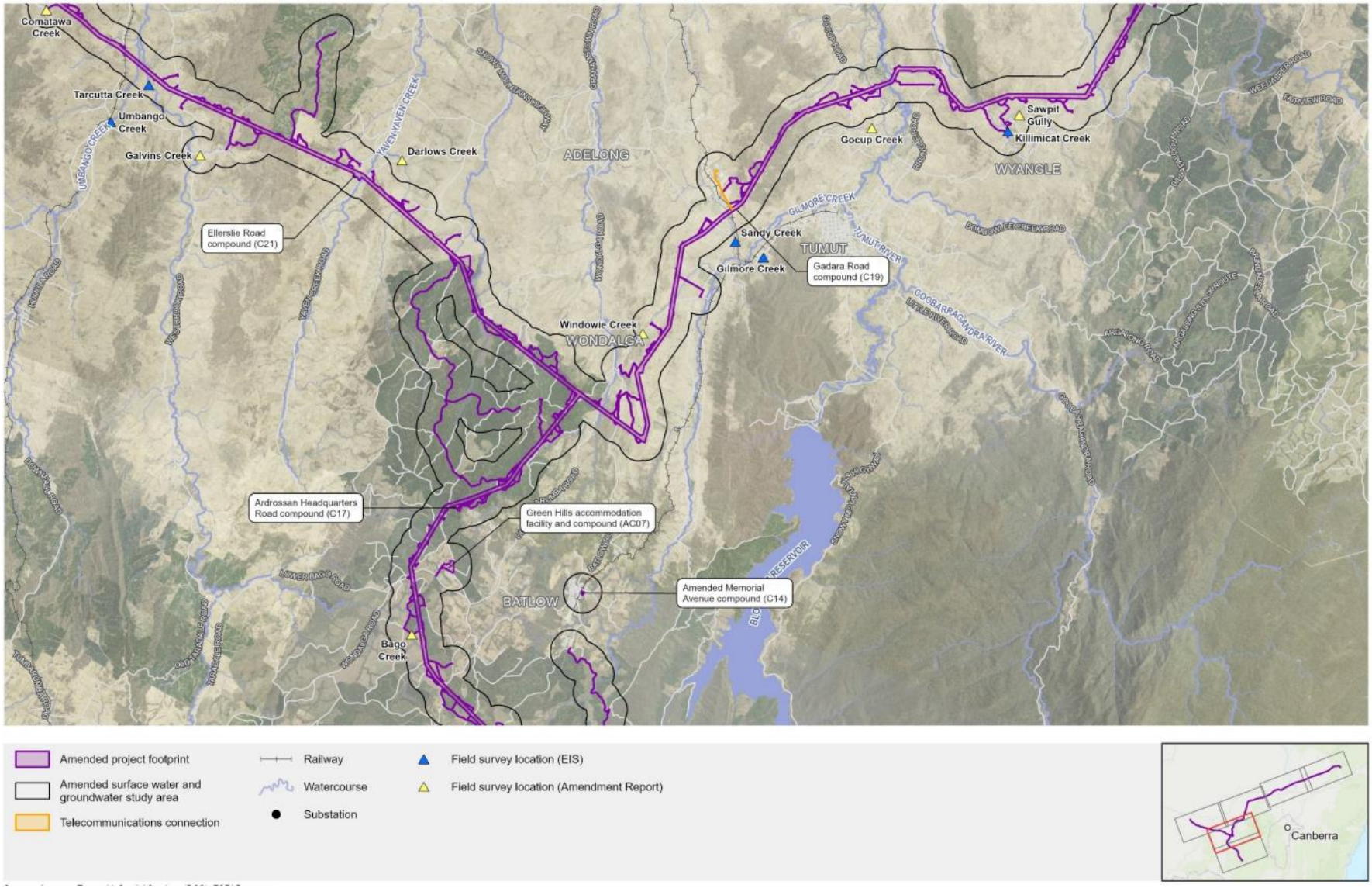


Figure 2-2: Field survey locations (*Technical Report 12-Surface Water and Groundwater Impact Assessment Addendum*)

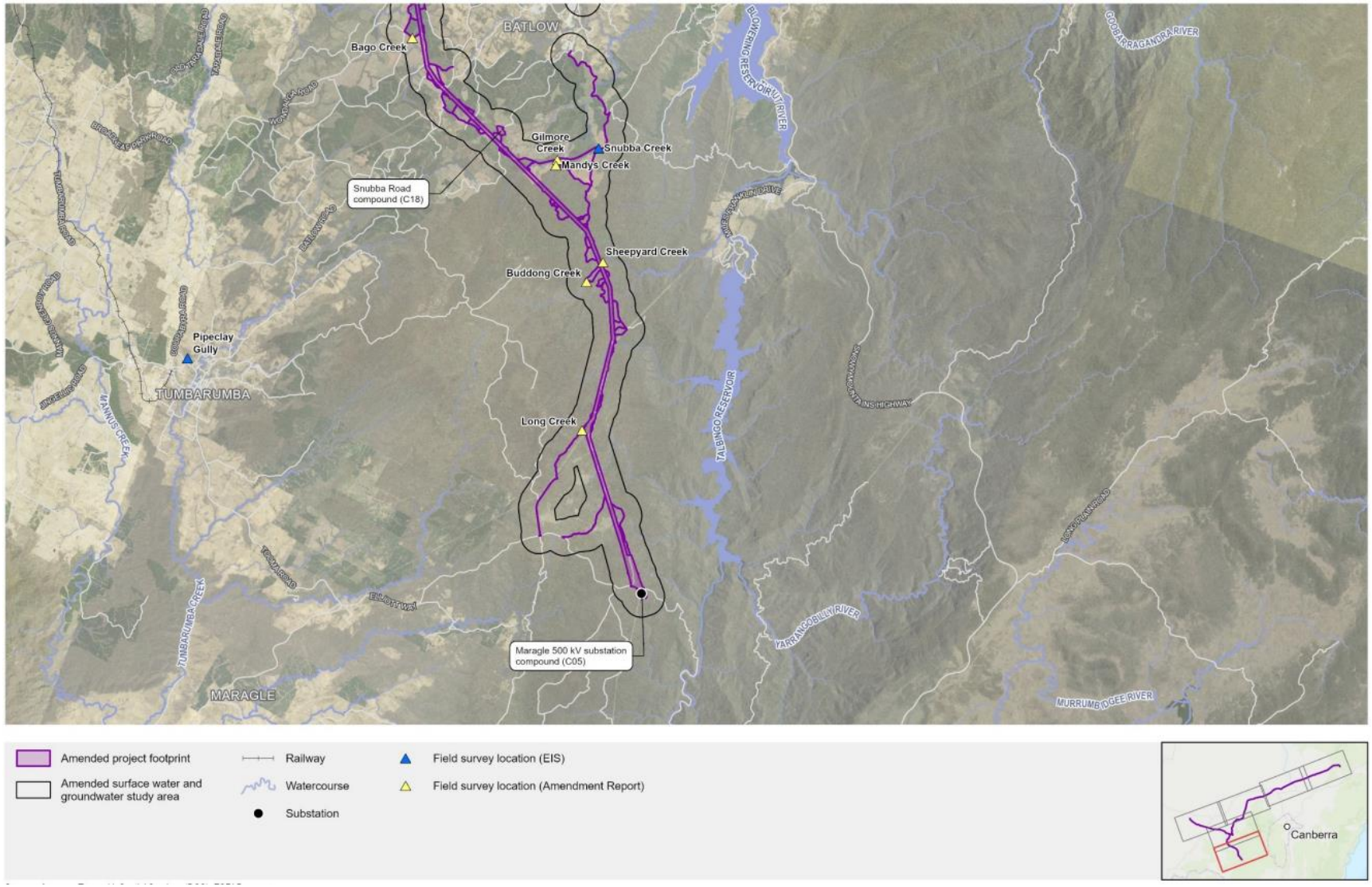


Figure 2-3: Field survey locations (*Technical Report 12-Surface Water and Groundwater Impact Assessment Addendum*)

Table 2-2: Background surface water quality data

SURVEY SITE	DATE	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% SAT)	pH	Turbidity (NTU)	Oxygen Reduction Potential (mV)	Total Dissolved Solids (mg/L)
ANZECC Guideline[1]		**N/A**	**125-2200**	**N/A**	**85-110**	**6.5-8.5**	**6 - 50**	**N/A**	**N/A**
BAGO CREEK	**17/10/2023**	9.8	20	8.12	81.2	7.58	5.6	73.4	no data
BUDDONG CREEK	**18/10/2023**	8	10.3	7.79	77.9	7.87	3.9	122.4	no data
COMATAWA CREEK	**16/10/2023**	15.5	404.3	6.72	69.9	7.46	15.1	109.5	no data
DARLOWS CREEK	**17/10/2023**	12.1	85.2	7.12	71.2	7.43	103.4	141.5	no data
FOLEYS GULLY	**16/10/2023**	15.4	111.2	6.78	67.8	7.33	145.2	107.8	no data
GALVINS CREEK	**17/10/2023**	11.4	475.2	6.9	69	7.99	2.7	117.7	no data
GILMORE CREEK	**18/10/2023**	8.8	10.8	7.7	77.7	6.66	8.3	132.8	no data
KEAJURA CREEK	**16/10/2023**	14.7	1275	6.71	67.1	7.54	8.3	89.5	no data
KYEAMBA CREK	**16/10/2023**	15	723	7.01	70.1	7.63	65.7	128.9	no data
LONG CREEK	**18/10/2023**	6.6	13	7.84	78.4	7.56	3.1	87.7	no data
MANDYS CREEK	**18/10/2023**	8.6	11.2	7.59	75.9	6.48	3.9	126.1	no data

[1] Physical and chemical stressors were based upon the South-east Australian lowland rivers of the Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand water quality guidelines (ANZECC & ARMCANZ 2000)

SURVEY SITE	DATE	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% SAT)	pH	Turbidity (NTU)	Oxygen Reduction Potential (mV)	Total Dissolved Solids (mg/L)
SHEEPYARD CREEK	**18/10/2023**	8.7	13	7.38	73.8	6.76	7.9	130.3	no data
SNUBBA CREEK	**18/10/2023**	9.9	12.6	7.46	74.6	6.51	4.4	127.5	no data
SNUBBA CREEK	**4/04/2022**	11.78	80	10.24	74.6	6.51	171	60.1	50
GILMORE CREEK	**4/04/2022**	11.78	80	10.24	77.7	6.66	171	60.1	50
SANDY CREEK	**5/04/2022**	13.9	902	7.7	No Data	7.19	417	221.1	584
O'BRIENS CREEK	**24/08/2022**	10.33	610	10.74	No Data	8.44	35.4	18.8	855
TARCUTTA CREEK	**25/08/2022**	10.53	590	11.17	No Data	8.17	77.4	33.7	386
UMBANGO CREEK	**25/08/2022**	10.8	954	10.75	No Data	8.27	14.5	27.7	623

3. Construction monitoring program

The mobilisation of sediments and pollutants during construction works are identified as a potential impact on surface water within disturbed catchments and waterways. A soil conservation consultant will be engaged to provide design input into erosion and sediment controls to control dirty water and separate clean water flows around the works.

Other potential impacts during the construction stage include increased turbidity from soil disturbance, increased pH from the use of concrete products, discharge of poorly treated water from water quality treatment infrastructure, erosion and sediment migration from areas of existing and known contamination.

3.1. Monitored locations

Locations to be monitored in the waterways around the HLW include:

- Where new creek crossings for Key Fish Habitat (KFH) will be necessary and,
- At receiving waterways for active sediment basins identified within the Monitoring and Discharge Point Register.

The location of new creek crossings within KFH and Monitoring and Discharge Points that may be used throughout construction of the HLW works are identified in Table 3-1 and Table 3-2.

Upstream and downstream monitoring points for each of the watercourses identified in Table 3-1 and Table 3-2 will be logged in the Surface Water Monitoring Point Register provided in Attachment 2.

The Surface Water Monitoring Point Register will include the following information:

- HLW KFH ID / HLW SB ID
- Date construction monitoring period commenced (i.e. Construction works commencement date, date basin became active)
- Baseline monitoring commencement date
- Associated upstream monitoring point
- Associated downstream monitoring point
- Monitoring point status (active/inactive)

Baseline monitoring for each upstream and downstream monitoring point will be undertaken as described in Section 3.2.1. A copy of the up-to-date Surface Water Monitoring Point Register will be included in the Monthly Environmental Report.

Surface water sampling locations will selected based on the accessibility and adherence to HLW safety requirements.

At the time of writing, the final design for access tracks which will need new crossings for KFH creek lines, as identified by the Project Ecologist, are still being determined and negotiations with landholders are still underway to avoid the need to impact on KFH by micrositing of towers and access tracks.

Additionally, it is noted that the waterway crossing within KFH sites identified in Table 3-2 are based on the desktop assessment undertaken for the EIS and Amendment Report. Field assessments will be undertaken by the Project Ecologist to confirm identification as KFH which will be documented within the Aquatic Biodiversity Survey Report (refer to Biodiversity Management Sub-Plan).

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Table 3-1: Receiving waterways to be monitored during construction

HLW ID (Table 7-2 of SWMP)	HLW worksite	Waterway	Catchment	Monitoring purpose
1	Gugga Construction Compound (C06)	Gregadoo Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
2	Tarcutta Accommodation Facility and Construction Compound (AC03)	Tarcutta Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
3	Ellerslie Road Construction Compound (C21)	Yaven Yaven Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
4	Ardrossan Headquarters Construction Compound (C17)	Germans Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
5	Kunama Accommodation Facility and Construction Compound (AC07)	Yaven Yaven Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
5	Kunama Accommodation Facility and Construction Compound (AC07)	Adelong Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges
6	Snubba Road Construction Compound (C18)	Walkers Creek	Murumbidgee	Potential impacts to receiving waterways due to sediment basin discharges

Table 3-2: Waterway crossings within KFH to be monitored during construction (subject to detailed design and Project Ecologist assessment)

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
1	V13.2-66	BAGO CREEK	MURRUMBIDGEE	148.0526041933	-35.5596687750	5C3/5C1-112 & 5C3/5C1-112	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
2	V13.2-61	BAGO CREEK	MURRUMBIDGEE	148.0600306143	-35.5706553935	5C3/5C1-109 & 5C3/5C1-110	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
3	V13. 2-52	MANDY CREEK	MURRUMBIDGEE	148.1666088974	-35.6186647420	5C3/5C1-76 & 5C3/5C1-77	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
4	V13. 2-56	SNUBBA CREEK	MURRUMBIDGEE	148.1954239323	-35.6091570839	5C3/5C1-73 & 5C3/5C1-73 North-east	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
5	V13. 2-50	YELLOW GULLY	MURRUMBIDGEE	148.2018048571	-35.6239141117	5C3/5C1-068 & 5C3/5C1-069	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
6	V13. 2-48	WEIR GULLY	MURRUMBIDGEE	148.2095307668	-35.6384482039	5C3/5C1-063 & 5C3/5C1-064 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
7	V13. 2-47	SHEEPYARD CREEK	MURRUMBIDGEE	148.2083345259	-35.6432550367	5C3/5C1-061 & 5C3/5C1-062	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
8	V13. 2-43	BUDDONG CREEK	MURRUMBIDGEE	148.2146206891	-35.6553516639	5C3/5C1-059 & 5C3/5C1-060 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
9	V13. 2-42	STOCKMANS CREEK	MURRUMBIDGEE	148.2338244147	-35.6603685527	5C3/5C1-52 & 5C3/5C1-53	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
10	V13. 2-41	HONEYSUCKLE CREEK	MURRUMBIDGEE	148.2426941114	-35.6795929323	5C3/5C1-045 & 5C3/5C1-046	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
11	V13. 2-40	UNNAMED TRIBUTARY HONEYSUCKLE CREEK	MURRUMBIDGEE	148.2453378271	-35.6909122599	5C3/5C1-042 & 5C3/5C1-043	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
12	V13. 2-39	LONG CREEK	MURRUMBIDGEE	148.2501211336	-35.7209136260	5C3/5C1-032 & 5C3/5C1-033 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
13	V13. 2-38	LONG CREEK	MURRUMBIDGEE	148.2484650407	-35.7224753750	5C3/5C1-032 & 5C3/5C1-033 Mid	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
14	V13. 2-37	MCGREGORS GULLY	MURRUMBIDGEE	148.2472728888	-35.7212949653	5C3/5C1-032 & 5C3/5C1-033 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
15	V13. 2-35	LONG CREEK	MURRUMBIDGEE	148.2470119566	-35.7254255689	5C3/5C1-030 & 5C3/5C1-031 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
16	V13. 2-36	LONG CREEK	MURRUMBIDGEE	148.2477680977	-35.7254828361	5C3/5C1-030 & 5C3/5C1-031 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
18	V13. 2-33	UNNAMED TRIBUTARY TOMNEYS PLAIN CREEK	MURRUMBIDGEE	148.2629259370	-35.7433002709	5C3/5C1-023 & 5C3/5C1-024	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
19	V13. 2-32	PLAIN CREEK	MURRUMBIDGEE	148.2878816	-35.76342341	5C3/5C1-014 & 5C3/5C1-015	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
20	V13. 2-31	LOGBRIDGE CREEK	MURRUMBIDGEE	148.3055653	-35.78477023	5C3/5C1-004 & 5C3/5C1-006 South	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
21	V13. 2-132 (V9- 30)	BIG SPRING CREEK	MURRUMBIDGEE	147.471823	-35.26199025	6R/6P-3 & 6R/6P-4	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
22	V13. 2-127	TOOLES CREEK	MURRUMBIDGEE	147.5647906597	-35.3036866054	5C3/5C2-121 & 5C3/5C2-120	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
23	V13. 2-125	UNNAMED TRIBUTARY OF KEAJURA CREEK	MURRUMBIDGEE	147.6073533350	-35.3075816140	5C3/5C2-111 & 5C3/5C2-109 General	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
24	V13. 2-126	UNNAMED TRIBUTARY OF KEAJURA CREEK	MURRUMBIDGEE	147.6160854665	-35.3048554325	5C3/5C2-111 & 5C3/5C2-109 General	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
25	V13. 2-118	KEAJURA CREEK	MURRUMBIDGEE	147.6501177044	-35.3234157056	5C3/5C2-103 & 5C3/5C2-102 South	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
26	V13. 2-119 (V9- 23)	UNNAMED TRIBUTARY OF KEAJURA CREEK	MURRUMBIDGEE	147.6680377149	-35.3217063504	5C3/5C2-101 & 5C3/5C2-100 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
27	V13. 2-114 (V9- 24)	UNNAMED TRIBUTARY OF COMTAWA CREEK	MURRUMBIDGEE	147.6974557496	-35.3288682156	5C3/5C2-95 & 5C3/5C2-94 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
28	V13. 2-111	COLLEGE CREEK	MURRUMBIDGEE	147.7560274	-35.34325925	5C3/5C2-82 5C3/5C2-81 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
29	V13. 2-201	UNNAMED TRIBUTARY OF GALVINS CREEK	MURRUMBIDGEE	147.8482165129	-35.3578886731	5C3/5C2-65 5C3/5C2-64 North	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
30	V13. 2-103	UNNAMED TRIBUTARY OF GALVINS CREEK	MURRUMBIDGEE	147.8461108247	-35.3637589645	5C3/5C2-65 5C3/5C2-64 Mid - North	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
31	V13. 2-97	GALVINS CREEK	MURRUMBIDGEE	147.8467571838	-35.3731046752	5C3/5C2-65 5C3/5C2-64 Mid - South	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
32	V13. 2-102	DARLOWS CREEK	MURRUMBIDGEE	147.9603376	-35.36623134	5C3/5C2-42 5C3/5C2-41 (North)	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
33	V13. 2-101	DARLOWS CREEK	MURRUMBIDGEE	147.9618496	-35.36959812	5C3/5C2-42 5C3/5C2-41 (Middle)	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
34	V13. 2-93 (V9- 26)	O'Briens Creek	MURRUMBIDGEE	147.9844336	-35.37696082	5C3/5C2-37 5C3/5C2-36 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
35	V13. 2-92	UNNAMED TRIBUTARY OF RIGHT ARM CREEK	MURRUMBIDGEE	147.999719	-35.38471287	5C3/5C2-34 5C3/5C2-33	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
36	V13. 2-91	RIGHT ARM CREEK	MURRUMBIDGEE	148.0046656	-35.38745705	5C3/5C2-33 5C3/5C2-32 North	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

HLW KFH ID	EIS/AR Reference	Waterway	Catchment	Lat	Long	HLW Location Reference	Monitoring purpose
37	V13. 2-90	UNNAMED TRIBUTARY OF RIGHT ARM CREEK	MURRUMBIDGEE	148.0050648042	-35.3897667442	5C3/5C2-33 5C3/5C2-32 South	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
38	V13. 2-86	NACKI NACKI CREEK	MURRUMBIDGEE	148.0309856288	-35.4059376419	5C3/5C2-25 5C3/5C2-24 West	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
39	V13. 2-81	UNCLES CREEK	MURRUMBIDGEE	148.0567682134	-35.4146070459	5C3/5C2-20 5C3/5C2-19	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
40	V13. 2-80	SHARPS CREEK	MURRUMBIDGEE	148.0645544078	-35.4151613198	5C3/5C2-19 5C3/5C2-18 East	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
43	V13. 2-77	WILSONS CREEK	MURRUMBIDGEE	148.1336327	-35.42002976	5C2/5C1-5 5C2/512-4 (south)	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.
44	V13. 2-88	WINDOWIE CREEK	MURRUMBIDGEE	148.1354245780	-35.4010156352	5C2/5C1-11 5C2/5C1-12	Potential impacts to KFH due to waterway crossing establishment and rehabilitation.

3.2. Sampling frequency

3.2.1. Baseline monitoring

As per the requirements of UMM SW3, HLW will undertake surface water quality monitoring to establish baseline water quality conditions in waterways of high sensitivity that may be impacted by construction. A minimum of three samples will be collected over a minimum one (1) month period at the upstream and downstream monitoring points identified in the Surface Water Monitoring Point Register (refer to Section 3.1 and Attachment 2), prior to commencing works that may impact the area.

3.2.2. Construction water quality monitoring

Upon commencing works in the area, construction water quality monitoring will be undertaken quarterly. Wet weather monitoring will be carried out:

- A minimum of once per 3 months where rainfall does not exceed 20mm, and
- When a continuous rainfall event of >20mm is received in the local catchment during a 24-hour period (as recorded at the HLW rain gauge(s) or nearby weather station) and has generated runoff from site.

For safety reasons, sampling will not be undertaken during peak storm-flows. Sampling will be completed when flows are reasonably constant and monitoring points can be safely accessed. Monitoring locations will be selected where possible to enable a safe monitoring location during all weather conditions.

Quarterly and wet weather construction water quality monitoring will be undertaken:

- At receiving waterways for sediment basins identified within the Monitoring and Discharge Point Register as being active during the relevant reporting period
- During establishment and rehabilitation works at new creek crossings within areas identified as KFH. Sampling during rehabilitation works will be undertaken until the relevant work area has been rehabilitated in accordance with the requirements of UMM B32.

-

3.3. Surface water quality parameters

Table 3-3 details the analytes that will be monitored during the HLW works, at the monitoring points identified in the Surface Water Monitoring Point Register (refer to Section 3.1 and Attachment 2).

Table 3-3: Monitored surface water quality parameters

Category	Measured	Parameters
Physio-chemical parameters	In-field using a calibrated multi parameter probe.	• Temperature (˚C) • Dissolved Oxygen (% saturation) • Electrical Conductivity (µS/cm) • Reduction-Oxidation Potential (Redox)(mV) • pH • Total dissolved solids (TDS) • Total suspended solids (TSS) • Turbidity (NTU) • Visible oil and grease
Nutrients	Laboratory testing	• Chlorophyll-a • Total Nitrogen • Total Phosphorous
Metals	Laboratory testing	• Aluminium • Cadmium • Chromium (III and VI) • Copper • Lead • Nickel • Zinc

3.4. Performance criteria

As detailed in the Environmental Assessment Documentation, some surface water quality parameters exceed the relevant ANZECC 2000 guidelines at numerous locations within the HLW project. At the time of writing, background monitoring data for the monitoring locations identified in Table 3-2 is limited.

Site specific trigger values (SSTV) would be established based on a rolling mean. Once baseline monitoring has been undertaken as detailed in Section 3.2.1, the averaged concentration of parameters will be established as the SSTV based on this data. As each round of sampling and testing occurs, the SSTV will be updated according to the average of the expanded dataset.

The SSTVs provide an easily identifiable indication of a potential change in water quality. A management response would be initiated if any of the following occurs:

- A parameter exceeds the SSTV for any single monitoring event by more than 30%
- A parameter downstream exceeds the corresponding parameter upstream for any single monitoring event by more than 20%
- A parameter exceeds the SSTV for two consecutive monitoring events
- A parameter exceeds the SSTV for half of the sampling events in a twelve-month period.

In the event that any of the above triggers are observed, a review will be initiated immediately to determine the significance of the exceedance(s) and possible causes. The review will assess the baseline data for the relevant waterway, recent rainfall records, other activities within the catchment and recent activities or recorded erosion/sediment control incidents occurring in the catchment.

If the exceedance is determined to be attributable to HLW Works, the event will be treated as an environmental incident and managed in accordance with the requirements of Section 7.10 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

3.5. Monitoring methods and sampling protocols

3.5.1. Sample collection

Grab samples will be collected manually from the sampling locations. The volume of sample collected will be sufficient for the required physico-chemical (field) parameter analysis using a multi-probe water quality meter(s).

3.5.2. Field measurements

Field physico-chemical parameters including pH, DO, ORP, temperature, and turbidity will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s). Other observations including odour and colour will also be recorded.

The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.

3.5.3. Recording of field results

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date, location, and sampler details.

3.5.4. Decontamination

Sampling equipment will be cleaned (decontaminated) between each sample. Where a sample site shows evidence of contamination (i.e. there is an algal bloom, or the site smells strongly of hydrocarbons, sewage or something else) equipment will need to be cleaned thoroughly. In addition, equipment will need to be cleaned periodically to prevent a build-up of dirt.

The following method will be followed:

- Rinse the equipment in tap water
- Clean with De-Con 90 (a phosphate free detergent), or equivalent
- Rinse again with tap water
- Rinse three times with de-ionised water, and finally
- Allow to dry.
- De-ionised and tap water will be available for washing equipment in the field, if required.
- Quality Assurance and documentation
- Quality assurance and control protocols during sampling and recording of physico-chemical (field) parameters will be undertaken monthly (each sampling event) in accordance with ANZECC/ARMCANZ (2000b) to ensure the integrity of the dataset.

As part of sampling, quality assurance and control samples during sampling will be undertaken to ensure the integrity of the dataset. These are to include:

- Rinsate blanks (one per sampling event only)
- Blind duplicates (at a rate not less than 20% of total samples)
- Split duplicates (at a rate not less than 20% of total samples).

- Samples are to be transported to a NATA-accredited laboratory under documented chain of custody protocols. Field results will be checked for accuracy before leaving the site and errors or discrepancies will be cross-checked and further investigation initiated if required.

Monitoring and calibration records will be maintained in accordance with the appropriate standard.

4. Review

This plan will be updated as part of the Soil and Water Quality Management Sub Plan update as detailed in Section 9 of the SWMP.

5. Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions and performance criteria. Monitoring reports will be submitted to the Environmental Representative (ER) and the within 60 days of the reporting period unless otherwise agreed with ER.

Reporting requirements associated with the Program are presented in Table 5-1.

Table 5-1: Reporting requirements

Schedule (during construction)	Requirements	Recipient (relevant authority)
Surface Water Monitoring Reports (every six months)	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period. Surface water quality results will be presented and performance criteria exceedances will be highlighted. Applicable management responses will be documented.	ER / Transgrid
Monthly Environmental Report (every month)	Monitoring program performance will be documented in the Monthly Environmental Report where applicable. Any incidents and key environmental issues will be documented.	ER / Transgrid

ATTACHMENT 1. KFH ASSESSMENT SITES

NOTE: The final design for access tracks which will need new crossings for Key Fish Habitat (KFH) creeks, as identified by the Project Ecologist, are still being determined and negotiations with landholders are still underway to avoid the need to impact on KFH by micrositing of towers and access tracks. On completion of landholder negotiations and detailed design a map of the required locations will be included in this section.

ATTACHMENT 2. Surface Water Monitoring Point Register Template

HLW KFH / SB ID	Baseline monitoring commencement date	Date construction monitoring period commenced	Upstream monitoring point	Downstream monitoring point	Monitoring point status (active/inactive)

Annexure F. Stockpile and Spoil Management Procedures

Annexure F

Stockpile and Spoil Management Procedure

HumeLink West

Revision: 02

TransGrid

Date 25/07/2025

Version Control

Revision	Date	Description	Approval
A	15/05/2024	Initial Draft for TG Review	Ian Irwin
00	25/06/2024	Issued for Consultation	Ian Irwin
01	18/03/2025	Update in response to consultation	Chris Millar
02	25/07/2025	Update in response to DPHI comments	Chris Millar

Distribution of controlled copies

This HumeLink West Soil and Water Management Sub-Plan – Annexure F: Stockpile and Spoil Management Procedure is available to all personnel and sub-contractors via the HLW document control management system.

The document is uncontrolled when printed. One controlled hard copy of the CEMP and supporting documentation will be maintained by the Quality Manager at the HLW office (and on the HumeLink website link to be provided).

Copy number	Issued to	Version

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2. Stockpile Controls – Examples **7**

Attachments:

Attachment 1: Stockpile Location Checklist

1. Introduction

1.1. Purpose

This procedure is for the establishment and management of temporary stockpile areas within the HLW boundary to ensure that environmental impacts associated with stockpiling are minimised during construction.

Temporary stockpile sites will be required to store various material including, but not limited to excavated materials, topsoil, mulch, excess timber for landscaping and revegetation works, concrete, pavement, rock, steel and other materials required for construction.

Temporary stockpile locations will be established at the beginning and throughout the HLW period, depending of stage and type of construction works. Once the HLW is complete the temporary stockpile site will be de-commissioned, and the land restored back to its original condition or as per specifications on the Issued for Construction Drawings.

Permanent stockpile sites, contaminated soils and waste management are not covered by this Procedure. The Remedial Action Plans (RAP) will designate specifics for material handling depending of classification and specific requirements. The Waste Management Plan will define how and where the waste material is to be reused, recycled, stockpiled or disposed of; the receptacles that will be used for storing identified waste materials prior to reuse, recycling, stockpiling or disposal.

Erosion and sediment capture measures will be established and regularly maintained to divert offsite stormwater, manage onsite stormwater runoff and stabilise stockpiles. These measures are to be implemented in accordance with Progressive Erosion & Sediment Control plan. *Stockpile Site Management and Volume 1 and Volume 2* of the *Blue Book: Managing Urban Stormwater: Soils and Construction* (2004)

1.1 Legislation, regulation, guidelines, and policy

This procedure has been developed by way of referring to Volume 1 and Volume 2 of the Blue Book: Managing Urban Stormwater: Soils and Construction (Landcom, 2004)

1.2 Work activities

The stockpiling procedures will be included in Environmental Work Method Statement (EWMS 006 – Earthworks)

Typically, this will cover:

- Locations where the materials will be temporarily stockpiled.
- Select material and fill, such as sand and rock.
- Topsoil, wood chips, mulch, and vegetation.
- Excavated natural material (ENM).
- Concrete or asphalt, block material removed or excavated from pavement.
- Pre-coat aggregate.
- Asphalt, such as cold mix.
- Neutralised & verified acid sulfate soils.
- Road base materials.
- Construction material laydown areas.

1.3 Assessment and Approval of Stockpile Sites

The new stockpile location is to be assessed against Sensitive Area Plans & The Stockpile Locations Checklist. (Attachment 1). The engineer or supervisor shall utilise the Stockpile Location Checklist to assess the potential stockpile location.

This will include determining if the stockpile locations are within sensitive or restricted areas. The Stockpile Locations Checklist requires approval from the Environmental Manager (or delegate).

Following this approval, the supervising engineer shall note the new stockpile details within the HLW Stockpile Register (refer Section 1.7).

Each new temporary stockpile will be justified in terms of the availability of existing sites in the area, haulage costs (to existing sites) the environmental, social and stakeholder risks.

Prior to utilising the approved stockpile site, it must be captured in the progressive erosion and sediment control plans an all controls installed on site and functioning prior to use.

1.4 Stockpile Controls

The following controls will be implemented before any stockpile is established to manage it use and operation during construction.

- Containment controls will be implemented to ensure runoff and sediment loss is controlled. This will include constructing stockpiles on hardstand (impervious) bunded areas when possible.
- Stockpiles will be managed to minimise soil disturbance and erosion.
- Be trimmed to a regular shape and rolled or bucket pressed to minimise dust.
- All temporary stockpiles in place for longer than two weeks will be stabilised with soil binder, fabric covers, temporary seeding (topsoil materials) or similar.
- Where required, be less than three metres in height with an appropriate height to length batter ratio.
- Establish erosion control and sediment measures, and maintain them regularly, to divert offsite stormwater, manage onsite stormwater and stabilise stockpiles.
- Locate stockpiles outside of the protection zone of trees and protected vegetation in accordance with the CEMP and sub plans.
- Locate stockpiles away from known heritage areas as identified in the CEMP and sub plans.
- Where possible, locate stockpiles at least 5.0m from likely areas of concentrated water flows and drainage lines.
- Keep stockpile materials separate, do not cross contaminate stockpile materials.
- Controls will be implemented to ensure that construction traffic working on stockpile sites do not track mud onto the wider road network or cause the spread of pathogens, diseases, or weeds.
- Biosecurity listed weeds will be managed and treated in accordance with the Biodiversity Management Sub-plan.
- Upslope run on water will be diverted around the temporary stockpile site.
- Downslope of the temporary stockpile site will have sediment fences and / or bunds, sumps and geo textile lined overtopping points.
- The height of all stockpiles will be limited, where practicable, to limit dust generation, or visual amenity impacts.

- All vehicle carrying materials for stockpiling will be covered to prevent the spread of dust.

1.5 Mulch Stockpiles

Locate and manage mulch stockpiles to minimise and manage tannin generation. Refer to SWMP Annexure I Tannin Management Protocol.

- Mulch stockpile sites will not be established on low lying areas within the wider catchment.
- Stockpile sites will not be in drainage lines or flood prone areas (10% AEP flood extent).
- Mulch stockpiles will be contained by earthen perimeter bunds at 300mm high to prevent run on surface water from entering the stockpile site and to capture tannin leachate.
- Stockpiles must be arranged to minimise any damage to natural vegetation and trees.
- Stockpiles must be monitored for temperatures to avoid spontaneous combustion.

1.6 Induction and training

Supervisors and relevant personnel will be trained in this procedure. Prior to requesting the assessment of a stockpile location, the engineer or supervisor is to check current locations to ensure the existing approved sites cannot be utilised. Minimise the number of stockpiles across the HLW, wherever practicable.

1.7 Record keeping and monitoring

Routine inspections will be undertaken of each stockpile site, the frequency of which will be determined by what is being stockpiled, the stockpile location and the sensitivity of the receiving environment.

The inspections will focus on the effectiveness of control measures in minimising environmental impacts. Inspections will be recorded in Synergy and made readily accessible for audit purposes.

The inspection will consider:

- Any impact on local environmental sensitivities.
- The effectiveness of the dust control measures.
- The integrity of the hardstand and bunding.
- The encroachment or storage of materials outside of the designated stockpile areas.
- Any residential impacts or complaints; any evidence of illegal dumping.
- The height of vegetation growth (to ensure it does not present a visual amenity risk, fire risk or would be at risk of forming a protected habitat) and general housekeeping.
- In instances of non-conformance, corrective actions will be defined and implemented. A follow-up site inspection will be conducted once the corrective action is implemented.

The Project Engineer will maintain records of stockpile locations in a Stockpile Register. The Stockpile Register will also include the purpose of the stockpile, the type of material contained, timing for establishment and removal. The Project Engineer is responsible for developing and maintaining the register.

1.2. Decommissioning

- Stockpile decommissioning will include, removing all stockpile material from the site, reusing, recycling or disposing of it at a licensed facility.
- Stabilising the site by planting and/or landscaping the site as per the IFC Drawings.

- Removing control measures such as erosion and sedimentation devices once the site stabilisation has occurred.
- Undertaking a site inspection and confirming stabilisation / restoration.

1.3. Review

This Stockpile Management Procedure will be updated, where:

- A routine site audit or inspection identifies any non-conformance created by the procedure.
- Following and incident or emergency.
- Following a change in legislation.
- Following a major change in construction method.

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2. Stockpile Controls – Examples

Example 1 – Stockpiles are to be rolled or bucket pressed to reduce erosion and dust

Picture 1 Bucket pressed stockpile

Example 2 – Unexpected contaminated material stockpiles will be covered with geotextile, watered down, fenced and signed with additional downslope controls.

Picture 2 Asbestos stockpile (Unexpected find)

Example 3 – Temporary stockpiles planned to be inactive for over 2 weeks will be stabilised to prevent erosion and dust

Picture 3 Soil Binder

Example 4 – Clean run on water will be diverted around any temporary stockpiles to prevent erosion and protect water quality. Stockpile diversion bunds will be wrapped in geotextile to ensure they have residual strength. The bund also acts as a containment for dirty water eroding from the stockpile.

Picture 4 Upslope diversion bunds

Example 5 – Temporary stockpile locations will have downslope perimeter controls that include sediment fences, edge bunds, sumps, and stabilised overtopping points.

Picture 5 Downslope controls

Example 6 – Temporary stockpiles set back from perimeter controls and edge bunds to ensure site drainage during rainfall.

Picture 6 Stockpile setbacks

Example 7 – Temporary stockpiles can utilise sand bags for short term control or in circumstances that fences and bunds cannot be installed due to ground conditions

Picture 7 Sandbag Controls

Example 8 -Temporary stockpiles on the HLW will be stabilised for Christmas shutdown periods to minimise erosion and dust impacts

Picture 8 Soil Binder Application

Attachment 1: Stockpile locations checklist

Temporary Stockpile Location Assessment Criteria (The Site)	Does the proposed stockpile meet the criteria? (Yes / No)	If No, provide description, justification and alternative solution and / or additional mitigation measures to demonstrate how potential impacts and risks will be managed
Within the approved project boundary (Project Area)		
Does not require the removal of trees or vegetation		
Trees on site can retained can be protected in accordance with the CEMP and sub plans		
Located outside of any existing tree protection zones		
Not located within a drainage line or concentrated water flow path		
Located outside of the 10% AEP flood extent		
Located away from sensitive receiver locations as identified in the CEMP and Sub plans		
The location and relevant work activities are compliant with the Noise Catchment it is located in		
The site is positioned so that the stockpiled material is accessible at any time including future works		

Temporary Stockpile Location Assessment Criteria (The Site)	Does the proposed stockpile meet the criteria? (Yes / No)	If No, provide description, justification and alternative solution and / or additional mitigation measures to demonstrate how potential impacts and risks will be managed
The site does not impact on any heritage area, EEC or other environmentally sensitive location.		
Has the proposed stockpile location been included in the ESCP for the area		

Annexure G. Water Take Register

Bore Number	Address	WAL	Water source take Allocated Total	Units used	Allocation remaining	Conditions

Annexure H. Spill Response Procedure

Annexure H

Spill Response Procedure

HumeLink West

Revision: 02

TransGrid

Date 21/03/2025

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Document Control

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A	15/5/24	Initial Draft for TG Review	
00	25/06/2024	Issued for Consultation	
01	30/12/2024	Update of personnel	
02	21/03/2025	Update in response to ER comments	

Distribution of controlled copies

This HumeLink West Soil and Water Management Sub-Plan – Annexure H: Spill Response Procedure is available to all personnel and sub-contractors via the HLW document control management system.

The document is uncontrolled when printed. One controlled hard copy of the Management Plan will be maintained by the Quality Manager at the HLW office and on the HumeLink website, were relevant.

Copy number	Issued to	Version

1. Purpose

This procedure explains the processes and procedures to be carried out for spill response associated with HLW construction activities.

2. Induction / Training

All personal involved in the project will be trained during the project induction in the requirements of this spill response procedure. Training will also include toolbox talks, pre-starts and targeted training as required. Records of all training, including inductions, will be maintained. Records will include the name and role of the attendee as well as the name of the course.

3. Scope

This procedure includes site specific advice and control measures for responding to spills and ensure compliant and appropriate response, handling, and disposal. It is intended that the environmental safeguards outlined in this plan will be incorporated into the pre-construction and construction phases of the project. Spill response & management and mitigation will be undertaken in accordance with the management plans and procedures for the project.

4. Spill Response Summary

A summary of the Spill Response Procedure is provided in Figure 4-1 below.

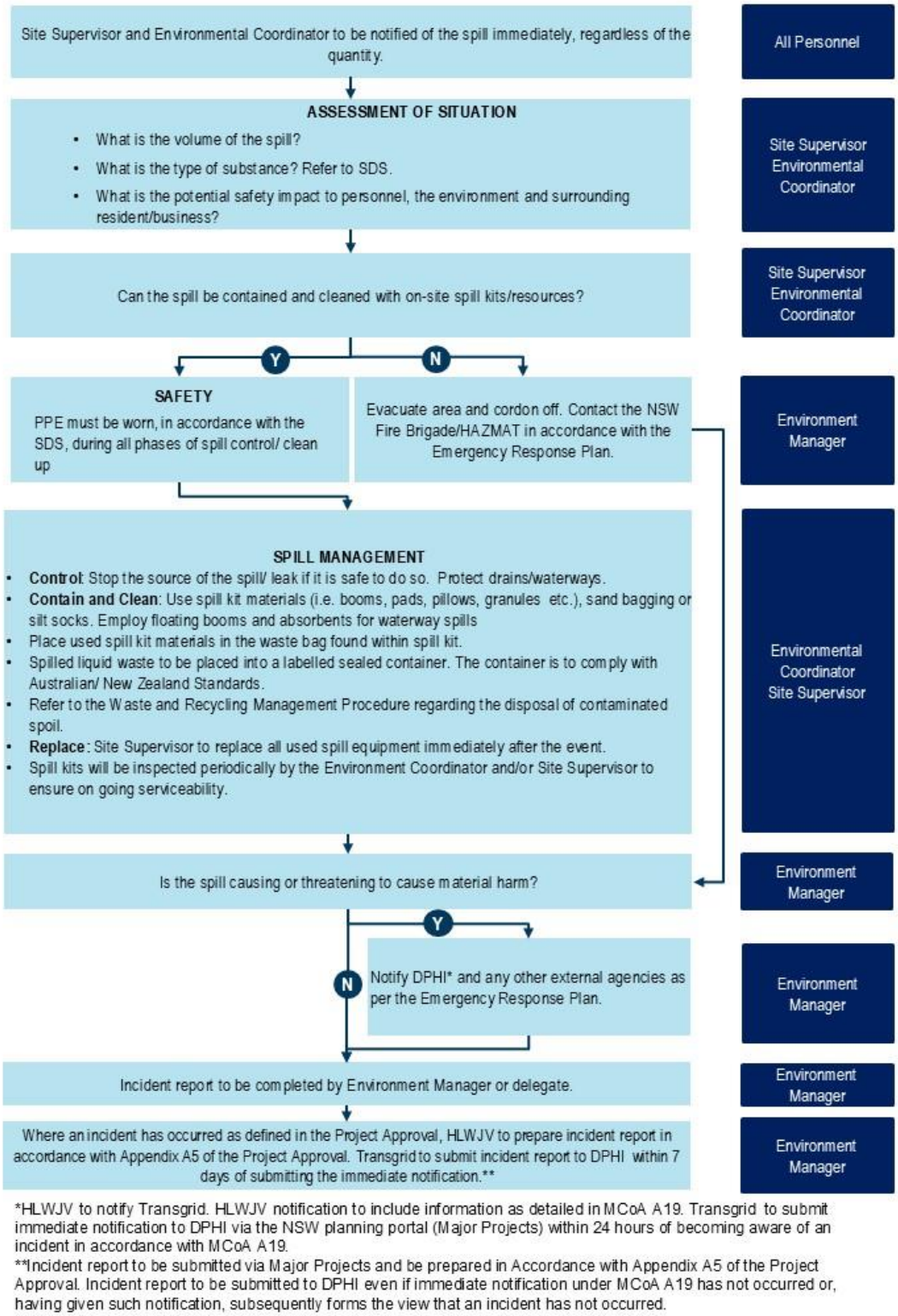
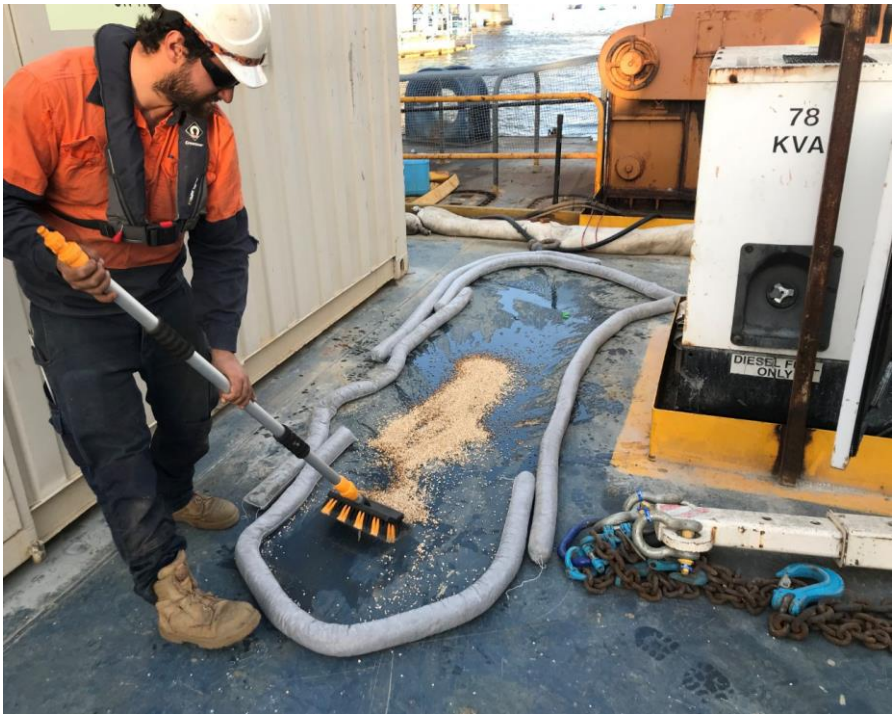


Figure 4-1: Spill Response Procedure

4.1. Spill Response Procedure Photographic Example

1) Turn off the plant / equipment causing the leak. Contain the spilled material to a smallest area possible, using booms, bunds or another suitable material. When the spill is contained, and the leak and source has been stopped. Contact the Supervisor.

2) Once contained, install absorbent sweep. Ensure that the absorbent sweep is placed across



the spill and thoroughly swept in multiple times.

3) Use the absorbent pads to soak up the spill. Place all spill materials into the clearly labelled contaminated waste bags and tie up the bag

4) Once the pads and absorbent sweep has be used, conduct a final spray of the dispersant to collect any surface remnants caused by the spill. Use pads to collect the surface remnants and placed in contaminated waste bag.

5) If the spill is on the ground. Remove the contaminated and earthen materials and place in the contaminated waste bags.

6) Place all materials, absorbent sweep, spill pads and contaminated earthen materials into the contaminated waste bags.

7) Place the contaminated waste bags into the designated hydrocarbon waste site facility. This will include steel drums, fully bunded, signed and secured.

8) Report incident, complete incident report and restock spill kit.

5. Emergency Contact Numbers

Position	Name	Phone
EPA pollution hotline		131 555
Fire and Rescue NSW		000 (for pollution incidents that present an immediate threat to human health or property) 1300 729 579 (for pollution incidents that do not present an immediate threat to human health or property)
Minister of Health (or delegate)	Albury Public Health Unit (Murrumbidgee and Southern NSW LHD)	(02) 6053 4800 After hours 1300 066 055
Rural Fire Service	Wagga Wagga LGA (Riverina office)	02 6971 4500
	Snowy Valleys LGA (Riverina Highlands office)	02 6981 4222
Hospitals (With Emergency Facilities)	Batlow - Adelong Multi-Purpose Service	(02) 6941 4333
	Wagga Wagga Health Service	(02) 5943 10005
	Tumut District Hospital	(02) 6947 0800
	Gundagai Multi-Purpose Service	(02) 6940 6300
	Holbrook District Hospital	(02) 6052 2800
SafeWork NSW		131 050
Council	Wagga Wagga City Council	(02) 6926 9100 1300 292 442
Council	Snowy Valleys Council	1300 275 782
24 hour community information line		1800 931 189
Construction Environmental Manager	Jeremy Slattery	0421 827 231
Construction Director	Vince Newton	0404 801 300

Position	Name	Phone
Superintendent	TBD	TBD
Environmental Representative	Derek Low	0402 403 716
Transgrid Representative	Jeremy Roberts	0408 950 387
Transgrid Environmental Representative	Ali Youssef	0498 260 949

Annexure I. Tannin Management Procedure

Annexure I

Tannin Management Procedure

HumeLink West

Revision: 00

TransGrid

Date 16/05/2024

Version Control

Revision	Date	Description	Approval
A	15/5/24	Initial Draft for TG Review	
00	5/7/24	Issued for consultation	

Distribution of controlled copies

This Tannin Management Procedure is available to all personnel and sub-contractors via the HLW document control management system. An electronic copy can be found on the HumeLink website.

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Attachments:

Attachment 1: Plates showing tannin generation & water quality impacts
Attachment 2 Plates showing the use of mulch for erosion & sedimentation controls
Attachment 3 Minimum Requirements for Community Mulch Giveaways
Attachment 4 Community mulch giveaway information sheet
Attachment 5 Records template for community mulch giveaway

1. Introduction

The purpose of this environmental protocol is to set management measures to minimise the generation and discharge of tannins from vegetation mulch used in construction projects.

Additional background information on tannins and the use of mulch on construction sites is included in section 3 of this procedure.

2. Management measures

The primary focus must be to minimise tannin generation on construction sites.

2.1. General mulch management measures

These general mulch management measures are to be followed for all construction projects.

2.1.1. Planning and works staging

The first step in planning and works staging is to identify the amount of mulch to be generated. With this information, a strategy can be prepared to manage mulch on site. Staging of chipping, tub grinding and/or mulching activities should be planned to reduce the volume of mulch to be managed at any one time. The volume of excess mulch can then be assessed, and plans made to dispose of this off site.

Other general considerations at the planning and works staging phase are as follows:

- Mulch stockpile sites should be established with appropriate controls in place before the main site clearing activities commence. Limited clearing may be required earlier for establishment of stockpile areas and access.
- Stage the mulching of cleared vegetation to ensure that mulch can be progressively moved to elevated, or otherwise suitable, stockpile locations. It is preferred that mulch should be transferred to a stockpile or reused on the day of mulching.
- Plan to efficiently reuse mulch in progressive works to reduce the time that mulch is concentrated in stockpile locations.
- Excess mulch can be managed by community giveaway. This takes considerable time and mulch needs to be suitably located and managed as this occurs. The conditions for community giveaway of mulch are included as Appendix 3.
- Any other form of bulk offsite mulch disposal (eg to Council parkland or a development site) must be assessed to ensure waste management provisions are adhered to for off site disposal.

2.1.2. Stockpile location and management

- Mulch stockpile sites should be established on elevated ground where possible.
- Stockpile sites with a duration of not more than 1 month should be constructed not less than 20 metres from a watercourse, including floodplains.
- Stockpile sites with a duration of more than 1 month should be constructed not less than 50 metres from a watercourse, including floodplains.
- Mulch stockpiles should be designed and constructed to divert upgradient water to prevent it from entering the stockpile site.

2.1.3. Management measures for the use of mulch on site

- Do not use mulch for surface cover or sedimentation controls in any low lying areas of the site that remain consistently wet. Alternative controls such as geofabric (for surface protection) or sediment fence will be required in these areas.
- Do not spread surface mulch in thicker than 100mm layers. Mixing mulch with topsoil is encouraged for batters to prevent loss of topsoil during initial stabilisation. It should be noted that mulch will generally cause nitrogen draw down which may inhibit plant growth, unless mulch has been composted first.
- Care is to be taken to ensure that excessive mulch is not applied for sedimentation controls such as perimeter bunds or catch dams.

2.1.4. Monitoring and response

- Monitor the site for generation of tannins. Tannin impacts can be readily identified visually as dark coloured ponded water. Site staff should be trained to identify and report potential impacts to the site project management or environment staff.
- Review management practices where required to prevent the generation of tannins in identified problem areas.

2.2. Mulch management methods for high-risk sites

2.2.1. High risk sites

High risk sites, where additional management measures may be required, include:

- where large quantities of mulch will be generated and stockpiled.
- where high tannin generating vegetation types are to be mulched (see 3.1).
- where the receiving environment is identified as sensitive (eg Marine Park, threatened aquatic species habitat).
- where tannins have been observed to be generated or discharged from an operating site with standard management controls.

2.2.2. Stockpile management measures for high risk sites

- Mulch stockpiles for high tannin generating vegetation types should incorporate an impermeable bund to capture stockpile leachate or tannin impacted water. Impervious bunds must be a minimum of 300 mm high, preferably higher to capture tannin impacted water. All bunded stockpiles that are in place for a period longer than one month must include a lined discharge point for overflow in extreme rainfall events.
- Stockpiles established on sloping sites must be designed to provide temporary stormwater containment equivalent to a 300 mm minimum height bund on a flat site.
- Tannin impacted water should be pumped out of bunded stockpiles within 5 days of the end of a rainfall event to maintain the storage capacity. This water should be used for on site purposes including dust suppression and landscape watering. These activities must be managed to prevent any pooling or runoff of tannin impacted water.
- Bunded stockpiles must be inspected within 24 hours of cessation of any rainfall event greater than 10mm to ensure tannin impacted water does not overflow.

2.3. Site management procedures

Site management procedures must be prepared for all sites where tannins are identified as a potential issue. Site management procedures should be based on the management measures provided in this environmental procedure.

3. Background

3.1. Tannin generation from vegetation mulch

See Plates 1 – 3 in Attachment 1.

Tannins are naturally occurring plant compounds. Tannin generation from vegetation mulch is likely to be highest from low-lying coastal floodplain areas. The species of vegetation (eg *Melaleuca*) will have a major impact on the likelihood of tannin generation.

Tannin generation is generally highest from mulched vegetation that is stockpiled in areas that are subject to inundation. Placement in wet areas will result in accelerated leaching of tannins into water, concentration of tannins in pooled water, and greater impacts on water quality.

3.2. Tannin impacts on water quality

See Plates 4 – 5 in Attachment 1.

The main concern with the discharge of water that is high in tannins is that it may increase the biological oxygen demand (BOD) of the receiving environment. Increases in BOD may result in a decrease in available dissolved oxygen. A lack of dissolved oxygen is identified as the main cause of about 80 percent of fish kills in NSW rivers and estuaries.

Tannin impacts may result in dark coloured water discharge from construction sites. This impact can be obvious and may raise the concern of the community and other stakeholders including regulatory authorities. Once discharged to the environment, tannins may reduce visibility and light penetration and change the pH of receiving waters. These impacts may affect aquatic ecosystems in receiving environments.

Tannins cannot be readily treated with standard construction site water quality controls. Once water on site is impacted with tannins it is not possible to treat effectively with currently approved flocculants. Minimisation of tannin generation in the first place is the management strategy that must be applied.

3.3. Use of mulch on construction sites

See Plates 10 – 16 in Attachment 2.

There are a number of environmental benefits of reusing various sizes of vegetation for different purposes. Mulch is a readily available and cheap source of material for temporary site stabilisation and sedimentation control. The re-use of mulch reduces the need to transport this material off-site and reduces handling and disposal costs for construction contracts.

Unprotected mulch sedimentation controls should not be placed in concentrated flow lines where mulch may be washed away. Mulch may be protected by wrapping it with geofabric or other materials to provide a stable control. All temporary catch dams constructed from mulch must have a stable outlet to minimise the washing away of mulch in high rainfall events, and the possible failure of the control.

Attachments

Attachment 1: Plates showing tannin generation & water quality impacts

Plate 1: Melaleuca vegetation community – mulch from this vegetation type will generally produce high amounts of tannins.

Plate 2: Vegetation mulching activity – mulch should be progressively moved into prepared stockpile areas.

Plate 3: Tannin generation from recently felled and partially mulched vegetation in an area subject to localised inundation. Mulched vegetation should be progressively moved to prepared stockpiles to manage tannin impacted water.

Plate 4: Tannin impact in stormwater at the discharge point from a road construction site. The discharge of impacted water may be obvious to community and other stakeholders.

Plate 5: Tannins in a drainage line generated from very thickly applied mulch on the batter above. Note that the sedimentation fence is not effective in treating the tannins.

Attachment 2: Plates showing the use of mulch for erosion & sedimentation controls

Plate 6: Mulched vegetation stockpiled in a low-lying area subject to inundation. This is not an appropriate stockpile location and may increase the generation of tannins from stockpiled mulch.

Plate 7: Mulch being placed as batter erosion control. Mulch should not be applied in layers more than 100 mm thick for surface stabilisation.

Plate 8: Site showing recent application of a mulch/topsoil mix on batters (40% mulch to 60% topsoil). Mulch mixes are used to provide temporary stabilisation to prevent the loss of topsoil from batters in heavy rainfall events. Mulch use is also shown as a mounded sedimentation control to prevent sediment entering the median drain.

Plate 9: A mulch/topsoil mix used to provide temporary batter stabilisation and to assist cover crop establishment.

Plate 10: Successful establishment of cover crops on batters where mulch has been used with topsoil to assist temporary stabilisation.

Plate 11: Geofabric wrapped mulch bunds used for sedimentation control

Plate 12: Mulch used as a bund for a temporary sedimentation catch dam. Mulch is effective as it can provide both containment and filtering of site water. Mulch should not be used as a control in areas of concentrated flow where it may be washed away. Any mulch containment control should have a defined and lined outlet that allows discharge from the control without washing mulch away. Note that this control does not have a defined discharge outlet which should be installed to prevent failure of the control in heavy rainfall events.

Attachment 3: Minimum requirements for community mulch giveaways

The purpose of community mulch giveaways is to provide mulch for residential landscaping purposes.

The activities of a community mulch giveaway are permissible under the *Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A* (the Raw Mulch Exemption 2008). However, the activities remain subject to other relevant environmental regulations within the Act and Regulations. The Raw Mulch Exemption 2008 is subject to the following conditions:

- The raw mulch can only be applied to land for the purposes of filtration or as a soil amendment material or used either singularly or in any combination as input material(s) to a composting process.
- The consumer must land apply the raw mulch within a reasonable period of time.

It is the mulch generators responsibility to ensure that the mulch is reused in an environmentally responsible manner.

A safe work method statement (SWMS) must be prepared that identifies potential OHS risks and all prevention and mitigation measures. The SWMS must apply to both the community and site workers involved in the mulch giveaway.

Each member of the community who participates in the mulch giveaway must read and understand a site specific information sheet. A template information sheet is attached as Appendix 4.

The site occupier must maintain written records for each load of mulch that is taken away and to ensure that each community participant understands the conditions of the community mulch giveaway information sheet. A suggested template to record this information is attached as Attachment 5.

Attachment 4: Community mulch giveaway information sheet

The following community mulch giveaway information sheet must be populated with site specific information.

Community Mulch Giveaway

Information Sheet

Details of Mulch Supply	
Site Occupier	<insert name of contractor / alliance etc>
Project Name	<insert project name>
Location	<insert location of mulch stockpile>
Mulch stockpile access directions	<insert adequate directions for community members to find the stockpile location>

Background

- This information sheet supports the non-commercial giveaway of mulch for local residents.
- The product is raw vegetation mulch from <insert project location / name>.

Conditions

- Any one individual may only take a maximum of 5 trailer loads from this project.
- The mulch may only be used for residential landscaping purposes.
- Mulch must not be placed in or immediately adjacent to waterways.
- The raw mulch can only be applied to land for the purposes of filtration or as a soil amendment material or used either singularly or in any combination as input material(s) to a composting process.
- The consumer must apply the raw mulch to land within a reasonable period of time.

Community Safety Requirements

- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>
- <add in any safety requirements or mitigation measures from the SWMS that apply to the community>

Attachment 5: Records template for community mulch giveaway

The records in the following suggested template must be kept as a minimum.

Community Mulch Giveaway Record Sheet				
Date	Car Registration	I have read and understand the 'Community Mulch Giveaway Information Sheet'	Name	Signature
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		
		☐ Yes		